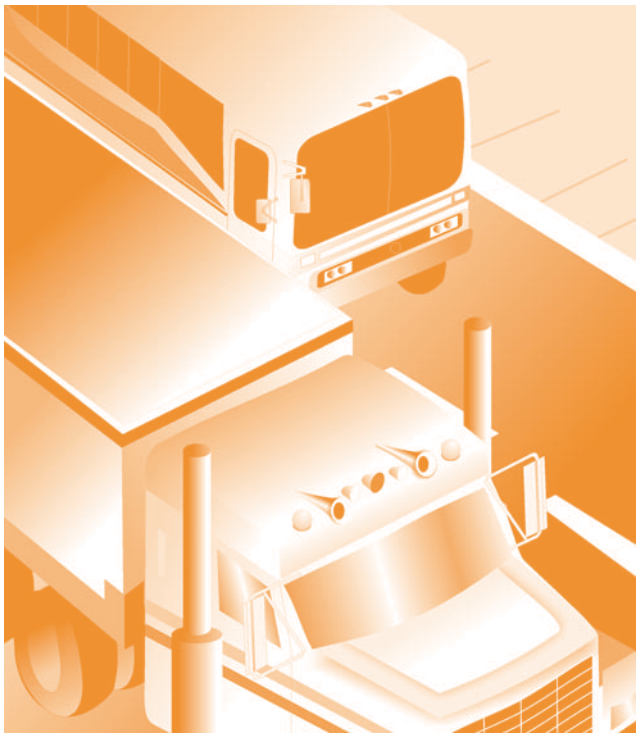
Motorcoach Run-off-the-Road and Rollover off Interstate 90 Victor, New York June 23, 2002



Highway Accident Report

NTSB/HAR-04/03

PB2004-916203
Notation 7643

National Transportation Safety Board
Washington, D.C.

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Adopted June 22, 2004

National Transportation Safety Board
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594

National Transportation Safety Board. 2004. *Motorcoach Run-off-the-Road and Rollover off Interstate 90, Victor, New York, on June 23, 2002.* Highway Accident Report NTSB/HAR-04/03. Washington, DC.

Abstract: On June 23, 2002, a 55-passenger Motor Coach Industries, Inc., motorcoach was traveling eastbound on Interstate 90 near Victor, New York. As it approached the Victor Exit 45 ramp, the bus departed the road; struck a W-beam guardrail, dragging about 700 feet of it across the eastbound entrance ramp; vaulted over the entrance ramp, landing on the ramp's south side shoulder; and rolled 90 degrees onto its right side, sliding to rest. The guardrail dragged by the bus during the accident sequence struck three eastbound vehicles on the entrance ramp. Three occupants of these vehicles were uninjured, and six received minor injuries. Of the 48 people on the motorcoach, 5 passengers were killed; the driver and 41 passengers sustained injuries; and 1 passenger was uninjured.

The safety issues discussed in this report are operator fatigue, motorcoach crashworthiness, and the adequacy of the Federal Motor Carrier Safety Administration's oversight of and rating system for motorcoach operations.

As a result its investigation, the Safety Board makes new recommendations to the Federal Motor Carrier Safety Administration, the U.S. Department of Defense Surface Deployment and Distribution Command, and Coach USA. Also, the Board reiterates Safety Recommendations H-99-47 and -48 to the National Highway Traffic Safety Administration.

Contents

Acronyms and Abbreviations

Arrow	Arrow Line, Inc.
CDL	commercial driver's license
CFR	*Code of Federal Regulations*
DoD	U.S. Department of Defense
DOT	U.S. Department of Transportation
ECM	electronic control module
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FMCSRs	*Federal Motor Carrier Safety Regulations*
Greyhound	Greyhound Lines, Inc.
IG	Office of the Inspector General
ISS-2	Inspection Selection System
I-90	Interstate 90
MCMIS	Motor Carrier Management Information System
MCSIA	Motor Carrier Safety Improvement Act
motorcoach 2	second chartered bus
MTMC	Military Traffic Management Command
NHTSA	National Highway Traffic Safety Administration
NYSP	New York State Police
Peter Pan	Peter Pan Bus Lines, Inc.
SafeStat	Safety Status Measurement System
SDDC	Surface Deployment and Distribution Command
SEA	Safety Evaluation Area

Executive Summary

At 2:56 p.m. on June 23, 2002, a 1998 Motor Coach Industries, 55-passenger motorcoach, operated by Arrow Line, Inc., a Coach USA subsidiary, was traveling eastbound between 60 and 63 mph on Interstate 90 near Victor, New York. The motorcoach, carrying 47 passengers, was en route from Niagara Falls, Ontario, Canada, to Waterbury, Connecticut. As the bus approached the Victor Exit 45 ramp, the vehicle departed the roadway and proceeded into the depressed grassy area between the eastbound exit and entrance ramps. The motorcoach then struck a W-beam guardrail, dragged approximately 700 feet of the guardrail across the eastbound entrance ramp, vaulted over the entrance ramp roadway, landed on the south side shoulder of the entrance ramp, rolled 90 degrees onto its right side, and slid to rest. The guardrail dragged by the motorcoach then struck three eastbound vehicles on the entrance ramp. Three occupants of these vehicles were uninjured, and six received minor injuries. Of the 48 people on the motorcoach, 5 passengers were killed; the driver and 41 passengers sustained injuries; and 1 passenger was uninjured.

The National Transportation Safety Board determines that the probable cause of the accident was that the bus driver fell asleep while operating the motorcoach due to his deliberate failure to obtain adequate rest during his off-duty hours. Contributing to the cause of the accident was the second Arrow Line, Inc., motorcoach driver, who did nothing to prevent the severely fatigued driver from operating the accident motorcoach, and the failure of Arrow Line, Inc., and its holding company, Coach USA, to provide adequate oversight of their drivers. Contributing to the severity of the accident was the lack of occupant restraints for the motorcoach passengers.

The safety issues identified in this accident are operator fatigue, motorcoach crashworthiness, and the adequacy of the Federal Motor Carrier Safety Administration’s oversight of and rating system for motorcoach operations.

As a result of this accident investigation, the Safety Board makes recommendations to the Federal Motor Carrier Safety Administration, the U.S. Department of Defense Surface Deployment and Distribution Command, and Coach USA and its subsidiaries. Also, the Safety Board reiterates Safety Recommendations H-99-47 and -48 to the National Highway Traffic Safety Administration.

Factual

Accident Narrative

Introduction

At 2:56 p.m. on June 23, 2002, a 1998 Motor Coach Industries, 55-passenger motorcoach, operated by Arrow Line, Inc. (Arrow), a Coach USA subsidiary, was traveling eastbound on Interstate 90 (I-90) near Victor, New York. (See figures 1 and 2.) The motorcoach, carrying 47 passengers, was en route from Niagara Falls, Ontario, Canada, to Waterbury, Connecticut.

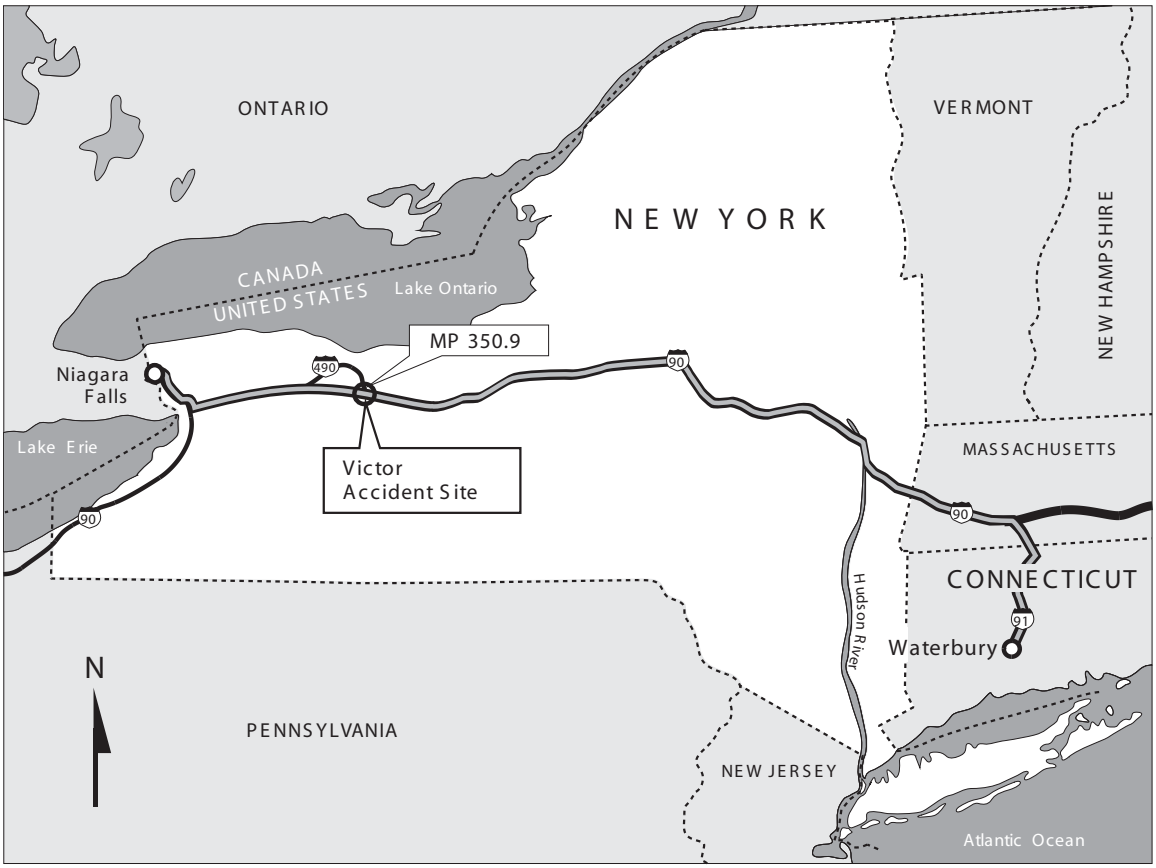

Figure 1. Regional view of accident site.

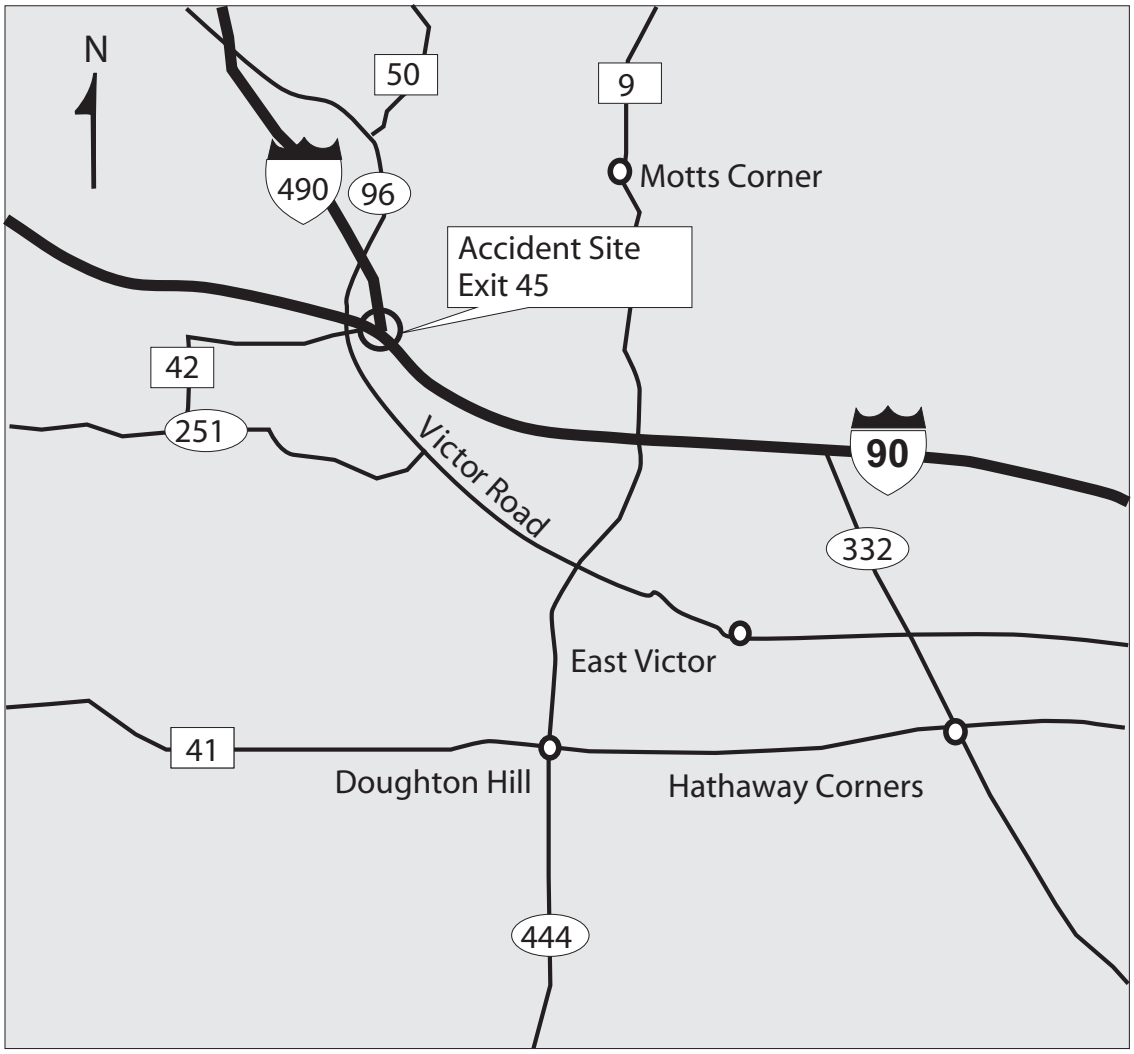

Figure 2. Local view of accident site.

As the motorcoach approached the Victor Exit 45 ramp (milepost 350.9), the vehicle left the roadway and drove across the paved gore[1] area into the depressed grassy gore area between the eastbound exit and entrance ramps. The motorcoach proceeded across the grassy gore area, struck a W-beam guardrail, and dragged about 700 feet of the guardrail across the entrance ramp. The motorcoach then vaulted over the ramp. The guardrail struck a 2003 Pontiac Vibe, a 1997 Ford Expedition, and a 1998 Buick LeSabre. After the motorcoach landed on the descending shoulder of the south side of the entrance ramp, it rolled 90 degrees onto its right side and came to rest at the bottom of the embankment near the guardrail for Willowbrook Road. (See figures 3 and 4.) Five bus passengers were killed, 7 passengers sustained serious injuries, the bus driver and 34 passengers had minor injuries, and 1 passenger was not injured. In the three passenger vehicles, six occupants sustained minor injuries, and three occupants were uninjured.

[1] The term "gore" refers to the area between a through roadway and an exit ramp or the area between a through roadway and a converging entrance ramp.

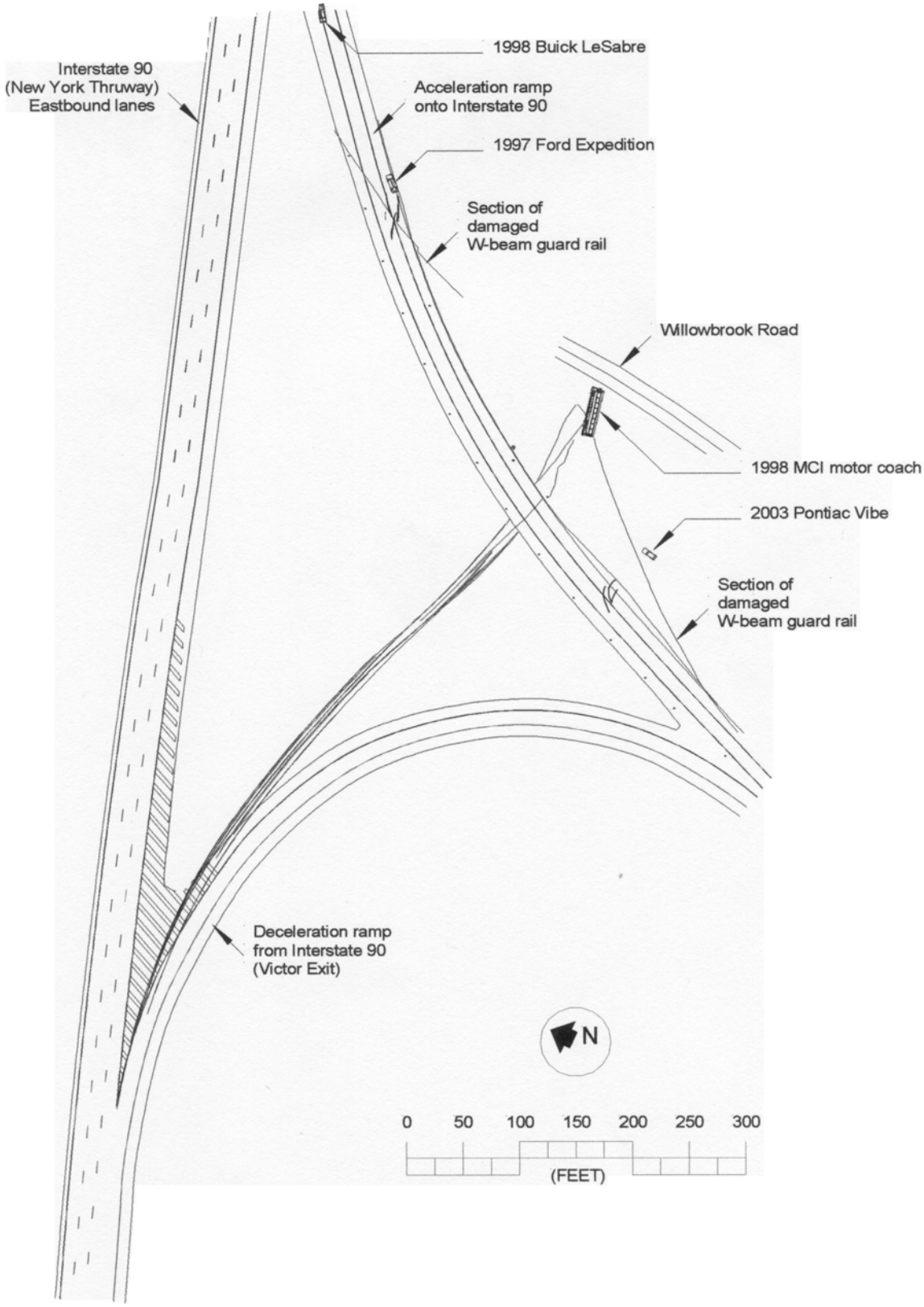

Figure 3. Schematic of accident site. (Source: New York State Police)

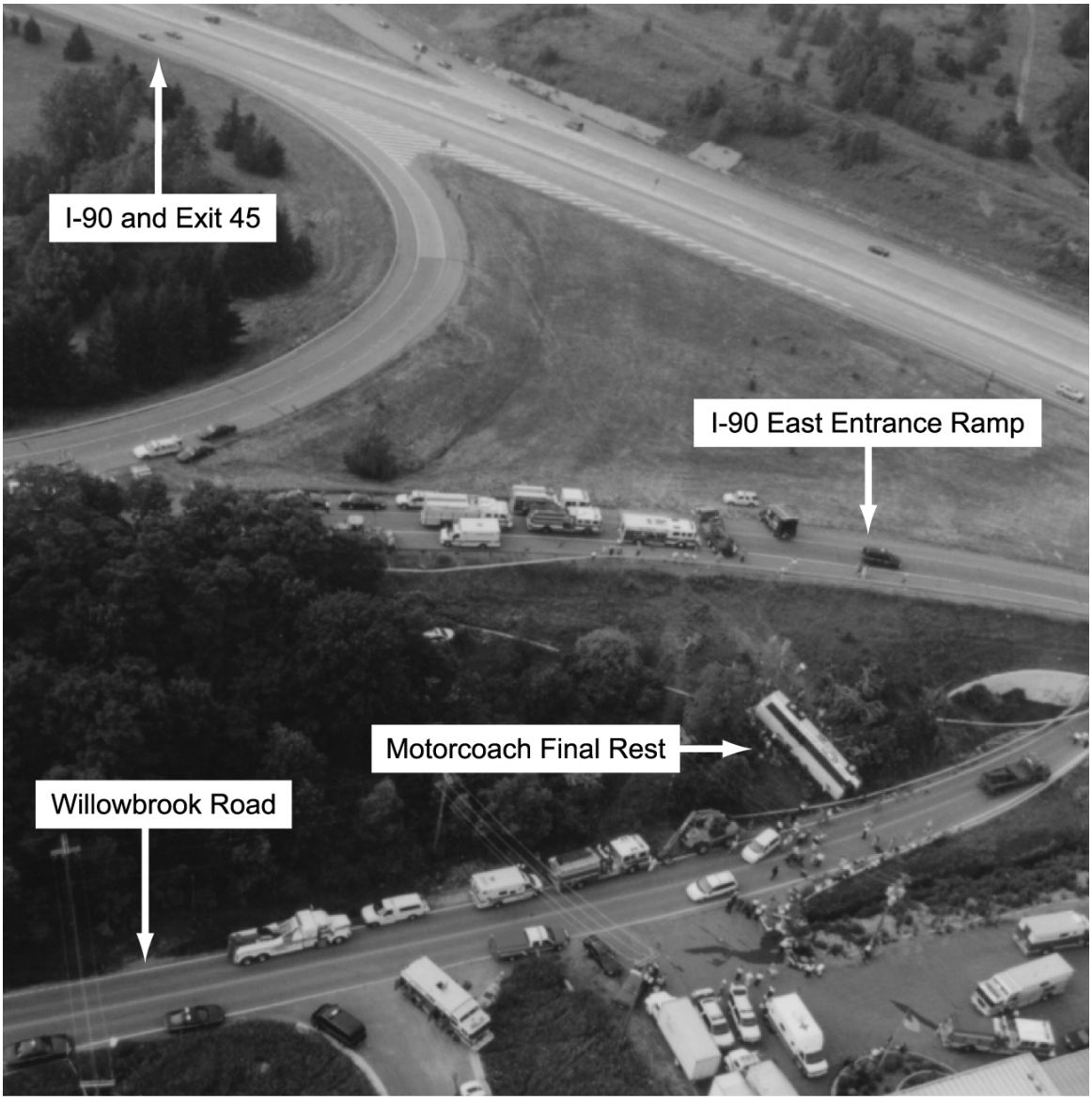

Figure 4. View of accident motorcoach at rest. (Source: New York State Police)

Witness Information. The driver of a vehicle that had passed the motorcoach moments before the accident told the New York State Police (NYSP) that when she was traveling behind the motorcoach, she observed the bus being driven erratically. She said that the motorcoach generally stayed within its lane, but alternately went slow and fast and at times swerved and drifted. She attempted twice to pass the motorcoach on its left. In both instances, the motorcoach swerved to the left in its lane, nearly striking her vehicle. She sounded her horn and dropped back behind the motorcoach. As both vehicles

approached Victor Exit 45, she again tried to pass the motorcoach and stated that when she did so, the motorcoach drove into the middle lane, forcing her into the far left lane to avoid a collision. After passing the motorcoach, she did not see it again.

Passenger Statements. Passengers reported to Safety Board investigators[2] that throughout the trip preceding the accident, the bus driver appeared sleepy and was seen rubbing his eyes, wiping his face, and resting his chin in his hands as he held the steering wheel with his elbows. In his statements to the NYSP, the accident driver denied falling asleep at the wheel and reported having a habit of stretching, rubbing his face and neck, and squirming in his seat while driving.

One passenger said that he used the intercom speaker to tell the other passengers in Spanish that the bus driver was sleepy and explained that they needed to help keep the driver awake. This passenger reported that the bus driver had driven over the right shoulder rumble strips[3] and back into the lane about six times. Another passenger and his wife reported they noticed the driver repeatedly touching his arms and face while driving. A passenger seated in the right-side first row aisle position stated that she observed the bus driver driving down the middle of the interstate between the two lanes and that another time the motorcoach almost sideswiped a parked truck on the roadside. Another passenger stated that just before the accident, the speedometer read between 75 and 80 mph,[4] and the driver was steering with his elbow while smoking a cigarette.

Passengers reported that one passenger, who was seated in the rear of the motorcoach, was concerned about the driver's aggressive lane changes and drifting within the lane. She went to the front of the bus and asked the driver to pull over but the driver rebuffed her request. (Passengers described the driver's manner as impatient and irritable.) Moments later, as the passenger returned to her seat, the motorcoach began to drift onto the right shoulder as it approached Victor Exit 45 and proceeded over the gore strip's raised thermoplastic lines, which resulted in an auditory and vibratory warning. According to passenger statements, a frightened passenger cried out, possibly startling the driver; one passenger thought that the driver might have interpreted the cry as a signal to take the exit that they were about to pass. A passenger seated in the right front seat said that as the motorcoach passed the exit ramp, the driver, who was driving with his elbows on the steering wheel, "shook his head and grabbed the steering wheel with both hands." Many passengers stated that just before the accident, they felt the motorcoach swerve to the right and attempted to grab onto the seat in front of them to keep from sliding out of their seats. Some passengers carried cellular telephones but did not use the telephones before the accident to report the driver's behavior. When asked what they believed would have helped to prevent the accident, several passengers answered that having a telephone on board the motorcoach with a direct line to call either 9-1-1 or an 800 number to the bus driver's employer may have helped.

[2] The Safety Board interviewed 15 of the accident bus passengers; this section summarizes their statements.

[3] Rumble strips or "audible roadway delineators" are raised or grooved patterns on roadway shoulders that provide both an audible warning and physical vibration that alerts drivers when they leave the roadway.

[4] The motorcoach had an engine governor, limiting the maximum engine speed to 70 mph.

Events Preceding the Accident

About 11:00 p.m. on Thursday, June 20, 2002, the accident bus departed Waterbury and a second chartered bus (motorcoach 2) departed Manhattan for a trip to Niagara Falls sponsored by a Waterbury church. The accident motorcoach met motorcoach 2 at the Canadian border, and both proceeded to a Niagara Falls hotel. The accident bus driver told the NYSP that he arrived at the hotel about 7:30 a.m. on Friday, June 21, 2002. The group organizers scheduled both motorcoaches to visit Marineland on Saturday, June 22, 2002. The motorcoach operators had no other scheduled driving duties until the return trip on Sunday, June 23, 2002.

The motorcoach 2 driver told the NYSP that he spoke with the accident bus driver on Saturday morning, when the accident driver stopped by his hotel room and said that he had won $4,000 at the casinos. According to the motorcoach 2 driver's statements, he knew that the accident driver slept for about 3 hours in the bus while the tour group was at Marineland, and he observed the accident driver getting into a cab to go to the casino around 5:00 p.m. on Saturday.

The accident driver informed the NYSP that he had been at the casino from noon on Friday until about 10:00 a.m. on Saturday, when he went back to his hotel room but did not sleep. Both motorcoaches departed the hotel around noon on Saturday and transported passengers to Marineland. The accident bus driver said that he remained with his motorcoach, napped about 3 hours, and left for the hotel with his passengers about 4:00 p.m. According to the accident bus driver, he showered at the hotel and then left for the casinos, where he remained until approximately 9:00 a.m. on Sunday morning.

About 8:30 a.m. on Sunday, June 23, the motorcoach 2 driver prepared his vehicle for the return trip boarding. According to the group organizers, when, at their request, hotel staff attempted to summon the accident bus driver from his room around 9:30 a.m., the accident bus driver did not answer. The motorcoach 2 driver told the NYSP that he saw the accident bus driver arrive at the hotel about 9:30 a.m., and the accident bus driver said that he had lost the money overnight that he had won the previous evening. The accident bus driver showed up at his motorcoach shortly before 11:00 a.m. (the scheduled departure time), opened the luggage compartment, took his seat behind the wheel, and slept while passengers loaded their luggage onto the motorcoach. Because one group organizer expressed her concern to the motorcoach 2 driver that the accident bus driver did not appear fit to drive, he roused the accident bus driver and asked whether he was all right to drive. The accident bus driver replied, "Yes, I'm fine." The motorcoach 2 driver planned to return directly to Manhattan; the accident bus driver planned to stop at two or three attractions before returning to Waterbury. The two motorcoaches departed about 12:30 p.m.

Injuries

Table 1. Injuries.

Injury	Bus driver	Bus passengers	Others	Total
Fatal	0	5	0	5
Serious	0	7	0	7
Minor	1	34	6	41
None	0	1	3	4
Total	1	47	9	57

Title 49 *Code of Federal Regulations* 830.2 defines fatal injury as "any injury which results in death within 30 days of the accident" and serious injury as "an injury which: (1) requires hospitalization for more than 48 hours, commencing within 7 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."

The five passengers who sustained fatal injuries were ejected and received severe injuries to the head, upper torso, internal organs, and extremities. These passengers were seated in rows 9, 10, 12, 13, and 14. Figure 5 shows the passengers' seating positions on the accident bus. The seven seriously injured passengers sustained blunt trauma to the head, upper torso, and extremities; one was reportedly ejected through the front windshield. The minor injuries consisted of abrasions, contusions, lacerations, and cervical strain.

Emergency Response

At 2:56 p.m., the Monroe (New York) and Ontario (New York) County dispatchers were notified of the accident through 9-1-1 and initiated the emergency response at 2:57 p.m. Emergency medical personnel and firefighters were on scene by 3:03 p.m. A NYSP trooper heard the emergency dispatch on his radio and arrived via the eastbound entrance ramp. Initial calls indicated the accident was at I-90 on the Victor Exit 45 ramp. Within minutes, the Incident Commander notified the dispatcher of the correct accident location and access information.

The first medical flight helicopter was dispatched at 3:03 p.m., and the last patient was transported from the scene at 4:00 p.m. A school bus transported patients with minor injuries to another triage center or to local hospitals for treatment.

Approximately 45 NYSP troopers and investigators, including Ontario County Sheriff's resources, were dispatched to the scene. About 75 volunteer firefighters and emergency medical technicians responded from 12 local fire departments and emergency medical service agencies. The rescue equipment included 17 ambulances, 11 fire vehicles, and 4 medical response helicopters.

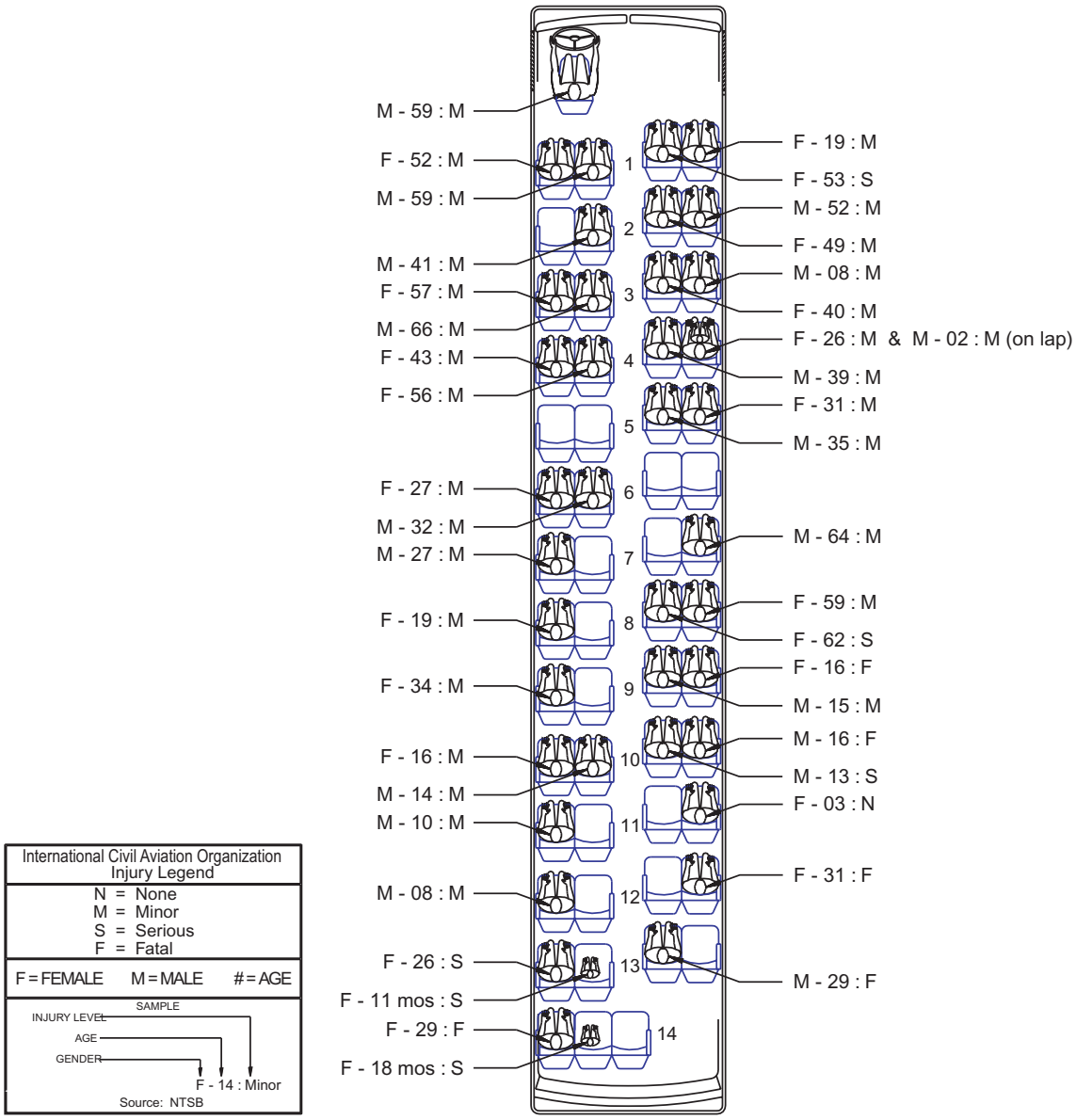

Figure 5. Accident bus passenger seating chart. (Seat locations could not be determined for six passengers.)

Meteorological Information

The National Oceanic and Atmospheric Administration station in Rochester, New York, about 10 miles west of the accident site, reported clear conditions, a temperature of 87.8º Fahrenheit, and a southerly wind speed of 7 knots at the time of the accident.

Bus Driver Information

The 59-year-old bus driver held a Connecticut class B commercial driver's license (CDL) valid through October 26, 2002. The CDL had a "P" endorsement for passenger transportation and a "T" restriction for taxicab, service bus, motor vehicle in livery service, coach, and motorcoach operation. This "T" restriction indicated that as an endorsed passenger driver, the bus driver had completed a fingerprint and background check and could transport passengers. The bus driver's current medical examiner's certificate (equivalent of a physical examination card) was issued on September 18, 2001, and noted that the driver had diabetes and peripheral vascular disease.[5]

Within 3.5 hours of the accident, a blood specimen was drawn from the bus driver at the emergency room where he was treated. The laboratory results indicated a blood glucose level of 141 (normal range: 80-120 mg/dL, levels up to 155 mg/dL are generally considered "under control" for diabetics). The driver told the NYSP that each morning, as usual, he took his medications: 30 mg Indur, 500 mg Glucophage, unspecified doses of Lipitor,[6] and another medication for controlling protein in the urine. He also advised the NYSP that he consumed one mixed drink at a casino on Friday night, June 21, 2002; no other information was available regarding his diet. The NYSP had the blood samples drawn by hospital personnel analyzed at the NYSP Western Regional Crime Laboratory in Olean, New York. Postaccident testing for the presence of 21 drugs, including both illicit and common licit drugs with known performance-impairing effects, yielded negative results. The alcohol test results were also negative.

According to the motorcoach driver's log entries (see table 2), the driver was off duty for 16.5 consecutive hours before starting the accident day return trip from Niagara Falls to Waterbury.[7] The motorcoach driver told the NYSP that he obtained no nighttime sleep on the 2 days preceding the accident; he said he had three naps totaling about 4 hours during the 51-hour period preceding the accident. The hotel's chambermaid informed the NYSP that it did not appear that the bus driver's bed had been slept in. Security videotapes from the casino showed the driver entering and leaving the casino and gambling in the interim. In addition, the cab driver who had picked up the bus driver from his hotel around 5:30 p.m. on Saturday and driven him to the casino verified the bus driver's statement about going to the casino. Safety Board investigators were unable to obtain additional information from the bus driver after his initial statements.

[5] Peripheral vascular disease causes narrowed or blocked blood vessels in the legs, abdomen, pelvis, arms, or neck.

[6] Indur, or propanolol, is a prescription blood pressure medication; Glucophage, or metformin, is a prescription diabetes medication; and Lipitor, or atorvastatin, is a prescription cholesterol-lowering medication.

[7] Title 49 *Code of Federal Regulations* (CFR) Part 395.5: The passenger-carrying driver may drive no more than 10 hours after 8 consecutive hours off-duty. Can no longer drive after being on-duty for 15 hours after 8 consecutive hours off-duty. Cannot drive after being on-duty 60 hours in 7 consecutive days or 70 hours in 8 consecutive days.

Table 2. Summary of bus driver logbook entries.

Date	Time	Logbook entry	Hours
June 20, 2002	0000-0015	Off duty	0.25
	0015-0030	On duty, not driving	0.25
	0030-0130	Driving	1.00
	0130-0145	On duty, not driving	0.25
	0145-0200	Driving	0.25
	0200-0215	On duty, not driving	0.25
	0215-2130	Off duty	19.25
	2130-2145	On duty, not driving	0.25
	2145-2230	Driving	0.75
	2230-2300	Off duty	0.50
	2300-2400	Driving	1.00
June 21, 2002	0000-0200	Driving	2.00
	0200-0215	On duty, not driving	0.25
	0215-0530	Driving	3.25
	0530-0545	On duty, not driving	0.25
	0545-0700	Driving	1.25
	0700-0715	On duty, not driving	0.25
	0715-0845	Off duty	1.50
	0845-0900	On duty, not driving	0.25
	0900-0915	Driving	0.25
	0915-0930	On duty, not driving	0.25
	0930-2400	Off duty	14.50
June 22, 2002	0000-1115	Off duty	11.25
	1115-1215	On duty, not driving	1.00
	1215-1245	Driving	0.50
	1245-1700	On duty, not driving (reportedly napped for about 3 hours)	4.25
	1700-1715	Driving	0.25
	1715-1730	On duty, not driving	0.25
	1730-2400	Off duty	6.50
June 23, 2002	0000-1100	Off duty	11.0
	1100-1230	On duty, not driving (reportedly napped for 45 minutes)	1.50
	1230-1330	On duty, driving short distance, and on duty, not driving, at two locations (reportedly napped for 30 minutes)	1.00
	1330-1500	Driving to time of accident	1.50

Motorcoach Information

The 1998 55-passenger Motor Coach Industries model 102DL3 motorcoach had an overall length of 45.5 feet and unladed weight of 35,000 pounds. It was equipped with a Detroit Diesel Corporation Series 60, 6-cylinder, 4-cycle diesel engine, which had a Detroit Diesel Electronic Controls III electronic control module (ECM),[8] which limited the engine speed to 70 mph. The motorcoach also had an Allison Transmission model B500 electronically controlled transmission without a retarder. After the accident, Safety Board investigators, the NYSP, and a Motor Coach Industries representative reviewed ECM data that indicated the motorcoach had been driven 231,649.5 miles.[9]

The coach was equipped with an airbrake system that provided braking to all three axles and a Bendix Commercial Vehicle Systems DD3 emergency park braking system that operated on the drive axle. All three axles were equipped with standard S-cam drum brakes with automatic slack adjusters. During the vehicle examination, push-rod stroke measurements were taken at all six wheel positions. The left rear drive axle brake exceeded the maximum allowable stroke by 1/8th inch.[10] The brake shoe thickness for all brakes was measured and found to be within the Federal guidelines.[11]

The motorcoach was equipped with a TRW automotive power steering system, and the "steerable" third (tag) axle was permanently placed in the locked position (tires straight ahead), disabling the steering feature of that axle. The steering wheel rotated freely and smoothly, and the steering linkage was intact and tight. All six of the motorcoach tires were Goodyear size 315/80R22.5 tires with "highway type" tread. None of the tires was flat, and each had normal or near-normal air pressure. The second outer right tire had an 8-inch cut due to the accident, and the third left and right tires had irregular wear on the outside edges. The motorcoach sustained damage to the left front wheel well; abrasive markings were consistent with tire contact during the accident event.

Wreckage Information

After departing the roadway, the motorcoach struck the W-beam barrier across the entire width of the front bumper, resulting in approximately 6 inches of crush damage rearward. The motorcoach's ground impact, as it landed, was primarily to its right front corner and resulted in the front bumper being torn off and the windshield being broken out. After hitting the ground, the motorcoach rolled onto its right side and slid to its final rest position on the grassy embankment.

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[8] The ECM's primary function was to control fuel flow to the engine; the ECM did not contain active data pages of speed, rpm, and braking.

[9] The Detroit Diesel Electronic Controls III recorded 95,561 miles less than the odometer; most likely, the Detroit Diesel Electronic Controls III mileage parameter was reset sometime during the life of the coach.

[10] Because only one of six brakes was out of adjustment, the vehicle would not be placed out of service under Federal regulations.

[11] Title 49 CFR 396.7(a), Appendix G (1)(a)(6).

As a result of the rollover, the right side of the motorcoach sustained moderate exterior damage along the right side roof rail. The maximum crush to the right side was approximately 5 inches along the roofline at the middle of the occupant compartment. Six of the eight right side emergency exit windows had missing or shattered glazing;[12] the left side windows were intact. The rollover and subsequent contact from passengers caused damage to the interior overhead light console and the luggage rack. The passenger compartment space was not compromised. Only the bus driver's seat was equipped with a three-point restraint; the passenger seats had no restraints. Several seatbacks were deflected forward due to passenger contact during the accident.

Highway Information

Highway Design

The accident occurred on eastbound I-90 at milepost 350.9, Victor Exit 45, in Ontario County. I-90 is classified as an urban principal arterial and in the vicinity of the accident site, was a divided, two-way, six-lane, paved concrete, limited-access highway. The roadway's inside and outside shoulders had 16-inch long, 7-inch wide, and 0.5-inch deep rumble strips spaced 5 inches apart in both traffic directions. The posted speed limit was 65 mph with an advisory speed of 30 mph on the Victor Exit 45 ramp.

Just before the eastbound Victor Exit 45 ramp, the two eastbound lanes expanded to the north (left) by one travel lane and to the south (right) by one exit lane, resulting in three travel lanes and one auxiliary deceleration lane in the eastbound direction. The added left through travel lane continued in the eastbound direction past Victor Exit 45. The far right lane was the deceleration lane for eastbound traffic; it curved off the highway's south side and looped around for highway exiting traffic.

About 1,500 feet east of the Victor Exit 45 ramp was the entrance ramp from I-490, which became an acceleration lane in the eastbound direction for approximately 460 feet and then merged into the outside eastbound lane of travel on I-90. The Interchange 45 eastbound exit and entrance ramps and the I-90 eastbound through lanes set the triangular border for the depressed grassy gore area. A W-beam guardrail system, consisting of 3-inch-long by 2-inch-wide by 28-inch-high metal posts, lined both sides of the entrance ramp and the west side of the exit ramp.[13]

Six-inch-wide and 10-foot-long retroreflectorized broken white lines, spaced 30 feet apart, separated the three eastbound traffic lanes. A 6-inch-wide retroreflectorized solid white edgeline separated the outside shoulder from the eastbound traffic lanes. All

[12] Glazing describes glass or other transparent materials used for windows.

[13] The barriers met Federal guidelines, as specified in the National Cooperative Highway Research Program 350 and the American Association of State Highway and Transportation Officials (AASHTO), *Roadside Design Guide*, fourth edition.

through lane pavement markings met the lane width requirements specified in the *Manual on Uniform Traffic Control Devices*.[14]

Victor Exit 45

The Victor Exit 45 deceleration lane's taper[15] began approximately 982 feet before the theoretical gore point,[16] and the deceleration lane reached full width approximately 680 feet from the gore divergence.[17] The exit had a paved area between the eastbound travel lanes and the exit ramp, which was painted with wide white diagonal "crossed-hatched" raised thermoplastic lines to indicate it was not a travel portion of the highway (see figure 3). The exit ramp had a superelevation[18] of 2.08 percent; the eastbound travel approach was at a 2.2 percent upgrade.

Traffic Information

The New York State Thruway Authority records from 1997 to 2001 indicated that 306 accidents, resulting in 48 injuries and 1 fatality, happened between mileposts 348.5 and 353.5 for both eastbound and westbound traffic lanes (the accident occurred at eastbound milepost 350.9). The traffic crash data do not include exact accident locations. According to the New York State Thruway Authority, the annual average daily traffic count from 1996 through 2001 for both eastbound and westbound traffic lanes between Exits 45 and 46 ranged from 25,219 to 31,870 vehicles (see table 3); trucks accounted for 26.6 percent of the total traffic in 2001.

Table 3. Annual average daily traffic count.

Year	Vehicles per day
1996	25,219
1997	26,040
1998	28,427
1999	29,982
2000	30,788
2001	31,870

Operations Information

Arrow Line, Inc.

According to the Federal Motor Carrier Safety Administration (FMCSA) registration, Arrow (U.S. DOT 94517) was an authorized for-hire passenger motor carrier

[14] Millennium Edition, 2000, as amended, approved by the Federal Highway Administration (FHWA), as the National Standard, in accordance with 23 *United States Code*, Sections 109 (d), 114 (a), 217, 315, 402 (a), 23 CFR 1204.4, and 49 CFR 1.48 (b) (33), and 1.48 (c).

[15] The pavement area where a lane is being added or dropped, which "tapers" from a zero to full width, or vice versa. The Victor Exit 45 lane tapered from zero to full width on the approach to the accident location.

[16] The apex or intersecting point of the channeled gore area between the through traffic lanes and the exit lane.

[17] The point at which the exit lane pavement begins to separate from the through lanes.

[18] The cross slope of a roadway associated with a horizontal curve, that is, the "banking" of a curve.

headquartered in East Hartford, Connecticut; company operations were coordinated at the Waterford, Connecticut, terminal. A third terminal was in Milford, Connecticut. At the time of the accident, Arrow provided charter service and tour service throughout the United States and Canada. Arrow operated line runs[19] and contracted transportation service for corporate and casino employees[20] from its three Connecticut terminals. Arrow managed 20 buses intrastate and 72 buses interstate and employed 206 drivers, including 74 assigned to intrastate and 132 assigned to interstate operations.[21] Arrow's interstate operation was primarily in the northeast portion of the United States. Arrow had operated since 1929, and it became a subsidiary of Coach USA in May 1997. (The Coach USA-Arrow affiliation was noted on motorcoaches, as seen in figure 6.).

Figure 6. Coach USA logo on accident motorcoach.

The Arrow safety director and assistant safety director were responsible for driver recruitment, training, remedial training, and duties not directly related to safety. Arrow did not have a driver-supervised program under which its Safety Department conducted structured operation surveillance or random road operation spot checks. During the Safety Board's investigation following the accident, Arrow indicated that it was developing a remedial driver training program and a driver logbook review program and that it intended to begin a safety meeting program for all drivers. According to Peter Pan Bus Lines, Inc.

[19] A line run is scheduled service with specific pick up and stop locations.

[20] Often referred to as casino runs, which consist of bus service from the casino parking lot to the casino. The service operates 24 hours a day, 7 days a week.

[21] According to the FMCSA's postaccident compliance review of Arrow, "drivers are permitted to bid for charter jobs based on seniority and hour availability at least two weeks prior to the job taking place."

(Peter Pan), the current holding company for Arrow, new drivers are required to train with a coach from 3 to 7 weeks, remedial driver training does occur, and safety personnel have been trained to conduct logbook reviews. (See Peter Pan Bus Lines, Inc., section of this report for more information.)

Coach USA

Coach USA is a holding company[22] for bus companies throughout the United States and is not registered with the FMCSA as a motor carrier. At the time of the accident, the company was part of Stagecoach Group, an international corporation headquartered in Perth, Scotland. As a holding company, Coach USA provided a national network of marketing and advertising, support for safety, and service facilities to maintain policy uniformity throughout its company affiliates. According to the corporate vice president of safety, Coach USA was affiliated with the following company operations: line, taxi, transit, bus service contract, and charter.

According to Coach USA, it did not exercise direct control over the operation of its affiliate companies. At the time of the accident, Arrow had its own company management structure and operated as an independent company from Coach USA. During the Safety Board's on-scene investigation, Coach USA created the position of Arrow general manager, whose duties included direct oversight of the three Connecticut terminal managers; brought in a new vehicle maintenance manager; and acquired computers equipped with an online driver training program.[23]

As part of its companywide oversight program, Coach USA contracted Driver's Alert, a Florida-based company, to operate a complaint and compliment tracking service. According to Coach USA officials, Driver's Alert monitored the Arrow fleet from February 15, 2002, through November 17, 2002. As of November 17, 2002, Driver's Alert received 172 incident reports of driving infractions involving Arrow vehicles; Arrow responded to 1 incident report. The incidents reported pertained to driver actions such as weaving, unsafe lane changes, speeding, tailgating, failures to yield and to stop, and faulty equipment. Of the 172 incident reports, 15 complimentary calls were received.

Each bus exterior in the Coach USA fleet, including the accident bus, was marked with a unit identification number and a toll-free telephone number for motorists to call and comment on a driver's performance.

[22] A holding company is usually a corporation that is created to own stock of other corporations and, thereby, often controls the management and policies of its affiliates.

[23] Coach USA reported in May 2004 that all drivers are now trained in basic recognition of drugs and alcohol and abnormal activity. According to Coach USA, drivers who suspect other drivers of drugs, alcohol, or other abnormal activity are to notify dispatch and a supervisor. Coach USA does not have a policy for disciplining a driver for failure to report.

Driver's Alert operated as follows:

1. When a complaint was received in which the caller was identified and provided call-back information, the Coach USA affiliate was notified and that company's safety director conducted a followup investigation of the incident; the safety director then notified Driver's Alert regarding the complaint. If not notified within 5 days by the affiliate's safety director, Driver's Alert contacted the Coach USA regional director of safety. Driver's Alert also provided monthly summary reports to the notified Coach USA affiliate safety directors.
2. When a complaint was received from a caller, who did not wish to be identified and provide call-back information, the report was not forwarded to the Coach USA affiliate. According to a Driver's Alert representative, experience indicated little value in processing anonymous calls because the complaint calls could not be substantiated or resolved without followup information.

Peter Pan Bus Lines, Inc.

On May 31, 2003, Coach USA sold its Arrow holdings to Peter Pan, headquartered in Springfield, Massachusetts. Peter Pan continued operating Arrow in a manner similar to that employed by Coach USA; Arrow functioned as its own company, using the name Arrow.

Peter Pan did not employ Driver's Alert or any other vendor to provide driver operational oversight. Peter Pan planned to use an in-house program similar to that used for the company previously and, also, a satellite tracking system of its vehicles as an oversight program. Peter Pan had an existing on-board recorder program for drivers, but did not plan to provide its new subsidiaries with that program, since the fleets will use the satellite system. Arrow drivers are now part of the Peter Pan drug and alcohol program, driver files have been reviewed and updated, and Arrow's management and supervisory personnel have been replaced.

According to Peter Pan, company policy is that each driver is responsible for the safe operation of the assigned bus and its passengers. If a driver suspects that another driver is impaired, the former is required to report the possibly impaired driver to a supervisor or dispatch, and the supervisor is to respond after notifying the safety director. A driver can be disciplined, including a suspension, for failing to report a driver who is suspected of impairment. Only a trained supervisor can evaluate a driver for reasonable suspicion of drug or alcohol use.[24] If a driver reports another driver to the company, either before the start of a trip or on the road, he or she may do so in person, by telephone, or anonymously. The informed supervisor is to report to the location of the complaint if it is away from a terminal.

[24] Title 49 CFR Part 382.

FMCSA Compliance Review Program

General. FMCSA standards require a motor carrier to have adequate management controls in place that comply with applicable safety requirements. The FMCSA uses a rating formula to determine a motor carrier's safety fitness. The safety fitness rating methodology begins with an FMCSA-conducted compliance review,[25] applying six factors (see table 4) that rate the carrier's compliance with the *Federal Motor Carrier Safety Regulations* (FMCSRs).

Table 4. Factors for FMCSA safety compliance.

Factors	Applicable FMCSRs and other criteria
1 – General	Parts 387 and 390
2 – Driver	Parts 382, 383, and 391
3 – Operational	Parts 392 and 395
4 – Vehicle	Parts 393 and 396 and out-of-service rate
5 – Hazardous materials	Parts 107, 171, 172, 173, 177, 180, and 397
6 – Accident	Recordable accident rate

Factors 1-General, 2-Driver, 3-Operational, 4-Vehicle, and 5-Hazardous Materials are rated satisfactory, conditional, or unsatisfactory. The ratings are defined below:

- Satisfactory—carrier has not violated any acute regulations or shown a pattern of noncompliance with critical regulations for that factor.
- Conditional—carrier has violated an acute regulation or had a pattern of noncompliance with critical regulations.
- Unsatisfactory—carrier has violated two or more acute regulations or has patterns of noncompliance with two or more critical regulations.

Factor 6-Accident is rated either satisfactory or unsatisfactory; a conditional rating is not given.

Acute[26] violations of the FMCSRs or hazardous materials regulations are those that demand immediate corrective action regardless of the motor carrier's overall safety posture (for example, requiring or permitting the operation of a vehicle declared out of service before repairs are made).[27] Critical[28] violations are regulatory violations that indicate breakdowns in the motor carrier's management controls (for instance, requiring or permitting a driver to drive after having been on duty for 15 hours).[29]

[25] Title 49 CFR Part 385, Appendix A.

[26] Title 49 CFR 385, Appendix B II (b).

[27] Title 49 CFR 396.9 (c) (2).

[28] Title 49 CFR 385, Appendix B II (b).

[29] Title 49 CFR 395.3 (a) (2).

For Factor 4-Vehicle, the carrier's out-of-service rate is determined by the number of vehicles placed out of service in relation to the number of vehicles inspected at a roadside inspection. The number of roadside vehicle inspections is dependent on the number of vehicles in a carrier's fleet.[30] Only the most recent (the past 12 months in chronological order) roadside inspections are applied for the out-of-service calculation. If a carrier's out-of-service rate exceeds 34 percent and the carrier has a pattern of critical or acute violations or both, the rating is unsatisfactory. If the carrier's out-of-service rate exceeds 34 percent but the carrier does not have a pattern of violations, the rating is conditional. If the carrier's out-of-service rate is less than 34 percent but the carrier has a pattern of critical or acute vehicle violations or both, the rating is conditional. Otherwise, the carrier receives a satisfactory rating for an out-of-service rate under 34 percent.

For Factor 6-Accident, the recordable accident rate is calculated by multiplying the number of interstate, reportable accidents for the 12 months before the compliance review by 1 million and dividing that number by the fleet's total interstate miles. If a carrier's accident rate exceeds 1.5 per million miles for a company that operates over a 100-mile radius or 1.7 per million miles for a company that operates in less than a 100-mile radius, an unsatisfactory rating is given. A calculated number under these rates results in the company receiving a satisfactory rating for this factor.

The rating for the first five factors and the accident rate for the 12 months before the compliance review are entered into a rating table, which is used to establish the motor carrier's safety rating (see table 5). Each of the six factors is given equal weight.

Table 5. Motor carrier safety ratings.

Factor rating		Safety rating
Number of unsatisfactory ratings	**Number of conditional ratings**	**Resultant safety rating**
0	2 or less	Satisfactory
0	More than 2	Conditional
1	2 or less	Conditional
1	More than 2	Unsatisfactory
2 or more	0	Unsatisfactory

[30] For example, the minimum number of vehicle inspections needed for a motor carrier with 20 vehicles is five. Based on this example, the five most recent inspections for the past 12 months or since the last compliance review would be used to calculate the carrier's out-of-service rate. These inspections may have been conducted during a roadside inspection or during vehicle inspections conducted at the carrier's terminal.

A carrier may be selected for a compliance review if identified as a high-risk carrier because of (1) a Safety Status Measurement System (SafeStat) score,[31] (2) a complaint against the company, (3) an enforcement followup to ensure that an enforcement action taken was effective, (4) involvement in a fatal accident, or (5) involvement in a major hazardous materials accident.

Arrow. After the accident, the FMCSA conducted a compliance review of Arrow. The company was issued an overall Conditional safety rating because, of the five applicable ratings, only Factor 4-Vehicle was Unsatisfactory. According to the FMCSA, Arrow's "compliance review revealed non-compliance with the *Federal Motor Carrier Safety Regulations* in almost all applicable parts to Arrow Line Inc.'s passenger transportation operation." Many violations were driver- and vehicle-related. (Appendix F provides a table of the Arrow violations.) Arrow received the following ratings:

- Satisfactory for Factor 1-General,
- Satisfactory for Factor 2-Driver Qualification,
- Satisfactory for Factor 3-Operational/Driving,
- Unsatisfactory for Factor 4-Vehicle/Maintenance (40 percent out-of-service rate for its vehicles),
- Not Applicable for Factor 5-Hazardous Materials, and
- Satisfactory for Factor 6-Crash Rate.

On July 24, 1994, Arrow had received a compliance review as a result of being placed on the U.S. Department of Transportation (DOT) Office of Motor Carriers[32] "Top 500 Worst Carriers List."[33] Arrow was given an overall safety rating of Conditional, and the Office of Motor Carriers noted that 25 percent of the checked driver logs were found to be false.[34] As a result of the July 1994 compliance review, Arrow underwent a followup compliance review on November 21, 1994, and received an overall Satisfactory rating; Factor 2-Driver and Factor 4-Vehicle were rated Conditional.[35]

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[31] The Safety Status Measurement System (SafeStat) analysis program utilizes data from Federal and State sources, including roadside inspections, accident data, and enforcement actions for all carriers, to develop a safety fitness assessment of a motor carrier.

[32] This agency was the predecessor to the FMCSA.

[33] This list is no longer compiled because it had been a project under the previous Selective Compliance and Enforcement Selection process used by the Office of Motor Carriers to focus on carriers who had high out-of-service rates based on at least 20 roadside inspections between January and October 1993. When SafeStat was instituted nationally in 1997, it replaced the Compliance and Enforcement process as the FMCSA's primary tool for identifying and prioritizing carriers for compliance reviews.

[34] The July 1994 compliance review revealed evidence of noncompliance in the areas of financial responsibility, driver qualification, driver hours of service, and vehicle out of service. The combination of noncompliance in these critical areas resulted in a conditional safety rating for Arrow.

[35] The November 1994 compliance review revealed noncompliance in the driver qualification and vehicle out-of-service areas and resulted in a Satisfactory safety rating.

The last Office of Motor Carriers inquiry into Arrow's operations prior to the Victor accident was the result of a complaint to the DOT's Office of Congressional Affairs that charged Arrow with violations of the FMCSRs. On October 31, 1995, the DOT responded that it "would closely monitor Arrow Line vehicle and driver safety operations." According to Arrow's operational history, the company was not given any compliance reviews, safety ratings, or enforcement followups from 1995 until this accident. The Office of Motor Carriers did monitor Arrow's performance through roadside inspections.

Other Arrow compliance reviews dating back to 1983 indicated that the Office of Motor Carriers had informed Arrow's management of FMCSR discrepancies and recommended corrections. (See appendix B for Arrow's compliance review dates and safety rating history.) The discrepancies were in Hours of Service, Vehicle Inspection, Accident Report Requirements, and Insurance Regulation Requirements. During each compliance review, the Office of Motor Carriers found that some of the discrepancies were not corrected after the previous compliance review or safety audit.

Roadside Inspection Program. In the FMCSA roadside inspection program, qualified safety inspectors carry out roadside inspections in compliance with the *North American Standard Guidelines*, which were developed by the Commercial Vehicle Safety Alliance and the FMCSA. During roadside inspections,[36] an inspector examines individual commercial motor vehicles and their drivers to determine whether they meet the FMCSRs. Serious violations result in the issuance of driver or vehicle out-of-service orders; out-of-service violations must be corrected before the affected vehicle or driver can return to service.

SafeStat

SafeStat is an automated data analysis program developed by the DOT Volpe National Transportation Systems Center that uses Federal and State information on roadside inspections, accident data, and enforcement actions for motor carriers to identify poor performers. SafeStat is not intended to evaluate every motor carrier in the United States but to identify motor carriers that are high risk so that further inspections or actions or both can be taken. Data are compiled to develop a composite SafeStat score for a motor carrier. If data are insufficient (for instance, fewer than three roadside inspections, fewer than two accidents, or no compliance review), the motor carrier is not scored.[37] SafeStat scores are updated monthly for all interstate carriers and are primarily used by the FMCSA as guides or indicators for deploying compliance review and roadside inspection resources. As of February 20, 2004, over 678,000 recorded motor carriers with census data in SafeStat were actively operating and of those, 30,000 were passenger carriers.

[36] Most State roadside inspections are conducted through the FMCSA-administered grant Motor Carrier Safety Assistance Program.

[37] The SafeStat methodology for developing scores can be found at <www.ai.volpe.dot.gov>.

A Safety Evaluation Area (SEA) value approximates the motor carrier's percentile rank relative to all other carriers with sufficient data to be assessed within the same SEA. The system uses up to 30 months of motor carrier safety and normalizing data to develop measures and indicators in the four SEAs. The higher the SEA value is, the lower the carrier's safety status is. For example, an accident SEA value of 80 for a motor carrier indicates that approximately 80 percent of the carrier population with sufficient data had a better safety performance than that carrier with respect to the accident SEAs. The four SEA values (Accident, Driver, Vehicle, and Safety Management) are then combined to calculate an overall safety status assessment, known as a SafeStat score (see appendix C).

The data used to calculate a SEA value are obtained from compliance reviews, State-reported commercial vehicle crash data, closed enforcement cases, roadside inspections, and motor carrier census data. Using the calculated SafeStat scores,[38] the FMCSA assigns carriers into categories A through H. Carriers in category A have the highest SafeStat scores (between 350 and 550) and thus have the most deficiencies. Category B carriers have a SafeStat score between 225 and 350, and category C carriers have a SafeStat score between 150 and 225. Carriers that are deficient in one SEA area are placed in categories D through G, which are used to prioritize carriers for roadside inspections. Motor carriers placed in category H have no deficiencies in any SEA. The FMCSA advised the Safety Board on May 11, 2004, that:

> [F]rom a compliance review standpoint,[39] the FMCSA makes use of SafeStat scores through the Motor Carrier Safety Improvement Process (MCSIP) that was implemented in October 2003. The MCSIP is a process to improve the safety of SafeStat Category A-C motor carriers through more accurate and timely identification and monitoring. Briefly stated, high-risk carriers (Category A & B) are recommended for an immediate compliance review while moderate risk carriers (Category C) are sent a warning letter and are given up to six months to improve if available resources do not allow for a more immediate compliance review.

When the public accesses the SafeStat database, the following caution is displayed:

> CAUTION: Please verify important data before relying on SafeStat results. Inaccurate or out-of-date normalizing data can result in SafeStat results that do not accurately reflect the motor carrier's safety status.

The FMCSA Web site for the DOT Volpe National Transportation Systems Center advises:

> Most data used by SafeStat are maintained in the Motor Carrier Management Information System [MCMIS], the FMCSA central database of all motor carriers with a U.S. DOT number. While the event data (such as roadside inspection and

[38] The overall SafeStat score equals the sum of 2 times the Accident SEA value, 1.5 times the Driver SEA value, the Vehicle SEA value, and the Safety Management SEA value.

[39] According to the FMCSA, compliance reviews occurring outside the MCSIP are not necessarily based on SafeStat results but are based on focus areas (hazardous materials or passenger carriers) identified in each State's safety plan and congressional mandates, such as public complaints and revisiting Conditional rated carriers.

> Compliance Review results in moving violations and crashes) are updated continuously, some normalizing data (e.g. number of power units) may not be up to date, particularly if the motor carrier has not recently had a Compliance Review or submitted an updated form MCS-150. This is especially true for the power unit information used to calculate the Accident Involvement Measure (AIM) and Accident Safety Evaluation Area (Accident SEA) value. Inaccurate or out-of-date normalizing data in MCMIS can result in SafeStat results that do not accurately reflect the motor carrier's safety status. Prudent users will verify the accuracy of the data prior to use and motor carriers should examine and correct their own data by filing an updated form MCS-150 with FMCSA.

At the time of the accident, Arrow was rated as a category H carrier; sufficient information was available to calculate a SEA value in three categories (Accident, Driver, and Vehicle), which had a score below 75, but not in the Safety Management category, since a recent compliance review had not been conducted. Arrow was not given a SafeStat score because no rated category resulted in a score over 75. FMCSA inspection records from 2001 indicate that, prior to the accident, Arrow was subjected to 312 roadside inspections, resulting in an out-of-service rate of 19.33 percent for vehicles and 0 percent for drivers. The national average for roadside inspections of out-of-service vehicles and drivers in 2001 was 23.3 percent and 7.6 percent, respectively. After the accident, on November 9, 2003, Arrow received a SafeStat score of 210 (SEA scores: Accident-5.08, Driver-75.99, Vehicle-51.02, and Safety Management-95.67) and was rated a category C carrier. The SEA scores reflect the results of the postaccident compliance review that reported Arrow did not provide an efficient safety management program.

DOT Office of the Inspector General Audit Findings

On February 13, 2004, the DOT's Office of the Inspector General (IG) issued its report *Improvements Needed In The Motor Carrier Safety Status Measurement System*[40] as a result of an audit of the FMCSA SafeStat program requested by the Chairman of the House Transportation and Infrastructure Highways and Transit Subcommittee. The IG's office conducted its audit with an "overall objective to determine whether SafeStat reliably identified high-risk carriers."[41] The resulting report noted that although SafeStat calculated scores consistent with its design, systemic weaknesses existed both in the reporting of the State and motor carrier data and in the FMCSA's correcting and disclosing of data problems.

The report listed three key sources for the SafeStat calculations:

1. motor carriers' periodic census reports,
2. police accident reports on crashes involving commercial vehicles, and
3. State reports on driver and vehicle violations found during roadside safety inspections.

[40] Audit Report Number MH-2004-034.

[41] MH-2004-034.

The IG reported that as of January 2003, the FMCSA had recorded 643,909[42] active interstate carriers and lacked updated census data[43] for 42 percent of the active carriers. The audit results indicated that even though carriers had inspections on record, the recorded values were zero in Vehicles for 11 percent of the carriers and zero in Drivers for 15 percent of the carriers.

The Motor Carrier Safety Improvement Act (MCSIA) of 1999 required interstate carriers to periodically update their identification reports (census forms), and the IG reported that in November 2000, the FMCSA promulgated rules requiring the updated census reports but did not enforce the rules by applying fines. According to the IG report, about 272,000 (42 percent) active interstate carriers had not met the requirement to update data every 2 years.[44] The IG found that in January 2003, the carrier's number of power units (vehicles) or drivers or both was used to calculate the SafeStat score for at least 74 percent of category A carriers (the highest risk SafeStat category). As the report noted, when zero values were in the census data, the SafeStat calculations were invalidated and could result in a carrier with crashes, including fatal crashes, having no SafeStat value in the Accident rate. The audit report explained that because the number of drivers and power units are used as a divisor in the calculations, values cannot be computed using zero or blank data. As an example, the IG's office found a carrier that had 21 crashes on record, yet received no SafeStat value in the Accident rate because the carrier's power units were recorded as zero.

In addition, the IG reported that, nationwide, underreporting across States for all crashes involving commercial vehicles varied; some States underreported by 60 percent or more and others by 20 percent or less. The IG noted an FMCSA report (using November 2002 data) that 1,031 of the 4,853 fatal large truck and bus crashes in the National Highway Traffic Safety Administration (NHTSA) database were missing from the SafeStat database. Also, according to the IG's audit, in fiscal year 2002, the States reported about 19,000 crashes (20 percent) 6 or more months after the crashes occurred.[45] As the report noted, SafeStat calculations attach the greatest weight to crashes (crash history is associated with future crash risks); however, large gaps exist in how completely and timely States report crash data. The IG report stated:

> [A]s a result of weaknesses in the data reported by the States, SafeStat rankings are geographically biased against the carriers operating in States that provide more complete data, while weaknesses in the data provided by carriers can produce errors in SafeStat calculations and cause some high-risk carriers to be missed.

Since 1999, the public has had free access to SafeStat via the Internet, which makes information available to those making decisions about and assessing the safety of carriers for personal or business reasons and to carriers verifying the online data for their companies. According to the IG's report, the public has accessed the Web site up to 80,000 times a

[42] As of August 2003, the FMCSA recorded 665,646 active motor carriers in SafeStat.

[43] Census data included the current number of vehicles and drivers.

[44] According to the FMCSA, 20 percent of the carriers who are scored in SafeStat and 10 percent of the carriers who are in the categories A, B, and C do not have updated data.

[45] Crashes occurring in the most recent 6 months are weighted more heavily than those in the previous 7 to 30 months.

month. As a result of its audit, the IG's office recommended that the FMCSA improve the quality and quantity of the data because, while SafeStat is sufficient for internal use, its public dissemination and use require timely and rapid corrective action. The FMCSA has now posted a more detailed cautionary disclaimer on the FMCSA Web site for SafeStat:

> Caution Urged in the Use of SafeStat Data: The States are required to provide standard, basic information about large truck and bus crashes to FMCSA within 90 days of the crash event, and the results of roadside inspections within 21 days of inspection. However, the completeness, timeliness, and accuracy of crash data–and to a lesser extent roadside inspection data–vary from State-to-State. Accordingly, SafeStat's ability to accurately and objectively assess the safety fitness of individual motor carriers may be inconsistent and not conclusive without additional analysis….WARNING: Because of State data variations, FMCSA cautions those who seek to use the SafeStat data analysis system in ways not intended by FMCSA. Please be aware that use of SafeStat for purposes other than identifying and prioritizing carriers for FMCSA and State safety improvement and enforcement programs may produce unintended results and not be suitable for certain uses. FMCSA recommends that all motor carriers periodically verify the accuracy of their SafeStat data.

Appendix G lists the IG's recommendations and the FMCSA's responses and corrective actions taken to date.

ISS-2

The Inspection Selection System (ISS-2), an FMCSA computer program, was designed to assist field inspectors with selecting vehicles for inspection by identifying carriers and vehicles that have a history of unsafe practices and poor safety performance. The ISS-2 criteria are based on data analysis from the MCMIS, SafeStat ratings, or PRISM.[46] If SafeStat contains insufficient data, the ISS-2 values are based on carrier size and number of past inspections. The inspector's ISS-2 inquiry results in one of three responses: Pass, Optional, and Inspect. Carriers are rated on a 100-point score system:

1. score of 1 to 49—Pass (no inspection required),
2. score of 50 to 74—Optional (inspection feasible), and
3. score of 75 to 100—Inspect (inspection warranted).

When an inspector accesses the ISS-2, it displays an inspection value, as well as the source of the value, such as SafeStat or insufficient data (indicated as lack of SafeStat data) or PRISM. The ISS-2 also displays a section on the carrier's violation details, which compares the carrier's violation history to the national violation warning threshold[47] in specific categories. Carriers that have a violation history greater than the warning threshold are highlighted, alerting the inspector to concentrate on or pay close attention to those items during an inspection process.

[46] A Federal and State program that links motor carrier safety fitness to State commercial vehicle registrations. For more information, access <www.fmcsa.dot.gov/factfigs/Prism.htm>.

[47] An FMCSA algorithm using national inspection histories and carrier census information.

At the time of the accident, based on the available SafeStat data, Arrow's assigned ISS-2 value was 32, indicating that Arrow's vehicles had a Pass score. The violation details indicated that Arrow exceeded the violation threshold warning in the categories of Brakes, Steering or Frame, and Traffic Laws. After the accident, Arrow's ISS-2 value was 98, indicating that an inspection was warranted.

U.S. Department of Defense

On February 6, 1986, the Bureau of Motor Carriers (predecessor agency to the FMCSA) and the U.S. Department of Defense (DoD) Military Traffic Management Command (MTMC), now known as the Surface Deployment and Distribution Command (SDDC), signed a Memorandum of Agreement that provided for an exchange of information and permitted the MTMC/SDDC access to the MCMIS, which contains carriers' profiles; accident, enforcement, and inspection histories; and compliance review and safety rating information. The Memorandum of Agreement is no longer in effect, and the military does not have direct access to the MCMIS but can access the SafeStat information online.

Prior to 1992, to qualify as a MTMC/SDDC-approved motor carrier for transporting military personnel, carriers were required to demonstrate they had a DOT compliance review rating of Satisfactory and had been in operation for over 12 months. A high failure rate during MTMC/SDDC inspections of motor carriers that had been previously considered qualified subsequently led to implementation of a "prequalification" screening and inspection process.

The prequalification inspection is a full on-site compliance review and performance evaluation. A DoD contractor conducts the inspection, and those carriers receiving a poor rating, such as 4 or 5,[48] are prohibited from transporting military personnel. All motor carriers who have failed this prequalification inspection are carriers who received an FMCSA Satisfactory rating and have been operating for longer than 12 months.

After 1992, before undergoing the prequalification inspection, motor carriers had to pass a DOD contractor-conducted "prescreening" that tested the applicant carriers' knowledge and understanding of specific regulatory requirements. According to the MTMC/SDDC contractor,[49] even though established motor carriers had applied, not one motor carrier answered all the compliance questions correctly. About 25 percent of the motor carriers who applied to the MTMC/SDDC failed the prescreening process, and 40 percent who did pass the prescreening then failed the subsequent prequalification inspection.

Arrow had undergone DoD contractor-conducted inspections in 1998, 1999, and 2000. Prior to the Victor accident, the most recent inspection was on December 4, 2001, and resulted in Arrow receiving a rating of 4. The inspection report noted a number of serious violations and operational deficiencies, which included incomplete driver qualification files and inadequate preemployment checks. The Vehicle Factor section noted irregularities in maintenance, repairs, and documentation and noncompliance with driver vehicle inspection

[48] The MTMC rating system is based on a scale of 1 to 5, with 1 being the highest and 5 being the lowest.

[49] FMCSA Docket No. FMCSA-2001-11061.

reports. In the rating comments, the report recommended that Arrow not be disqualified because the motor carrier was taking "aggressive" steps to correct the discrepancies. In addition, the report stated, "[I]t is Coach USA's responsibility to monitor the managers of their operating subsidiaries." Arrow, which was owned and operated by Coach USA, had done nothing to correct discrepancies noted in past inspections. Neither the DoD contractor nor the MTMC/SDDC office informed the FMCSA of its findings, nor were they required to do so. On June 27, 2002, as a result of the Victor accident, the MTMC/SDDC notified Arrow that the carrier had been placed in a "nonuse" category.

Tests and Research

Accident Reconstruction

The NYSP mapped the accident site in detail and provided the following results. The physical evidence revealed no braking tire marks on the roadway before the motorcoach veered off the highway. In the gore area between the mainline and the ramp, several scuffmarks extended about 120 feet just outside the ramp edgeline. According to the NYSP measurements, the scuffmarks had a radius of 657 feet. Two distinct parallel furrowed tire marks, approximately 350 feet long, were on the grassy median that divided the exit and entrance ramps. According to the NYSP, these tire marks showed that the motorcoach traveled up the embankment to the entrance ramp and struck the W-beam barrier at a 90-degree angle on the north side of the ramp. The guardrail became lodged on the motorcoach; approximately 700 feet of guardrail was pulled from its support posts onto the entrance ramp. No tire marks were found on the entrance ramp or on the W-beam guardrail on the south side of the entrance ramp, indicating the motorcoach was airborne for 63 feet.[50] The motorcoach left tire marks on the south side past the entrance ramp, where the vehicle came to final rest, down the embankment, and next to a guardrail on the north side of Willowbrook Road (see figure 3).

Accident Simulation

As part of its investigation, the Safety Board simulated the accident using Human Vehicle Environment System software.[51] The simulations were conducted to determine the dynamics of the accident motorcoach, with emphasis on the motorcoach's approach to the exit, the bus driver's potential steering input, and the motorcoach's vault and rollover. The simulations also provided a crash pulse (the forward, lateral, and vertical accelerations for the motorcoach as it struck the guardrail, vaulted over the eastbound entrance ramp, and came to final rest). The crash pulse was used to assess accident severity.

[50] The NYSP determined that the airborne angle of departure at the embankment was 8 degrees.

[51] Version HVE4.4 was released February 6, 2003, by the Human, Vehicle, Environment, Engineering Dynamics Corporation, Beaverton, Oregon.

To estimate the speed of the motorcoach before it left the roadway, the simulations utilized road evidence at the accident site, tire marks, impact with the north side guardrail, and witness accounts. The simulations indicated that at speeds of 60 mph, only two very short tire marks were present on the roadway. At speeds over 63 mph, the motorcoach yawed substantially, control of the motorcoach could not be maintained before striking the guardrail, and the guardrail strike site was substantially to the right of the accident motorcoach's actual strike site. The simulation indicated that at the gore area, the accident motorcoach was probably traveling between 60 and 63 mph.

The simulations showed that the motorcoach most likely drifted to the right, off the through lanes, and into the gore area for the exit ramp without much substantial steering (by maintaining a slight right turn similar to that needed to negotiate the curvature of I-90 in the main through lanes before the exit ramp). The bus driver could have maintained the same steering for about 10.75 seconds while heading towards and entering the gore. The tire marks on the gore edgeline were made as the steering was increased. The calculations and the simulations indicated that the motorcoach quite likely vaulted after hitting the north guardrail on the entrance ramp at about 45 mph and slowed to about 33 mph during the vault, as it landed.

Motorcoach Crashworthiness in Other Countries

In Europe, directives (regulations) are in place that relate to the strength of the motorcoach superstructure and seats and their anchorages. Although these directives are not compulsory,[52] motorcoach manufacturers consider them when developing, approving, and testing new motorcoaches.[53] The fitting of motorcoach seat belts in European countries varies from country to country; the European Union Commission is attempting to make compliance with the seat belt regulation for new vehicles mandatory throughout Europe.

In January 2000, the European Union Commission initiated a 3-year research program, "Enhanced Coach and Bus Occupant Safety," the goal of which was to reduce injuries through the development of new motorcoach regulations and standards. The program initially focused on the analysis of motorcoach collision data, and that analysis was completed in 2001. The results were published in an August 2003 report,[54] which included a suggested list of recommendations for new regulations and written standards pertaining to motorcoach and bus safety in the areas of rollovers and frontal and rear-end

[52] The United Nations' Economic Commission for Europe details the list of regulations known as the Geneva Regulations. European countries may adhere in a voluntary manner to each of these regulations, which will be mandatory in a particular county only if the regulations are explicitly incorporated into the country's regulations. The European directives are mandatory for all European Union members when the directives are included in Directive 70/156-2001/116/CE. Those directives are issued by the European Parliament Council or European Commission, depending on the case, and they are approved in Brussels.

[53] RONA Kinetics and Associates, Ltd., *Evaluation of Occupant Protection in Buses*, Report RK02-06, North Vancouver, British Columbia, Canada, June 4, 2002. Prepared for Road Safety and Motor Vehicle Regulation Transport, Canada.

[54] *ECBOS - Enhanced Coach and Bus Occupant Safety, Final Published Report*, project number 1999-RD.11130, funded by the European Commission under the Competitive and Sustainable Growth Program of the 5th Framework, August 2003.

impacts. In addition, the report included recommendations for new regulations pertaining to the development of rollover dummies, avoidance of partial ejections, contact loads with side windows or structures, further research on the general rating of passive safety, and a harmonized accident database.

In the United Kingdom, regulations have been introduced that require that seat belts be fitted in all new intercity and mini buses. In one study,[55] detailed data on 47 rollovers revealed that the application of two countermeasures, restraints and retentive glazing, would have reduced the injury severity for 55 percent of fatally and severely injured bus occupants. Additional studies have been done to develop a coach seat that could use a three-point seat belt to restrain the seat occupant, as well as provide effective occupant protection for an unbelted occupant during a frontal impact.

In late 1994, the European Union Commission began a project on problems related to seat belt installation in motorcoaches. The concerns included seat size, cost, weight, and potential injury to an unbelted passenger seated behind the belted passenger. Since 1994, bus seats with integral seat belts have become available that overcome these concerns.[56] These seats passed all tests for conditions of combined loading in which an unbelted or lap belted passenger impacted the seat in front of the one in which passengers had been belted. The seat, which is made using conventional materials and production methods, was tested with standard mounting rails and is no larger and weighs no more than a typical European production seat currently in use.

In Australia, as a result of severe motorcoach collisions and significant public pressure, regulations were introduced to address rollover strength, seat and seat anchorage strength, and the fitting of lap/torso belts for motorcoaches.[57] The Australian and European regulations regarding the strength of the bus superstructure, seat attachments, and seat belts generally reflect real-world collision data.[58]

In Canada, every new bus built or imported must comply with the applicable Canada Motor Vehicle Safety Standards, which currently do not require restraints for passengers in motorcoaches.

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[55] P. Botto, M.C. Caillieret, C. Tarriere, C. Got, and A. Patel, "Passenger Protection in Single and Double-Decker Coaches in Tipping Over," Thirteenth International Technical Conference on Experimental Safety Vehicles, Paris, France, 1991.

[56] Majid M. Sadeghi, Universal Coach Safety Seat. Paper no. 217 presented at the 18th International Technical Conference on the Enhanced Safety of Vehicles, Nagoya, Japan, May 19-22, 2003.

[57] Report RK02-06, June 2002.

[58] Report RK02-06, June 2002.

Analysis

In the Victor accident investigation, the Safety Board considered the factors that may have caused or contributed to the severity of the crash, including the performance of the driver, the vehicle, and the motor carrier and its holding company; the DOT's oversight of motor carrier operations; the highway elements; and the emergency response and survival aspects. The Safety Board has identified issues regarding the driver's off-duty activities and resultant lack of sleep, the motor carrier's failure to ensure compliance with Federal regulations, and the DOT's deficiencies in motorcoach operations oversight, as well as deficiencies in its rating system for such operations.

In addition, the Board reviewed survival factor and motorcoach crashworthiness issues similar to those identified in previous accident investigations and in the 1999 Safety Board report on motorcoach crashworthiness.[59] These issues will be discussed in later sections of this analysis.

Exclusions

The weather was clear and dry at the time of the accident. Postaccident inspection of the motorcoach did not indicate mechanical problems hindering the vehicle's operation. The highway was inspected for design and construction defects in the area of the crash site. The pavement markings were visible, and no defects in the highway were found that would have caused or contributed to the crash.

Results of the toxicological analysis of the bus driver's blood and urine specimens were negative for alcohol and illicit drugs. The driver was diabetic, and he was taking the medication metformin, typically prescribed to regulate blood glucose levels. When the driver was evaluated in the emergency room following the accident, his blood glucose level was moderately high but was consistent with his treatment for diabetes, indicating no impairment at the time of the accident.

The initial 9-1-1 call misidentified the exact site of the accident due to the motorcoach's location over a steeply sloped embankment; however, the misidentification did not hamper the emergency response. Appropriate resources were dispatched, responders and medical personnel arrived quickly to the scene, and the injured received medical care on scene and were transported to local hospitals in a timely manner.

[59] National Transportation Safety Board, *Bus Crashworthiness Issues*, Highway Special Investigation Report NTSB/SIR-99/04 (Washington, DC: NTSB, 1999).

The Safety Board concludes that the weather, the design and condition of the roadway, the mechanical condition of the motorcoach, and the driver's diabetes did not contribute to the accident. Further, test results showed no evidence of drug or alcohol use by the driver, and the emergency response was adequate.

Accident Discussion

After departing the right side of the roadway, the motorcoach struck the rear of the W-beam guardrail for the eastbound entrance ramp, vaulted the entrance ramp while dragging a 700-foot section of the guardrail that then struck three vehicles on the ramp, collided with the embankment on the far side of the ramp, and finally rolled over onto its right side and slid to rest. The motorcoach's initial speed leaving the travel lanes was calculated based on tire marks and other evidence at the scene. The Safety Board's simulations showed that the vehicle's speed was between 60 and 63 mph in the gore area where tire marks were found. The posted speed limit on I-90 was 65 mph.

The bus driver did not have control of the motorcoach before the accident, which resulted in the motorcoach traveling off the right through lane of the highway into the paved area between the travel lanes and the Exit 45 ramp. Several factors indicate that the driver fell asleep while operating the motorcoach before it left the roadway. The driver had obtained no nighttime sleep and only three brief naps totaling less than 4 hours in the 51 hours preceding the accident; he admitted to spending his off-duty hours gambling in a casino. Although the driver had sufficient time off before the accident trip to comply with Federal hours-of-service rules, he did not use this time to rest.

The bus driver would not speak to Safety Board investigators; therefore, determination of the cause of his loss of control at Exit 45 is based on passenger statements, reports about the driver's lack of sleep prior to the accident trip, and physical evidence in the roadway. Before departing Canada, passengers noted the driver napping as they loaded their luggage. A witness driving behind the motorcoach reported the vehicle drifting and swerving in the lane and traveling erratically, slow and then fast. During the trip, passengers described the bus driver rubbing his eyes and resting his chin in his hands as he drove with his elbows; they stated that the motorcoach often drifted to the right side of the roadway and over the rumble strips along the shoulder before correcting back into the travel lane. Unlike the right lane's shoulder before the exit lane for Exit 45, just prior to the thermoplastic striped gore area where the motorcoach departed the roadway, the road surface did not have rumble strips. Therefore, when the driver fell asleep, he did not drive over any rumble strips that might have awakened him before entering the gore area, as he had during his earlier episodes of drifting.

The bus driver's action exiting the paved roadway onto the gore area was probably not an intended maneuver. Passengers had observed the driver just prior to the accident and reported behaviors, such as irritability, restlessness, and lack of concentration, that are highly indicative of a person experiencing a severely sleep-deprived state. Passengers said that after the bus driver drifted out of the travel lanes near Exit 45, a passenger cried out

and then the bus driver "shook his head and grabbed the steering wheel with both hands." The passenger may have startled the driver; one problem with a *startled response* (whether associated with sleep onset or just a redirection of attention) is that the actions that follow it are typically without conscious decision or deliberate control.[60] The driver's drifting off the roadway and traveling over the thermoplastic striping of the gore area suggest that he had been nodding off, which he had done several times previously during the trip. In this particular instance, however, a passenger screamed, and thus the driver was possibly awakened by the noise, observed the exit ramp, and attempted to steer toward it as a reactive measure rather than a decisive maneuver. This steering maneuver may have also been part of the wakening response to the passenger's crying out, irrespective of any visual input from the exit ramp.

When individuals awaken from Stage 1 sleep (the first stage people enter as they transition from wakefulness to sleep), they frequently experience some degree of mental confusion and vague or fragmented imagery.[61] This effect is greatest when the person is sleep-deprived, as was the accident driver, and may explain why he perhaps saw the exit but was not able to rationally judge its proximity, in the context of the motorcoach's speed, before his motor response initiated and the motorcoach left the roadway.

Many individuals also experience *hypnic myoclonia*, a muscle contraction that can be local (one limb) or generalized (whole body). This response does not suggest any sort of sleep pathology; it often occurs when individuals are sitting upright and suddenly their entire body, or head, jerks as they transition from being awake to sleep. The bus driver's abrupt right steering maneuver off the roadway might have been a consequence of hypnic myoclonia, either directly (muscles in his right arm contracted, causing him to steer to the right) or indirectly (a generalized response might have challenged his sense of equilibrium, triggering a reaction that resulted in the rightward steering maneuver).[62] Therefore, the Safety Board concludes that the accident bus left the roadway as a result of the driver falling asleep.

Bus Driver Performance

Off-Duty Hours

The accident driver's schedule for the 2 days preceding the accident trip included no driving except for one trip to the local Marineland attraction. Although the driver had a nighttime travel schedule from Waterbury to Niagara Falls, he had sufficient off-duty time from his arrival in Niagara Falls on Friday, June 21, about 7:30 a.m., through Saturday, June 22, at 11:00 a.m. (the departure time for Marineland) to obtain sleep. Furthermore,

[60] Mary A. Carskadon and William C. Dement, "Normal Human Sleep: An Overview," in M.H. Kryger, T. Roth, and W.C. Dement, [eds.], *Principles and Practices of Sleep Medicine*, Third Edition (Philadelphia, PA: W.B. Saunders Company, 2000).

[61] Carskadon and Dement.

[62] Carskadon and Dement.

the driver had no driving scheduled from Saturday at 4:30 p.m. (the return time from Marineland) until Sunday, June 23, at 11:00 a.m. (the departure time for Waterbury) and therefore had adequate time to obtain additional sleep.

Yet, according to the bus driver's statement to the NYSP, he had no nighttime sleep on either of the 2 days preceding the accident. The bus driver's statements were supported by security videotapes that showed his arrival at and departure from a local casino in which he spent his off-duty hours and by the statements from the taxicab driver who drove the bus driver from the hotel to the casino. In addition, the hotel chambermaid told the NYSP that the bus driver's bed did not appear to have been slept in during the bus driver's 2-night stay. Passengers reported that the bus driver napped during the time when they were loading their luggage on the motorcoach, and they described his demeanor at other times as restless and irritable. Passengers also stated that during the return trip just before the accident, the driver's behavior indicated that he was sleepy; he was consistently rubbing his face and arms and resting his elbows on the steering wheel while driving.

Even though the need for sleep varies among individuals, losing as little as 2 hours sleep can negatively affect alertness and performance, resulting in degraded judgment, decision making, and memory; slowed reaction time; lack of concentration; fixation; and irritability.[63] The amount of sleep the driver obtained prior to the accident was clearly insufficient to meet the physiological need for sleep; the bus driver reported taking three brief naps, totaling 4 hours of sleep, in the 51-hour period before the accident. The bus driver's ability to fall asleep "on demand" while awaiting the return of passengers visiting attractions or the passengers loading their luggage in the motorcoach is further indication of inadequate sleep. A sleep latency[64] of less than 5 minutes is widely regarded within the sleep medicine community as an indication of a compelling physiological need for sleep.[65, 66]

Witnesses stated that the motorcoach drifted in its lane and almost collided with other vehicles on the highway. Passengers described the driver as consistently drifting onto the rumble strips of the right shoulder before redirecting the motorcoach onto the roadway and once almost hitting a parked truck. Although the driver denied falling asleep at the time of the accident (he stated that he had the habit of stretching; rubbing his head, chin, and neck; and squirming in his seat when driving), the onset of sleep is subtle and may not be apparent to the individual experiencing the first stage of sleep. Research on sleep deprivation has concluded that the absence of behavioral and subjective indicators of sleepiness is not always an accurate reflection of the

[63] Fatigue Resource Directory Web site <http://www.olias.arc.nasa.gov/zteam/fredi/home-page.html>. Compiled in conjunction with the NASA/NTSB symposium, "Managing Fatigue in Transportation: Promoting Safety and Productivity," and managed by the DOT. Also, Medical Dictionary Web site <http://www.graylab.ac.uk/omd/contents/F.html>.

[64] The amount of time needed to fall asleep.

[65] J. Van den Hoed, H. Kraemer, and C. Guilleminault, "Disorders of Excessive Somnolence Polygraphic and Clinical Data for 100 Patients," *Sleep* Vol. 4 (1981).

[66] F. Zorick, T. Roehrs, and G. Koshorek, "Patterns of Sleepiness in Various Disorders of Excessive Daytime Somnolence," *Sleep* Vol. 5 (1982).

physiological state of sleepiness.[67] Individuals can often mask symptoms of sleepiness and even compensate for impaired performance for discrete periods of time; nonetheless, the inability to maintain wakefulness, even when instructed (or required) to do so, is a telling indicator of severe sleep deprivation.[68]

The bus driver purposely used his off-duty time to pursue other activities that did not include acquiring adequate sleep. Because the driver's actions were knowing and deliberate (he gambled in a casino during the night in lieu of sleeping), they were clearly imprudent. Historically, the Safety Board has recognized that the root cause of many fatigue-related accidents stems from practices that are administratively controllable by the motor carrier, such as scheduling. Recommendations directed at motor carriers or entities that regulate them have emphasized the need to respect the physiological need for sleep in the establishment of drivers' schedules, the elimination of incentives or sanctions that promote drowsy driving, and the education of drivers with regard to sleep hygiene and safety.[69] However, in this accident, the trip itinerary did not include excessive hours for the driver that would have prevented him from obtaining sleep. The circumstances of this accident deviate from the usual fatigue-related accidents investigated by the Safety Board because the motorcoach driver's lack of sleep was directly attributable to his off-duty activities and independent of any work-related demands caused by the carrier. The Safety Board concludes that the bus driver had less than 4 hours of interrupted sleep in a 51-hour period as a result of deliberately spending his off-duty hours in a casino; he was therefore severely fatigued at the time of the accident.

Operator Fatigue

The Safety Board has previously addressed the issue of operator fatigue and the need to provide operators with fatigue awareness training in all modes of transportation. In 1989, the Safety Board issued the following recommendation to the DOT:[70]

> I-89-02
>
> Develop and disseminate education material for transportation industry personnel and management regarding shift work; work and rest schedules; and proper regimes of health, diet and rest.

[67] K.M. Hartse, T. Roth, and F.J. Zorick, "Daytime Sleepiness and Daytime Wakefulness: The Effect of Instruction," *Sleep* Vol. 5 (1982).

[68] K.M. Hartse, T. Roth, and F.J. Zorick.

[69] NTSB/HAR-00/01 and NTSB/SIR-99/01.

[70] National Transportation Safety Board, *Head-End Collision of Consolidated Rail Corporation Freight Trains UBT-506 and TV-61 Near Thompsontown, Pennsylvania, on January 14, 1988*, Railroad Accident Report NTSB/RAR-89/02 (Washington, DC: NTSB, 1989).

A 1999 Safety Board special investigation report[71] noted the extensive efforts made by most of the modal administrations to develop and disseminate educational materials on fatigue issues and health and diet issues; Safety Recommendation I-89-02 was therefore classified "Closed–Acceptable Response" on May 25, 2001.

The Board issued Safety Recommendations H-90-21 and H-95-5 pertaining to driver fatigue in commercial motor vehicles to the FHWA urging that educational materials be developed for commercial drivers about the dangers of driving while drowsy. According to the FHWA, the agency's goal was to educate all CDL holders on recognizing fatigue and on the importance of adequate rest and healthy work and lifestyle choices. The Safety Board commended the FHWA for working with different organizations to educate drivers about the dangers of drowsy driving, and Safety Recommendations H-90-21 and H-95-5 were classified "Closed–Acceptable Action" on July 7, 1998.

In February 1999, the Safety Board recommended in its special investigation report, *Selective Motorcoach Issues*, that the DOT:

> H-99-4A
>
> Require that the Federal Highway Administration's fatigue video that is being developed for motorcoaches discuss the dangers of inverted sleep periods.

In June 1999, the FHWA began a two-phase project addressing bus driver fatigue. In the first phase, the FHWA studied the differences between motorcoach operations and truck operations as they related to operator fatigue. In the second phase, the FHWA developed a fatigue awareness and countermeasure video for motorcoach drivers, which was distributed to the industry in February 2000. The Safety Board reviewed the video and, as a result, classified Safety Recommendation H-99-4A "Closed–Acceptable Action" on December 7, 2000.

Increased awareness and recognition of the dangers of drowsy driving are essential to reduce this threat to transportation safety. The circumstances of this accident indicate that the accident driver took no personal responsibility for being well rested and fit for duty. The accident driver was charged and subsequently convicted of manslaughter, assault, reckless driving, and reckless endangerment.[72]

The prevention of future accidents requires measures to promote drivers' acceptance of personal responsibility for their off-duty actions that are beyond the purview of their employers, and the emphasis on personal responsibility to be fit for duty should be included in the training given by motor carriers. The Safety Board will inform the Amalgamated Transit Union, United Transportation Union, American Bus Association,

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[71] National Transportation Safety Board, *Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue*, Special Investigation Report NTSB/SIR-99/01 (Washington, DC: NTSB, 1999).

[72] The driver pled guilty and received the maximum sentence permitted under New York State law (3 years and 4 months to 10 years).

and United Motor Coach Association of the circumstances of this accident and the driver's failure to manage his off-duty activities in a manner that ensured his fitness to drive, emphasizing that drivers need to use discretion in planning their off-duty activities and need to obtain adequate sleep.

Driver's Alert Program

The trip coordinators and several motorcoach passengers expressed concern over the accident bus driver's visible sleepiness. Even without knowing that the driver had been awake for nearly 2 days, the coordinators recognized that the driver was unfit to perform his duties, since he displayed obvious signs of a sleep-deprived state. Initially, they sought the assistance of the motorcoach 2 driver, who knew of the accident driver's overnight casino trips and yet deferred to the accident driver's statement that he was "okay to drive." The motorcoach 2 driver told the NYSP that the accident bus driver had "30 years experience and would know if he was alright." During the trip, a coordinator used the microphone, speaking in Spanish, to tell the passengers that they should make noise because the driver was sleepy. Another passenger approached the driver just prior to Victor Exit 45 and asked him to pull over at the next stop and rest; however, the driver rebuffed her and she started to return to her seat.

In 1998, the Safety Board investigated an accident near Burnt Cabins, Pennsylvania,[73] in which the bus driver fell asleep and the motorcoach ran off the road, striking a parked semitrailer. Greyhound Lines, Inc. (Greyhound), which owned the motorcoach, had a 1-800-SAFEBUS driver safety check program that included a written policy for processing complaints against drivers, similar to the Driver's Alert program for Coach USA. The purpose of the 1-800-SAFEBUS program was to allow the public to report to the company, using a toll-free number, on driver performance, service, and driving behavior. As in the Driver's Alert program, the number was displayed on the outside of the Greyhound motorcoach and the system did not process anonymous calls. As a result of its investigation, the Safety Board concluded that Greyhound's policy of disregarding anonymous calls prevented the company from identifying patterns of unsafe driving practices by particular drivers or on particular runs and diminished the safety oversight benefits of the program. As a result, the Safety Board issued the following recommendation to Greyhound:

> H-00-9
>
> Revise your 1-800-SAFEBUS program to ensure that all complaints are included in drivers' files and used in drivers' assessments.

In September 2000, Greyhound responded that after an analysis of the SAFEBUS program, Greyhound agreed to perform a case-by-case review of anonymous motorist complaints. The anonymous calls would no longer be discarded by the SAFEBUS vendor

[73] National Transportation Safety Board, *Greyhound Motorcoach Run-off-the-Road Accident, Burnt Cabins, Pennsylvania, June 20, 1998*, Highway Accident Report NTSB/HAR-00/01 (Washington, DC: NTSB, 2000).

and would be passed on the to the Greyhound Safety Department for further action. The Safety Board therefore classified Safety Recommendation H-00-9 "Closed–Acceptable Action" on January 5, 2001.

In the Victor accident, the exterior of the accident motorcoach also displayed a toll-free number for individuals to call when they observed the motorcoach being operated in an unsafe manner. The Coach USA Driver's Alert Program operates 24 hours a day and is staffed by personnel who speak directly with the caller and obtain information. Although another driver reported to the NYSP after the accident that the bus driver had been driving erratically, no calls to Driver's Alert were made prior to the accident. Quite possibly, even if calls had been made to report the accident driver, had the callers remained anonymous or been unwilling to leave contact information, nothing would have been done to investigate the complaint and stop the driver. The Safety Board concludes that even if passengers had called Driver's Alert to report the driver, a system was not in place to allow Arrow to take immediate action. Although Coach USA no longer owns Arrow, Coach USA owns many subsidiary passenger carriers and still uses the Driver's Alert program. The Safety Board believes that Coach USA should evaluate all calls reporting dangerous driver behaviors immediately upon receiving them and establish a method to reach the driver so that Coach USA can evaluate the driver's fitness for duty and take appropriate countermeasures, if necessary.

During interviews, the passengers indicated obvious concern regarding the driver's state; yet, either the passengers did not recognize the seriousness of the situation, or none were able to identify an option to promptly obtain the driver's cooperation in delaying or discontinuing the trip until he had obtained sufficient rest. After having approached the accident bus driver's colleague and after futilely requesting his assistance with the fatigued driver, several passengers felt helpless during the events that led up to the accident and seemed reluctant or felt unable to take control of the increasingly dangerous situation. Although many passengers aboard the motorcoach used their cellular telephones to call relatives and friends after the accident, none used the cellular telephones before the accident to report the driver or situation to 9-1-1. Instead, the passengers deferred to the driver's authority and let the trip continue.

In a motorcoach, the driver is normally in charge, which in most situations is the most appropriate allocation of authority. When a driver is impaired, whether due to fatigue, intoxication, or an apparent medical condition, passengers are placed at risk. But individuals may be reluctant to challenge a driver's fitness for duty directly, particularly if the driver is irritable or defensive or simply refuses to postpone the trip or to pull over. In this accident, passengers approached the motorcoach 2 driver, asked for his assistance, and subsequently deferred to his opinion that the accident driver was fit to operate the motorcoach.

Although the exterior of the accident motorcoach displayed an emergency number, no similar posting was available inside the bus for passengers to use when they observed the bus driver operating the motorcoach in an unsafe manner. An emergency number posted inside the motorcoach may have prompted the passengers to call and report the bus driver's behavior. The Safety Board concludes that had Arrow provided a method for passengers to contact the company to report the driver's severely fatigued condition, the

company could have prevented the driver from beginning or continuing the accident trip. Emergency situations can occur at any time and on any passenger carrier's motorcoach. Therefore, the Safety Board believes that the FMCSA should require the posting of an emergency telephone number on the interior of motorcoaches for passengers to call in the event of an emergency with the driver.

Peter Pan Bus Lines currently owns Arrow and does not use Driver's Alert or any other vendor for driver operational oversight. The company has a similar in-house program and plans to use satellite tracking systems as its driver oversight program in the near future. However, such programs still do not give passengers the ability to contact the company when they are experiencing an emergency situation with their driver. The Safety Board will inform the United Motorcoach Association and the American Bus Association of the circumstances of this accident and of the opportunity to provide passengers, via a posted emergency telephone number on the interior of motorcoaches, with a readily available method for communicating directly with companies to report an emergency or hazardous condition with a driver or vehicle. In addition, the Safety Board will emphasize to the association the importance of the telephone operator being able to evaluate all calls, including those from anonymous callers, and the importance of the company establishing a method to reach the driver to assess the driver's fitness for duty and, if necessary, take appropriate countermeasures.

Passengers had approached the motorcoach 2 driver and asked his assistance in dealing with the fatigued accident bus driver. When the motorcoach 2 driver deferred to the accident driver's "Yes, I'm fine" statement, he abdicated his responsibility for the safety of the accident coach's passengers. Even though the motorcoach 2 driver was aware of the off-duty activities of the accident driver and his lack of sleep, he did nothing to prevent the accident driver from transporting passengers in an unfit state. Failing to report an on-duty driver who is severely fatigued is no different from failing to report an on-duty driver who has knowingly been drinking or using drugs.[74] The motorcoach 2 driver had spoken with the accident driver, who informed the motorcoach 2 driver of his off-duty gambling activities during the previous 2 nights; had witnessed the accident bus driver's napping onboard the motorcoach during the daytime trip to Marineland; and had observed the accident bus driver return from the casino and subsequently nap onboard the motorcoach before departing for the return trip to Connecticut. In spite of his awareness of the accident driver's failure to obtain adequate sleep, the motorcoach 2 driver showed a lack of due concern for the accident motorcoach passengers' safety. Therefore, the Safety Board concludes that the driver of the second Arrow motorcoach did nothing to prevent the severely fatigued accident driver from transporting passengers in his impaired condition.

[74] Laboratory research has clearly established the relationship between sleep loss, both acute and cumulative, and decreased performance and alertness. Recently, varying amounts of acute sleep loss (2, 6, and 8 hours) were found to increase sleepiness more than ethanol and had comparable effects to ethanol on degrading psychomotor performance. In this study, 4 hours of sleep loss equated to a 0.095 percent BrEC percent or the equivalent of ingesting five to six 12-ounce beers. See T. Roehrs, E. Burduvali, A. Bonahoom, et al: "Ethanol and Sleep Loss: A 'Dose' Comparison of Impairing Effects," *Sleep*, 2003; 26: 981-5.

Coach USA was the parent company of Arrow at the time of the accident. Coach USA's policy now is to train its drivers in the basic recognition of drugs and alcohol, as well as abnormal activity. Coach USA believes that if an incident between drivers similar to the one that occurred in the Victor accident were to happen again, another driver would recognize that a problem exists and would contact dispatch and his or her supervisor. However, Coach USA does not have a policy for disciplining a driver for failing to report another driver.

Current Peter Pan policy requires a driver to report the impairment of another driver due to drugs, alcohol or fatigue to a supervisor or dispatcher, and a supervisor is to respond after notifying the safety director. A driver is to be disciplined, including suspension, for failing to report an impaired driver. According to Peter Pan, it has an open door policy under which the safety director and supervisory personnel are to be notified either in person or by telephone. Should a report on an impaired driver be received, a supervisor is to respond directly to the motorcoach's location. In the Victor accident, such a report by motorcoach driver 2 might have prevented the accident driver from beginning or continuing the trip.

The Safety Board will inform the United Motorcoach Association and the American Bus Association of the opportunity for passenger-carrying operators to provide their drivers with basic training in the recognition of impairment due to drugs, alcohol, or fatigue and with a readily available method for communicating directly with supervisory personnel to report another driver's impairment so that the motorcoach operator can evaluate the reported driver's fitness for duty and, if necessary, take appropriate countermeasures.

Whenever an accident occurs in which inadequate company oversight of safety practices may have been a contributing factor, the Safety Board investigates how corporate culture may have set the stage for the accident.[75] Corporate culture can be described in various ways. One definition refers to it as "the beliefs held by workers and managers in the organization about the way operations ought to work; the practices and customs that have become the norm; and, how these various factors are valued either

[75] (a) National Transportation Safety Board, *Downeast Airlines, Inc., DeHailland DHC-6-200, N68DE, Rockland, Maine, May 30, 1979*, Aviation Accident Report NTSB/AAR-80/05 (Washington, DC: NTSB, 1980); (b) National Transportation Safety Board, *Air Illinois Hawker Siddley, HS748-2A, N748LL, Pinckneyville, Illinois, October 11, 1983*, Aviation Accident Report NTSB/AAR-85/03 (Washington, DC: NTSB, 1985); (c) National Transportation Safety Board, *Collision of Northeast (METRA) Train and Transportation Joint Agreement School District 47/155 School Bus at Railroad/Highway Grade Crossing, Fox River Grove, Illinois, October 25, 1995*, Highway Accident Report NTSB/HAR-96/02 (Washington, DC: NTSB, 1996); (d) National Transportation Safety Board, *Washington Metropolitan Area Transit Authority Train T-111 With Standing Train at Shady Grove Passenger Station, Gaithersburg, Maryland, January 6, 1996*, Railroad Accident Report NTSB/RAR-96/04 (Washington, DC: NTSB, 1996); (e) National Transportation Safety Board, *Head-On Collision Between Burlington Northern Railroad Freight Trains 602 and 603, Ledger, Montana, August 30, 1991*, Railroad Accident Report NTSB/RAR-93/01 (Washington, DC: NTSB, 1993); (f) National Transportation Safety Board, *Highly Volatile Release From Underground Storage Cavern and Explosion Mapco Natural Gas Liquids, Inc., Brenham, Texas, April 7, 1992*, Pipeline Accident Report NTSB/PAR-93/01 (Washington, DC: NTSB, 1993); and (g) National Transportation Safety Board, *Explosion and Fire on Board the U.S. Tankship OMI Charger at Galveston, Texas, October 9, 1993*, Marine Accident Report NTSB/MAR-94/04 (Washington, DC: NTSB, 1994).

positively or negatively."[76] If an employee's operating performance conforms to carrier procedure or reflects the accepted values and attitudes found in the carrier's workplace and an unsafe situation occurs, the corporate culture may be at fault.

In the case of Arrow, the company's history of repeatedly violating FMCSRs pertaining to passenger safety, particularly in drivers' false duty logs, hour of service, and vehicle maintanence, and its failure to prioritize the correction of these violations over 2 decades of operation are evidence of a corporate culture that fostered indifference to passenger safety. For example, in Arrow's postaccident compliance review, the driver of motorcoach 2 was specifically cited as having violated the FMCSR pertaining to false duty status record reports only 1 month prior to the Victor accident. However, either Arrow did not address the violation by disciplining motorcoach driver 2 or did not discover the violation. Both situations demonstrate that Arrow did not have effective safety management controls. Transportation companies can, through their actions, communicate to their employees an attitude that influences the degree to which employees comply with operating rules and with safe operating practices. Corporate culture is important in every mode of transportation, and it can have influence in even minor ways. While common sense alone should have prompted the accident bus driver to acquire adequate sleep before driving, the lack of sleep is not specifically addressed in Federal regulations, which only require that the driver have adequate time off duty. Nonetheless, the intent of the regulations is to provide the opportunity to acquire adequate sleep. Although the driver did not technically violate the hours-of-service rules, he is required to be "fit for duty."[77] Based on Arrow's repeated history of failing to correct violations in hours of service and duty logs among its drivers, it is apparent that the culture prevalent at Arrow was that adherence to the FMCSRs[78] for passenger safety was not a top priority. As stated in the FMCSA's postaccident compliance review, Arrow "revealed noncompliance with the Federal Motor Carrier Safety Regulations in almost all applicable parts to Arrow Line, Inc.'s passenger transportation operation." Even before the accident, according to the MTMC/SDDC 2001 compliance audit report of Arrow, a number of "serious violations and operational deficiencies [were] found during the review" and "significant breakdown in the carrier's safety management controls" was revealed. The audit report also noted:

[76] Remarks of Chairman Jim Hall, National Transportation Safety Board, *Symposium on Corporate Culture and Transportation Safety*, April 24, 1997, Washington, DC.

[77] Title 49 CFR Part 392.3:

> No driver shall operate a commercial motor vehicle, and a motor carrier shall not require or permit a driver to operate a commercial motor vehicle, while the driver's ability or alertness is so impaired, or so likely to become impaired, through fatigue, illness, or any other cause, as to make it unsafe for him/her to begin or continue to operate the commercial motor vehicle. However, in a case of grave emergency in which the hazard to occupants of the commercial motor vehicle or other users of the highway would be increased by compliance with this section, the driver may continue to operate the commercial motor vehicle to the nearest place at which the hazard is removed.

[78] In areas such as hours of service, vehicle inspections, accident report requirements, and insurance regulation requirements.

> Whenever an audit is conducted, if violations and operational deficiencies are brought to the carrier's attention, it is expected that they will take decisive and immediate corrective action to prevent future violations. When similar violations or operational deficiencies are again found during any subsequent audits, it has the appearance that the carrier has either chosen to ignore the violations or failed to take any initiative to address the concerns.

Arrow's management thus fostered the impression that corporate practices did not need to give priority to passenger safety. Therefore, the Safety Board concludes that at the time of the accident, Arrow had a documented history, as evidenced in FMCSA compliance reviews, of failing to adequately oversee operational safety issues and failing to correct inherent safety problems.

Motor Carrier and Federal Regulations

U.S. Department of Defense

On February 6, 1986, the Bureau of Motor Carriers (predecessor agency to the FMCSA) and MTMC/SDDC signed a Memorandum of Agreement that provided information and granted the MTMC/SDDC access to MCMIS, which contains a carrier's profile, accident history, enforcement inspection history, and compliance review and safety rating information. Arrow underwent inspections by the DoD's contractor in 1998, 1999, 2000, and 2001. The most recent inspection was on December 4, 2001, and resulted in a low rating of 4. The executive summary of the inspection report noted a number of serious violations and operational deficiencies. Neither the DoD contractor nor the MTMC/SDDC office contacted the FMCSA to report its findings, nor were they required to do so.

Many of the deficiencies noted in the MTMC/SDDC 2001 inspection were the same violations listed in the postaccident compliance review of Arrow and included violations in vehicle maintenance, driver qualifications, and driver records. Both the FMCSA in 1994 and MTMC/SDDC in previous inspections had identified these same deficiencies on the part of Arrow. According to the FMCSA, one mechanism that can trigger a compliance review is a complaint against a company. Had the MTMC/SDDC information been shared with the FMCSA, it may have caused the FMCSA to conduct a compliance review of Arrow before the accident. Additionally, in response to the FMCSA's postaccident compliance review, Arrow made changes, such as replacing management and supervisory personnel, in an attempt to correct the FMCSR violations. Therefore, the Safety Board concludes that although the FMCSA had not prioritized Arrow for a compliance review from 1994 until the accident, the agency might have done so if the MTMC had alerted the FMCSA to Arrow's unsafe, repetitive practices discovered during its inspection. The Safety Board believes that the MTMC/SDDC should provide motor carrier information, including timely results of passenger carrier inspection processes and ratings, to the FMCSA. Such an exchange would provide the FMCSA with an additional opportunity to identify potentially unsafe motor carriers and schedule

compliance reviews. In addition, the Safety Board believes the FMCSA should utilize motor carrier safety information, including results of compliance audit reports provided by the MTMC/SDDC, to determine whether further review of a motor carrier is warranted.

SafeStat

The FMCSA utilizes SafeStat to identify and prioritize carriers for FMCSA safety improvement programs, such as roadside inspections and compliance reviews. The SafeStat selection system is based on a carrier's history of previous roadside inspections, accidents, enforcement actions, and safety. The carrier's SEA value approximates the carrier's percentile rank relative to all other carriers with sufficient data to be assessed within the same SEA.

The IG's audit report presented to the FMCSA on February 13, 2004, made several conclusions regarding the SafeStat program. The IG found that material weaknesses existed in the data reported by the States and motor carriers and in the FMCSA's processes for correcting and disclosing data problems. The IG also determined that while SafeStat is sufficient for internal use, its continued public dissemination and external use require prompt corrective action. Both the IG's office and the FMCSA, in its response to the audit, agreed that existing data quality problems are likely to make a high-risk carrier appear to be a safe operator. The IG's report concluded:

> [W]hen motor carriers and the states provide insufficient data it creates an unknown degree of bias in SafeStat's rankings of motor carriers and limits SafeStat's effectiveness as a tool for identifying high-risk carriers. As a result, FMCSA cannot be sure it is focusing its resources for compliance reviews on carriers with highest-risk….Additionally, missing, incomplete, or untimely safety event data may cause public Internet users, who rely on specific rankings, to make incorrect decisions.

The SafeStat system ranks all motor carriers in relation to each other. But ranking passenger motor carriers in relation to nonpassenger carriers does not effectively draw attention to passenger carriers that should be considered high-risk. As of February 20, 2004, over 678,000 recorded motor carriers with census data in SafeStat were actively operating in interstate commerce. Of those, only 30,000 were passenger carriers. Therefore, not only are passenger carriers underrepresented in the larger motor carrier population, they are also underrepresented in SafeStat rankings. As a result, a passenger carrier that ranks poorly compared with other passenger carriers, may not rank poorly when compared to the larger population of motor carriers.

Because motorcoaches carry a large number of passengers who rely on the safety assessment of a given carrier in making transportation decisions, it is critical that passenger carriers be evaluated separately from the truck population. If passenger carriers were to be rated and evaluated only in relation to other passenger carriers, the resulting safety information would be more valid and would accurately highlight and prioritize unsafe carriers for the public using the Internet database, as well as for the FMCSA in compliance reviews or roadside inspections. Arrow had received a "pass" inspection recommendation,

even though not enough information on safety management was available for a rating; however, had the rating for Arrow more accurately reflected its actual safety management practices and adherence to the FMCSRs, the carrier may have been prioritized for an updated compliance review between 1994 and the accident date. For example, data in SafeStat included the Satisfactory rating Arrow had received during its 1994 compliance review despite a high frequency of repeated noncompliance with Federal safety regulations. The FMCSA recognized and discussed these issues with Arrow in all its compliance reviews, yet the FMCSA neglected to conduct periodic compliance reviews until after the Victor accident because Arrow was not rated a high-risk priority carrier in SafeStat.

Another accident investigated by the Safety Board also uncovered discrepancies in the SafeStat system. In June 2002 in Loraine, Texas,[79] a new entrant commercial motor carrier, which had been operating for 22 months without a compliance review, collided with a Greyhound motorcoach; three passengers were fatally injured and the driver and five passengers were seriously injured. The FMCSA practice of conducting compliance reviews based on the carrier's SafeStat score was one reason the carrier had not received a compliance review in 22 months. Yet many new entrant carriers, because they have not been reviewed, have no score in the Safety Management area and have no accident history. The Loraine accident carrier had high scores in the Vehicle and the Driver Safety evaluation areas, indicating many violations in these two important areas. But, because SafeStat uses a composite score, the carrier did not warrant a compliance review. As a result of the Loraine investigation, the Safety Board concluded that the current SafeStat system does not accurately reflect a new motor carrier's safety posture because the composite score is based on areas in which a new motor carrier may not be rated; therefore, SafeStat is unlikely to provide FMCSA inspectors with enough data to determine whether a safety audit should be performed sooner rather than later.

This same situation existed in Arrow's case, that is, the Safety Management area did not have enough information for a rating. Therefore, the composite score for Arrow indicated that the carrier did not warrant an inspection, and, as a result, a compliance review was not performed between 1994 and the accident in 2002. Even though the Driver and Vehicle areas included numerous violations in previous compliance reviews, this information was not reflected in the SafeStat category in which Arrow was placed. As a result of the Victor accident investigation, the Safety Board concludes that due to its composite ranking methodology, the current SafeStat program does not accurately reflect the safety fitness of motorcoach operators. The Safety Board believes that the FMCSA should revise the SafeStat system to compare passenger carriers to other passenger carriers to ensure accurate safety ratings.

Compliance Reviews and Safety Rating Effectiveness

The purpose of the FMCSA compliance review is to make sure that a motor carrier has adequate safety management controls in place to ensure compliance with applicable

[79] National Transportation Safety Board, *Collision of a Greyhound Lines, Inc., Motorcoach and Delcar Trucking Truck Tractor-Semitrailer, Loraine, Texas, June 9, 2002*, Highway Accident Report NTSB/HAR-03/01 (Washington, DC: NTSB, 2003).

Federal safety requirements. The compliance review utilizes a computer tabulation program to identify adherence with the FMCSRs in each rating factor based only on Acute or Critical regulations, while the noncritical and nonacute violations are not factored into the safety rating process. The Volpe National Transportation Systems Center reported that for the year 2000, the FMCSA performed 12,624 compliance reviews; of these reviews, 3.2 percent resulted in no violations, 16.1 percent resulted in Acute violations, 54.3 percent resulted in Critical violations, and 95.8 percent resulted in other, noncritical or nonacute violations. However, the noncritical or nonacute violations, regardless of the number or presence in previous reviews, were not considered in the safety rating process.

After the Victor accident, Arrow was found to be in noncompliance with 12 specific regulations regarding the required alcohol and drug testing and had a completely ineffective random testing program. Arrow failed to maintain the required records on the effectiveness of the tests performed, resulting in 100 percent noncompliance. Arrow did not complete driving record checks, which are undertaken to determine whether a driver is properly qualified and has had a background check. Arrow required or permitted drivers to drive for more than 10 hours, which violated the hours-of-service regulations. Arrow failed to require drivers to sign driver vehicle inspection reports when defects or deficiencies were noted. For 24 of 39 repair orders checked, Arrow did not have the required certification to verify that the repairs were made, even though these buses continued to transport passengers. The compliance review found violations that Arrow failed to inspect and maintain vehicles to ensure safe and proper operating conditions as well as failed to inspect safety items such as pushout emergency windows, emergency doors, and emergency marking lights every 90 days. This lack of operational oversight was also present during many FMCSA and MTMC/SDDC compliance reviews before the accident, even as recently as the December 2001 MTMC/SDDC inspection.

The Victor accident is one of many in which the Safety Board has identified the inadequacy of motor carrier inspections, including compliance reviews, as cause for concern. For example, in 1995, the Safety Board investigated an accident in Indianapolis, Indiana,[80] in which the motorcoach overturned when it entered an exit ramp, and as a result, 2 passengers sustained fatal injuries and 13 received serious injuries. Postaccident inspection of the vehicle revealed out-of-adjustment brakes, which probably contributed to the accident. The Office of Motor Carriers (now the FMCSA) conducted a postaccident compliance review of the operator, Hammond Yellow Coach Lines, Inc., (Hammond) that resulted in an Unsatisfactory rating (10 out of 10 vehicles reviewed were placed out of service).

Hammond had significant safety problems before the accident and yet was still permitted to operate. Between 1987 and 1995, the Office of Motor Carriers had inspected Hammond nine times. In 1993, the agency gave Hammond an Unsatisfactory rating, citing the carrier's accident rate and hours-of-service violations; 3 months later, the agency upgraded that rating to Satisfactory. In 1994, the agency used Indiana State Police terminal inspection results to determine the rating for its compliance reviews. Because of the high number of vehicles (63 percent) meeting out-of-service criteria, Hammond received a

[80] National Transportation Safety Board, *Selective Motorcoach Issues*, Special Investigation Report NTSB/SIR-99/01 (Washington, DC: NTSB, 1999).

Conditional rating for the Vehicle Factor component. But the agency rated all other factors Satisfactory, resulting in an overall rating of Satisfactory, and Hammond continued to operate with unsafe vehicles. Following the Indianapolis accident, the Safety Board recommended that the FHWA:

> H-99-6
>
> Change the safety fitness rating methodology so that adverse vehicle or driver performance-based data alone are sufficient to result in an overall unsatisfactory rating for the carrier.

On December 14, 1999, the Office of Motor Carriers responded that it expected to issue a notice of proposed rulemaking calling for a more performance-based means of determining carrier fitness to conduct commercial motor vehicle operations. The agency stated that it would take into account the Safety Board's recommendation, including any comments received, in developing a new system. On March 17, 2000, based on the expected notice of proposed rulemaking, the Safety Board classified Safety Recommendation H-99-6 "Open–Acceptable Response." The Board also added the recommendation to its Most Wanted List of Transportation Safety Improvements to increase the public's awareness of and support for action to adopt safety steps that can help prevent accidents and save lives.

Had the earlier compliance reviews of Arrow resulted in Unsatisfactory ratings, the carrier would have only had 45 days to correct the problems or cease operations. Instead, it received Conditional and Satisfactory ratings and continued to operate for 8 years without another review of its safety operations, even though the DOT notified a U.S. Senator that the DOT "would closely monitor Arrow Line vehicle and driver safety operations."[81] If the FMCSA received notification from the MTMC/SDDC when the latter inspects a motorcoach operation and gives the carrier a poor rating, if a more accurate SafeStat system for motorcoaches were in place, and if the compliance review rating methodology were revised to give appropriate weight to the driver and vehicle safety areas, the FMCSA would have accurate information regarding a carrier's level of passenger safety; under such conditions, Arrow would have received an Unsatisfactory rating.

In 2001, the Safety Board investigated an accident in Mountainburg, Arkansas,[82] in which a postaccident compliance review of the motor carrier, Stuart Trucking, resulted in a Conditional rating. The motor carrier received the FMCSA compliance review following an accident in which a Stuart Trucking truck collided with a school bus and killed three children. The postaccident compliance review resulted in a Conditional rating for Factor 2-Driver, a Satisfactory rating for Factor 4-Vehicle, an Unsatisfactory rating for Factor 5-Accident, and an overall Conditional rating.

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[81] From the DOT Office of Congressional Affairs' correspondence of October 31, 1995.

[82] National Transportation Safety Board, *Collision Between Truck Tractor Semitrailer and School Bus near Mountainburg, Arkansas, on May 31, 2001*, Highway Accident Report NTSB/HAR-02/03 (Washington, DC: NTSB, 2002).

The Safety Board determined that even if the Vehicle rating had been changed to Conditional as a result of the 2001 compliance review, Stuart Trucking's overall rating would have remained unchanged. Under current compliance review procedures, one Unsatisfactory factor rating and two or fewer Conditional factor ratings result in an overall Conditional rating. The 2001 rating for Stuart Trucking underscores the failure of compliance reviews to identify unsafe carriers. This carrier had not been rated in more than 11 years at the time of the accident. Despite having unsafe vehicles on the road and numerous driver violations, Stuart Trucking received a Conditional rating. As a result of the Mountainburg accident, the Safety Board reiterated Safety Recommendation H-99-6 to the FMCSA on September 4, 2002, urging the agency to change the safety fitness rating methodology so that adverse vehicle and driver performance-based data alone are sufficient to result in an overall Unsatisfactory rating.

Like Stuart Trucking, Arrow received a Conditional rating as a result of a postaccident compliance review. Although the FMCSA inspected 20 motorcoaches and placed 8 buses out of service, for an out-of-service rate of 40 percent, and in spite of Arrow's numerous other violations, the carrier received the Conditional rating. During the postaccident compliance review, the FMCSA stated that Arrow "revealed a non-compliance with the Federal Motor Carrier Safety Regulations in almost all applicable parts to Arrow's passenger transportation." However, many violations were not rated as Acute or Critical and therefore did not result in Conditional or Unsatisfactory factor ratings, even in the driver-related areas. The compliance review resulted in Satisfactory ratings for four of the five applicable factors and, thus, an overall Conditional rating, even though Arrow had violated nearly all applicable regulations. The Safety Board concludes that the current FMCSA compliance review process does not effectively identify unsafe motorcoach operators and prevent them from operating.

Following the Board's September 2002 reiteration of Safety Recommendation H-99-6, the FMCSA advised the Safety Board that it intended to issue a notice of proposed rulemaking regarding the safety fitness rating methodology in late 2003. Thus far, 5 years after the Safety Board first issued the recommendation, the FMCSA still has not published a notice of proposed rulemaking. In June 2004, the FMCSA notified the Board that it anticipates making a final determination concerning changes to the safety fitness rating methodology in 2004. The FMCSA indicated that it was considering whether to seek additional comments through a supplemental advanced notice of proposed rulemaking or to proceed directly to a notice of proposed rulemaking. The FMCSA anticipates completing the rulemaking process in 2005. Although the Safety Board is disappointed that the FMCSA has not acted on Safety Recommendation H-99-6, the action announced by the FMCSA is a positive, albeit overdue, effort to address this critical issue.

Survival Aspects and Motorcoach Crashworthiness

In the Victor accident, during the overturn of the bus onto its right side, many passengers were thrown toward the right into other passengers and into seats, windows, and other interior components. Because the glazing failed on the right side during the

overturn, the risk of ejection increased. In the case of the five ejected passengers found under the motorcoach, their contact with the windows that shattered during the vehicle's structural distortion and overturn caused them to be ejected, pinned beneath the still-moving vehicle, and fatally injured. Another ejected passenger who was seriously, but not fatally, injured and who had been seated in the front right side of the motorcoach told the NYSP she was ejected through the front windshield.

The motorcoach's interior compartment was not compromised by intrusion during the accident sequence and therefore adequate survivable space for the occupants was available. Based on the Safety Board's simulations, given the available survivable space within the passenger compartment postaccident, had the passengers remained in their seating area, their exposure to injury-causing impacts and to ejection would have been reduced and they probably would not have sustained such serious, or fatal, injuries. The passenger's injuries were a direct result of leaving the seating compartment, contacting other passengers and the vehicle's interior components, or being ejected during the accident sequence. The Safety Board concludes that the lack of motorcoach occupant protection systems to retain passengers in their seating compartment throughout the accident sequence contributed to the ejections and to the passengers' serious and fatal injuries.

Occupant ejection is a major cause of death in automotive crashes, accounting for over 10,000 deaths each year. In 2001, passenger vehicle rollovers resulted in 10,642 fatalities, and of these, 3,766 fatalities involved complete or partial ejection. The mitigation of these ejections is one of the most important objectives in rollover safety. [83] The fact that restraint systems prevent ejection during overturn accidents is well known. Motorcoaches are equipped with large panoramic windows that often fracture during rollovers and provide large open areas for ejection. As in the case of the Victor accident, fatalities in motorcoach collisions are often due to occupant movement outside of the seating compartment and ejections. Currently, no Federal regulation or standard exists that requires large motorcoaches, sold or operated in the United States, to be equipped with active or passive passenger protection. In Europe, regulations are in place that apply to the strength of the motorcoach superstructure and the strength of seats and their anchorages. These regulations are not compulsory, but manufacturers take them into account in developing, approving, and testing new motorcoaches.[84] The fitting of seat belts in Europe varies from country to country; however, the European Union Commission is attempting to make compliance with the seat belt regulation for new vehicles mandatory throughout the continent. In Australia, as a result of the number of severe motorcoach collisions and significant public pressure, regulations were introduced to address motorcoach rollover strength, seat and seat anchorage strength, and lap/torso restraints for motorcoaches.[85]

[83] Donald T. Willke, Stephen Summers, J. Stephen Duffy, Allison E. Louden, and Jeffrey C. Elias, "Status of NHTSA's Ejection Mitigation Research Program." ESV Conference Paper #342, May 19-22, 2003, Nagoya, Japan.

[84] RONA Kinetics and Associates, LTD.

[85] RONA Kinetics and Associates, LTD.

In the Safety Board's 1999 bus crashworthiness study,[86] the Board found that one of the primary causes of preventable injury in motorcoach accidents was occupant motion out of the seat during a collision. Two of the recommendations issued in that report also apply to the Victor accident. The Safety Board recommended that NHTSA:

> H-99-47
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> In 2 years, develop performance standards for motorcoach occupant protection systems that account for frontal impact collisions, side impact collisions, rear impact collisions, and rollovers.
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> H-99-48
>
> Once pertinent standards have been developed for motorcoach occupant protection systems, require newly manufactured motorcoaches to have an occupant crash protection system that meets the newly developed performance standards and retains passengers, including those in child safety restraint systems, within the seating compartment throughout the accident sequence for all accident scenarios.

On October 27, 2000, NHTSA responded that it had initiated a research plan in conjunction with motorcoach manufacturers to support the motorcoach crashworthiness recommendations. The Safety Board reiterated Safety Recommendations H-99-47 and -48 to NHTSA on August 28, 2001, as a result of the Board's investigation of a motorcoach accident in New Orleans, Louisiana,[87] in which 22 passengers died, 10 of whom had been ejected from the bus. In its report of the New Orleans accident, the Safety Board noted that it had identified occupant protection issues similar to those discussed in the *Bus Crashworthiness Issues* report. On March 6, 2002, NHTSA advised the Safety Board that it had assisted in the formation of the Bus Manufacturers Council, which will work to create industry-wide standards to enhance motorcoach safety. NHTSA also sponsored a motorcoach public safety meeting on April 30, 2002. Therefore, on June 28, 2002, the Safety Board classified Safety Recommendations H-99-47 and -48 "Open–Acceptable Action," pending development of industry-wide standards for occupant protection.

Recent motorcoach accidents that have occurred since the Safety Board's 1999 bus crashworthiness study continue to underscore the need for action from NHTSA in response to the Board's recommendations on motorcoach occupant protection. In the Victor accident, the majority of the passengers sustained minor injuries, while those fatal injuries sustained were a direct result of being ejected from the motorcoach or the seating compartment. In another accident investigated by the Board that occurred in Loraine, Texas,[88] a motorcoach operated by a driver and occupied by 37 passengers rear-ended a slow-moving tractor semitrailer. The Safety Board determined that the seriously injured passengers seated further to the rear of the area of impact were most likely thrown out of

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[86] NTSB/SIR-99/04.

[87] National Transportation Safety Board, *Motorcoach Run-off-the-Road, New Orleans, Louisiana, May 9, 1999*, Highway Accident Report NTSB/HAR-03/01 (Washington, DC: NTSB, 2001).

[88] NTSB/HAR-03/01.

their seating compartment during the collision events, thus sustaining their injuries. The Safety Board concluded from the Loraine accident investigation that the lack of a restraint system for the passengers contributed to the injuries of those seated outside the area of impact.

The Safety Board is currently investigating other motorcoach accidents in Hewitt, Texas, and Tallulah, Louisiana. In both accidents, passengers were also injured and killed after being thrown from their seating compartments into the area of impact. Currently, the United Kingdom and Australia require restraints, and Europe and Australia are actively researching, developing, and testing measures to improve occupant protection systems that can help prevent ejections, mitigate injuries, and reduce fatalities (for example, the development and testing of seat anchorage systems, the universal coach safety seat with three-point restraints, and the modeling and testing of coach structures for rollover strength). The tragic consequences of the Victor accident, as well as the Hewitt and Tallulah accidents, add urgency to Safety Recommendations H-99-47 and -48 to develop performance standards for motorcoach occupant protection systems that retain occupants within the seating compartment throughout accident scenarios. To date, NHTSA has done little to implement these recommendations; therefore, the Safety Board reiterates Safety Recommendations H-99-47 and -48.

Conclusions

Findings

1. The weather, the design and condition of the roadway, the mechanical condition of the motorcoach, and the driver's diabetes did not contribute to the accident; the test results showed no evidence of drug or alcohol use by the driver, and the emergency response was adequate.

2. The bus driver had less than 4 hours of interrupted sleep in a 51-hour period as a result of deliberately spending his off-duty hours in a casino; he was, therefore, severely fatigued at the time of the accident.

3. The accident bus left the roadway as a result of the driver falling asleep.

4. Even if passengers had called Driver's Alert to report the driver, a system was not in place to allow Arrow Line, Inc., to take immediate action.

5. Had Arrow Line, Inc., provided a method for passengers to contact the company to report the driver's severely fatigued condition, the company could have prevented the driver from beginning or continuing the accident trip.

6. The driver of the second Arrow Line, Inc., motorcoach did nothing to prevent the severely fatigued accident driver from transporting passengers in his impaired condition.

7. At the time of the accident, Arrow Line, Inc., had a documented history, as evidenced in Federal Motor Carrier Safety Administration compliance reviews, of failing to adequately oversee operational safety issues and failing to recognize and correct inherent safety problems.

8. Although the Federal Motor Carrier Safety Administration had not prioritized Arrow Line, Inc., for a compliance review from 1994 until the accident, the agency might have done so if the Military Traffic Management Command had alerted the Federal Motor Carrier Safety Administration to the Arrow Line, Inc.'s unsafe, repetitive practices discovered during its inspection.

9. The current Federal Motor Carrier Safety Administration compliance review process does not effectively identify unsafe motorcoach operators and prevent them from operating.

10. Due to its composite ranking methodology, the current SafeStat program does not accurately reflect the safety fitness of motorcoach operators.

11. The lack of motorcoach occupant protection systems to retain passengers in their seating compartments throughout the accident sequence contributed to the ejections and to the passengers' serious and fatal injuries.

Probable Cause

The National Transportation Safety Board determines that the probable cause of the accident was that the bus driver fell asleep while operating the motorcoach due to his deliberate failure to obtain adequate rest during his off-duty hours. Contributing to the cause of the accident was the second Arrow Line, Inc., motorcoach driver, who did nothing to prevent the severely fatigued driver from operating the accident motorcoach, and the failure of Arrow Line, Inc., and its holding company, Coach USA, to provide adequate oversight of their drivers. Contributing to the severity of the accident was the lack of occupant restraints for the motorcoach passengers.

Recommendations

New Recommendations

To the Federal Motor Carrier Safety Administration:

Require the posting of an emergency telephone number on the interior of motorcoaches for passengers to call in the event of an emergency with the driver. (H-04-18)

Revise the Safety Status Measurement System to compare passenger carriers to other passenger carriers to ensure accurate safety ratings. (H-04-19)

Utilize motor carrier safety information, including results of compliance audit reports provided by the U.S. Department of Defense Surface Deployment and Distribution Command, to determine whether further review of a motor carrier is warranted. (H-04-20)

To the U.S. Department of Defense Surface Deployment and Distribution Command:

Provide motor carrier information, including timely results of passenger carrier inspection processes and ratings, to the Federal Motor Carrier Safety Administration. (H-04-21)

To Coach USA and its subsidiaries:

Evaluate all calls reporting dangerous driver behaviors immediately upon receiving them and establish a method to reach the driver so that Coach USA can evaluate the driver's fitness for duty and take appropriate countermeasures, if necessary. (H-04-22)

Reiterated Recommendations

The National Transportation Safety Board also reiterates the following recommendations:

To the National Highway Traffic Safety Administration:

In 2 years, develop performance standards for motorcoach occupant protection systems that account for frontal impact collisions, side impact collisions, rear impact collisions, and rollovers. (H-99-47)

Once pertinent standards have been developed for motorcoach occupant protection systems, require newly manufactured motorcoaches to have an occupant crash protection system that meets the newly developed performance standards and retains passengers, including those in child safety restraint systems, within the seating compartment throughout the accident sequence for all accident scenarios. (H-99-48)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

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Member

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Member

RICHARD F. HEALING
Member

Adopted: June 22, 2004

Appendix A

Investigation and Public Hearing

The National Transportation Safety Board was notified of the Victor, New York, accident on June 23, 2002. An investigative team was dispatched on July 7, 2002, with members from the Washington, D.C.; Denver, Colorado; Gardena, California; and Parsippany, New Jersey, offices. Groups were established to investigate human performance aspects; motor carrier operations; and highway, vehicle, and survival factors.

Participating in the investigation were representatives of the Federal Motor Carrier Safety Administration, the New York State Police, the New York State Thruway Authority, and Motor Coach Industries, Inc.

No public hearing was held; no depositions were taken.

Appendix B

Arrow Compliance Review and Safety Rating History

Compliance review date	Rating date	Rating
July 18, 1989	September 20, 1989	Unsatisfactory
December 21, 1989	January 26, 1990	Conditional
August 20, 1990	August 30, 1990	Conditional
October 3, 1990	October 9, 1990	Satisfactory
March 18, 1992	May 28, 1992	Satisfactory
June 24, 1994	July 18, 1994	Conditional
November 21, 1994	December 8, 1994	Satisfactory
August 8, 2002 (postaccident)	October 8, 2002	Conditional

Appendix C

Safety Evaluation Area Criteria

Within SafeStat, motor carriers are evaluated in four Safety Evaluation Areas (SEAs): Accident, Driver, Vehicle, and Safety Management. Based on the value assigned to a carrier, carriers are then ranked against other carriers within their peer group and are assigned a percentile in the range of 0-100 (100 being the worst). Then all four SEA values are combined and an overall SafeStat score is calculated. Only carriers that have deficient SEA values of 75 and higher in two or more SEAs receive a SafeStat score that is equal to the sum of the deficient SEA values for the Vehicle and Safety Management SEAs, plus two times the deficient Accident SEA value, plus 1.5 times the deficient Driver SEA value. The single SEA category SafeStat score is based on carriers deficient in one SEA.

Category	SafeStat score range	Includes SEA values of 75 or higher
A	>350 to <550	All 4 SEAs 3 SEAs that result in score of 350 or more
B	>225 to >350	3 SEAs that result in score of less than 350 2 SEAs that result in score of 225 or more
C	>150 to <225	2 SEAs that result in score of less than 225 2 SEAs that result in score of 150 or more
Single SEA category	**Specific SEA**	**SEA value**
D	Accident	75 to 100
E	Driver	75 to 100
F	Vehicle	75 to 100
G	Safety Management	75 to 100
H	All	Less than 75

Appendix D

ISS-2 Recommendation and Inspection Values

The Federal Motor Carrier Safety Administration computer program Inspection Selection System (ISS-2) was designed to assist field inspectors with selecting vehicles for inspection by identifying the carriers and vehicles that have a history of unsafe practices and poor safety performance. The ISS-2 criteria are based on data analysis from the Motor Carrier Management Information System, SafeStat ratings, or PRISM.[1] If SafeStat contains insufficient data, the ISS-2 values are based on carrier size and the number of past inspections. The inspector's ISS-2 inquiry results in one of three responses: Pass, Optional, and Inspect. Carriers are rated on a 100-point system.

The ISS-2 also displays a section on the carrier's violation details that compares the carrier's violation history to the national violation warning threshold[2] in specific categories. Carriers that have a violation history greater than the warning threshold are highlighted, alerting the inspector to concentrate on or closely attend to those items during an inspection process.

Recommendation	ISS-2 inspection value
Inspect (inspection warranted)	75-100
Optional (may be worth a look)	50-74
Pass (no inspection required)	1-49

[1] A Federal and State program that links motor carrier safety fitness to State commercial vehicle registrations. For more information, access <www.fmcsa.dot.gov/factfigs/Prism.htm>.

[2] A Federal Motor Carrier Safety Administration algorithm using national inspection histories and carrier census information.

Appendix E

FMCSA Compliance Reviews and Roadside Inspections

On June 7, 2004, the Federal Motor Carrier Safety Administration reported 674,101 active interstate carriers, of which 10,183, or 1.5 percent, were active interstate passenger carriers with at least one motorcoach. The FMCSA further reported the following statistics:

Table E-1. Number of Federal compliance reviews conducted on active interstate passenger motorcoach carriers* and roadside inspections conducted in fiscal years 2003, 2002, and 2001.**

Program output	Fiscal year 2003	Fiscal year 2002	Fiscal year 2001
Compliance reviews on active interstate carriers	11,270	8,826	10,840
Compliance reviews on active interstate passenger carriers with at least one motorcoach	261	250	441
Percentage of compliance reviews on active interstate passenger carriers	2.32%	2.83%	4.07%
Roadside inspections, trucks	2,993,176	2,904,348	2,627,605
Roadside inspections, buses	42,218	38,932	35,786

*As of June 7, 2004, according to the Federal Motor Carrier Safety Administration.
**As of March 31, 2004, according to the Federal Motor Carrier Safety Administration's *Motor Carrier Safety Progress Report*.

Appendix F

October 2002 FMCSA Compliance Review of Arrow Line, Inc.

The following is a verbatim excerpt from the October 2002 compliance review of Arrow Line, Inc.

19 out of 191 random tests from January 1 through May 30, 2002, were performed on drivers who were not selected by scientifically valid method, nor were they listed as alternate on random controlled alcohol selection lists. Results were in 9.9 percent violation rate.
162 safety sensitive employees out of 334 selected for random controlled substance and/or alcohol testing, were either not tested or test results were unavailable to confirm tests were in fact performed. This was 49 percent violation rate.
29 out of 146 driver vehicle inspection reports were unavailable (or not prepared and submitted) for interstate trips made for 8 out of 11 vehicles checked. This resulted in 25 percent violation rate.
Using driver before motor carrier has received negative preemployment controlled substance test result.
Failing to prepare and maintain on file record stating reasons alcohol and controlled substances postaccident tests were not properly administered.
Failing to ensure that each driver selected for random alcohol and controlled substances testing has equal chance of being selected each time selections are made.
Failing to maintain list or certificate relating to violations of motor vehicle laws and ordinances required by 391.27.
Failing to maintain inquiries into driver's employment record in driver's qualification file.
Failing to ensure that drivers are tested within selection period.
Failing to ensure persons designated to determine that drivers undergo reasonable suspicion testing receive 60 minutes training for alcohol and/or 60 minutes of training for controlled substances.
Failing to maintain medical examiner's certificate in driver's qualification file.
Requiring or permitting driver to drive after having been on duty 15 hours.
Failing to require inspector to prepare periodic inspection reports as prescribed.
Failing to obtain from driver for first time or intermittently a signed statement giving total time on duty during preceding 7 days and time which last relieved from duty.
Failing to inspect push-out windows, emergency doors, and emergency marking lights in buses at least every 90 days.
Failing to certify that reports were made or not necessary.

65 out of 232 Arrow Line, Inc., employees who performed safety sensitive functions were not enrolled in Arrow Line, Inc., random controlled substance and alcohol selection pool, based on current Arrow Line, Inc., safety sensitive employees list and list of drivers currently enrolled in random controlled substance and alcohol selection pool, as of July 1, 2002. This resulted in 28 percent violation rate.
34 out of 604 records of duty status checked were noted as False Record of Duty Status for 6 out of 18 drivers checked; 6 percent violation rate. Falsification of records of duty status was discovered for drivers designated as Part Time, and numerous part-time drivers had outside employment in addition to Arrow Line, Inc., and failed to report additional work hours on records of duty status submitted.
Using driver to perform safety sensitive functions after failing to obtain information required by 40.25(b), from previous employers within 30 days without obtaining or making and documenting good faith effort to obtain information.
Failing to conduct postaccident alcohol and controlled substances testing for each surviving driver.
Failing to use scientifically valid method to select drivers for random testing.
Failing to maintain driver's employment application in driver's qualification file.
Failing to maintain a note relating to the annual review of driver's driving records as required by 391.25(c)(2).
Failing to make an inquiry into the driving record of each driver to the appropriate State agencies in which the driver held a commercial motor vehicle operators license at least once every 12 months.
Failing to investigate driver's background.
Required, permitted, or authorized an employee with Commercial Driver's License which is suspended, revoked, or cancelled by State or who is disqualified to operate commercial motor vehicle.
Requiring or permitting driver to drive more than 10 hours.
False reports of records of duty status. False reports of records of duty status (inaccurate).
Failing to require driver to prepare record of duty status in form and manner prescribed.
Failing to inspect and maintain vehicle to ensure safe and proper operating condition.
Failing to require driver to prepare driver vehicle inspection report.
Failing to require driver to sign vehicle inspection report when defects or deficiencies were noted.

Appendix G

DOT Office of Inspector General Report

The following information is a verbatim excerpt from the recommendations in the U.S. Department of Transportation Office of Inspector General's (OIG's) Report (MH-2004-034) and from the U.S. Department of Transportation Federal Motor Carrier Safety Administration's (FMCSA's), January 14, 2004, response to those recommendations.

OIG Recommendation # A1.

Initiate an effectiveness study of the current model that tests the model's key parameters, assesses possible model adjustments to account for missing data, and evaluates whether the use of vehicle miles traveled or adjustments for team drivers would improve SafeStat calculations. The result of the study should be subjected to independent review by a party outside of Volpe.

FMCSA Response to A1.

FMCSA has an independent analysis contractor on board to revalidate the SafeStat model. The study should begin early in 2004.

OIG Recommendation # A2.

Establish processes for soliciting public comment on proposed changes in SafeStat calculations, to include those changes if any, resulting from the revised effectiveness study.

FMCSA Response to A2.

FMCSA has an effective public comment process. The FMCSA's Analysis & Information online site that displays SafeStat data to the public has a feedback mechanism, whereby the industry and public can offer suggestions on improvements. In fact, the majority of SafeStat changes have originated from industry and other stakeholder feedback. FMCSA will explore the feasibility of using the existing feedback mechanism on A&I to solicit public comment on proposed changes.

OIG Recommendation # B1.a.

Take immediate action to mitigate the impact of inaccurate or incomplete data on public users of SafeStat by making available to all states an improved system for facilitating the correction of data inaccuracies and the tracking of corrective actions within 3 months following the issuance of this report.

FMCSA Response to B.1.a.

In late January 2004, FMCSA will implement the DataQs system, an electronic means for filing concerns about Federal and State data released to the public by FMCSA. Through this system, data concerns are automatically forwarded to the

appropriate office for resolution. This system will simplify the existing process and provide a mechanism for FMCSA, the States, and the public to track data challenges. In addition, monthly updates of SafeStat scores should be recognized as a data quality improvement. Now, when a carrier updates its census data and gets an inaccuracy corrected, its SafeStat score will show an improvement in 30 days or less, instead of up to 6 months later.

OIG Recommendation # B.1.b.

Take immediate action to mitigate the impact of inaccurate or incomplete data on public users of SafeStat by disclosing data problems, including variations in State reporting, to public users of SafeStat.

FMCSA Response to B.1.b.

FMCSA will add clear and comprehensive guidance for web users as to the limitations of the data by the end of January 2004. We will further enhance this guidance by adding information on each State's timeliness, accuracy, and completeness.

OIG Recommendation # B.2.a.

As expeditiously as possible, establish an overall data quality improvement program that addresses longstanding issues associated with motor carrier census data by imposing fines on carriers that fail to provide updated carrier census information despite repeated opportunities to do so.

FMCSA Response to B.2.a.

Beginning January 2004, all reminder notices sent to motor carriers about filing their biennial update will contain the following statement: Even if the information has not changed or your company is no longer in business (or no longer operating commercial vehicles in interstate commerce), we need you to file this update. Please note that, under 49 CFR 390.19(e), failure to file a new and accurate Form MCS-150 may result in the imposition of a civil penalty of $550 for each offense. Each day the violation continues constitutes a separate offense, and the total penalty for all offenses related to a single violation may reach $5,500. In January 2003, to help improve the response rate of the biennial update, FMCSA provided an easy way for carriers to update their census data online. Currently, 40 percent of carriers are providing updates in this manner. We also developed a plan for addressing the missing respondents and are weighing implementation options. In addition, FMCSA's New Entrant program meets with each new motor carrier within the first 18 months of operations and conducts a safety audit. In this audit, census data is verified and updated. If the new entrant fails to pass the safety audit, the USDOT number is revoked.

OIG Recommendation # B.2.b.

As expeditiously as possible, establish an overall data quality improvement program that sets minimum standards for the quality of SafeStat data consistent with the Department's data quality guidelines. At a minimum, the standards should address completeness, accuracy, and timeliness of data.

FMCSA Response to B.2.b.

FMCSA is undertaking a continuous data quality process, including developing a comprehensive data quality plan in FY 2004. Some of the planned components of this process include: (1) awarding a contract to conduct a sample certification of source documents (inspection and crashes) against what is uploaded; (2) coordinating with OIG to identify additional edit checks, (3) conducting training sessions at FMCSA's IT workshop that specifically address data quality issues, (4) assigning a person in FMCSA to review the monthly timeliness, non-match, and traffic enforcement reports by State to identify problems and work with States to resolve them, and (5) review recently completed analysis on improving the biennial update response rate. FMCSA has set data quality goals for timeliness, completeness, and accuracy of crash data.

OIG Recommendation # B.2.d.

As expeditiously as possible, establish an overall data quality improvement program that enhances the depth, frequency, and type of FMCSA State data quality reviews and monitoring, and ensures State plans address data quality.

FMCSA Response to B.2.d.

FMCSA responded that part of their continuous data quality process will involve assigning a person in FMCSA to review the monthly timeliness, non-match, and traffic enforcement reports by State to identify problems and work as part of the Commercial Vehicle Analysis Reporting System (CVARS) program.

OIG Recommendation # B.2.c.

As expeditiously as possible, establish an overall data quality improvement program that accomplishes actions planned, in conjunction with the National Highway Traffic Safety Administration, for improving the completeness and timeliness of state-reported crashes.

FMCSA Response to B.2.c.

In early Summer 2003, FMCSA provided grants to 22 States under the Commercial Vehicle Analysis Reports System (CVARS) program to improve their crash data reporting. We recently found that 11 of these States had shown a marked increase in the completeness of crash data reporting. We continue to include more States in CVARS, and have established goals for accuracy, timeliness, and completeness. Through training and data system improvements, we expect the States to make significant strides in the quality of crash data reporting.with the States to resolve them.

OIG Recommendation # B.2.e.

As expeditiously as possible, establish an overall data quality improvement program that modifies FMCSA guidance and funding decisions so that MCSAP incentive grant awards are based, in part, on each State's implementation of guidelines established to provide accurate, complete, and timely safety event data.

FMCSA Response to B.2.e.

FMCSA responded that they could not agree with the specific approach of penalizing States for data problems, because they believe that withholding funds may lead to a reduced level of enforcement. In the alternative, FMCSA believed that providing incentive funding to States will assist them in improving data quality reporting processes. In fact, receiving high priority MCSAP grants will be tied to participation in the DataQ system. This information we sent out in mid-January to each MCSAP agency.

On May 11, 2004, the FMCSA provided the Safety Board with the following updated status of its progress in response to the OIG audit report (MH-2004-034) of the FMCSA SafeStat system.

FMCSA updated response to A1:

The Volpe Center conducted an updated effectiveness study of the current SafeStat version 8.5 and recent motor carrier data (available as of March 2003). The updated study (dated March 2004) again confirmed SafeStat's effectiveness. The FMCSA has contracted with Oak Ridge National Laboratories (ORNL) to independently review and validate the findings of the updated report. ORNL held an initial meeting with the Volpe Center authors on February 25, 2004. ORNL submitted a draft statement of work outlining its strategy for conducting the validation to the Analysis Division of Volpe, and ORNL proposes to complete its draft validation report by June 30, 2004. The Analysis Division of Volpe will review the draft validation report, share it with others within FMCSA for their review and concurrence, and present the final report to the FMCSA Administrator no later than September 30, 2004. The FMCSA states the study is on target for October 2004.

FMCSA updated response to A2:

FMCSA's Analysis & Information online site that displays SafeStat data to the public has a feedback mechanism available on every Web page whereby the industry and public can provide comments and offer suggestions for improvement. In fact, the majority of SafeStat changes have originated from industry and other stakeholder feedback. FMCSA will modify the existing feedback mechanism on A&I to solicit public comment on proposed changes. The updated feedback mechanism was operational on April 30, 2004.

FMCSA updated response to B1.a:

On February 27, 2004, we implemented the new electronic system (DataQs) for filing concerns about Federal and State data released to the public by FMCSA.

FMCSA updated response to B1.b:

FMCSA implemented a "SafeStat Disclaimer" Web page on SafeStat Online in January 2004 that cautions users on the appropriate use of SafeStat data. All public users of SafeStat Online must acknowledge this cautionary message before proceeding into SafeStat Online. In addition, FMCSA developed a report that rates the quality of individual State crash and inspection data reporting on the basis of data completeness, timeliness and accuracy. The report was approved by

FMCSA top management on March 23, 2004, and is being sent to the States for review, comment and concurrence. Within 60 days of approval of the final product by FMCSA management, the report will be added to the A&I Online Web site. On target for May of 2004.

FMCSA updated response to B2.a:

As noted in the OIG report (MH-2004-034), on January 1, 2004, FMCSA began incorporating stronger language in the biennial update reminder letter to ensure that motor carriers understand the penalties for not filing the updated information on their operations. In spring 2004, FMCSA began working with motor carrier organizations, such as the American Trucking Associations, to identify other methods to ensure that motor carriers are aware of the update requirement. Strategy developed to increase response to update requirements. Statistical sampling of biennial update non-respondents has been identified by FMCSA and reviewed by BTS and OST. Contacts will be made to determine why carriers did not respond. On target for June of 2004. A requirement of PRISM is for the States to deny International Registration Plan (IRP) license plate renewal when the MCS-150 "date of last update" is greater than 12 months old at the time of renewal. In other words, the States require that the carriers update if the MCS-150 will expire in the registration year. PRISM states that require MCS-150 update with IRP renewal: Arizona, Colorado, Connecticut, Georgia, Indiana, Iowa, Kentucky, Maine, Minnesota, North Carolina, Ohio, Pennsylvania, South Dakota, Tennessee, and Washington.

FMCSA updated response to B2.b:

FMCSA will develop the initial version of a comprehensive data quality plan by July of 2004. This plan will be an evolving document addressing new data improvement methods as they are identified. The initial plan will provide for one-on-one contact with State document processors; verification of source documents; identification of additional edit checks; conducting training sessions on data quality issues; assigning staff to monitor reports on the quality of State data; and addressing the analysis of the biennial update non-respondents. It will also set quality goals for timeliness, completeness and accuracy as part of the Commercial Vehicle Analysis Reporting System (CVARS) program. A comprehensive data quality plan is on target for July of 2004.

FMCSA updated response to B2.c:

FMCSA's Analysis Division has developed a draft project plan (dated February 24, 2004) that presents a multi-faceted, multi-year strategy for a nationwide crash data improvement project. This project will culminate in significant improvements to the collection and reporting of eligible large truck and bus crash data by the States through SAFETYNET to the FMCSA. It contains a list of major tasks and deliverables as well as associated activities within each task. The project plan establishes the following goal: all States and the District of Columbia will report complete, accurate and timely data on all data elements identified by FMCSA for at least 95 percent of all eligible trucks and buses involved in all eligible crashes by September 30, 2010. In summary, the long-term project goal is nearly full reporting with improved timeliness, accuracy, and completeness. FMCSA will seek input from NHTSA and other organizations regarding the draft plan, and will look for partnering opportunities in implementing the plan.

The project plan also includes helping the States improve their processes for collection and use of commercial motor vehicles (CMV) involved crash information (through FMCSA-sponsored training and education) so that there is a lasting improvement in quality of data and analysis; helping States improve the CMV-related portions of their Traffic Records Systems in order to support the improved collection and reporting of crash information; facilitating and encouraging a close working relationship between FMCSA division administrators and stakeholders in the State's motor carrier safety environment. In the plan, States will be asked to (1) work with FMCSA to assess their crash data reporting strengths and weaknesses and (2) develop proposals for assistance (financial and non-financial) from FMCSA. FMCSA will then evaluate, approve (if viable), and fund viable State proposals, using funding provided by the U.S. Congress for crash data improvements. FMCSA will ensure that each proposal includes metrics that allow FMCSA to periodically measure State crash data accomplishments, and the agency will establish and implement a tracking system to monitor State accomplishments quarterly and provide quarterly feedback to States. The plan has been completed, NHTSA has submitted their comments, and the OIG has reviewed it.

FMCSA updated response to B2.d:

FMCSA's data quality coordinator has been assigned the responsibility for monitoring the monthly State reports in timeliness, non-match and traffic enforcement records and working with the appropriate States to resolve issues. The reviews will begin in spring 2004. As noted in the response to Recommendation B2.c, FMCSA will work with the States to ensure their plans address data quality. This is on target for June 2004.

FMCSA updated response to B2.e:

As noted in the OIG report (MH-2004-034), FMCSA has taken an alternative approach to meeting the objectives of this recommendation. In mid-January 2004, FMCSA notified each Motor Carrier Safety Assistance Program (MCSAP) agency that high priority grants will be contingent on its "participation in the electronic tracking system for data challenges" known as DataQs. This has been completed.

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