



National Transportation Safety Board  
Washington, DC 20594

**Highway Accident Brief**

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**Accident Number:** HWY-06-MH-013  
**Accident Type:** Rear-end chain-reaction collision  
**Location:** State Route 121, near Lake Butler, Florida  
**Date and Time:** January 25, 2006, 3:25 p.m. eastern standard time  
**Vehicles:** 1996 Thomas Built school bus  
1993 Pontiac Bonneville sedan  
2004 Freightliner truck tractor and 1998 Wabash box trailer  
**Owners/Operators:** Union County, Florida, School District  
Private owner  
Crete Carrier Corporation  
**Fatalities/Injuries:** 7 fatalities  
5 serious injuries  
6 minor injuries

**Accident Description**

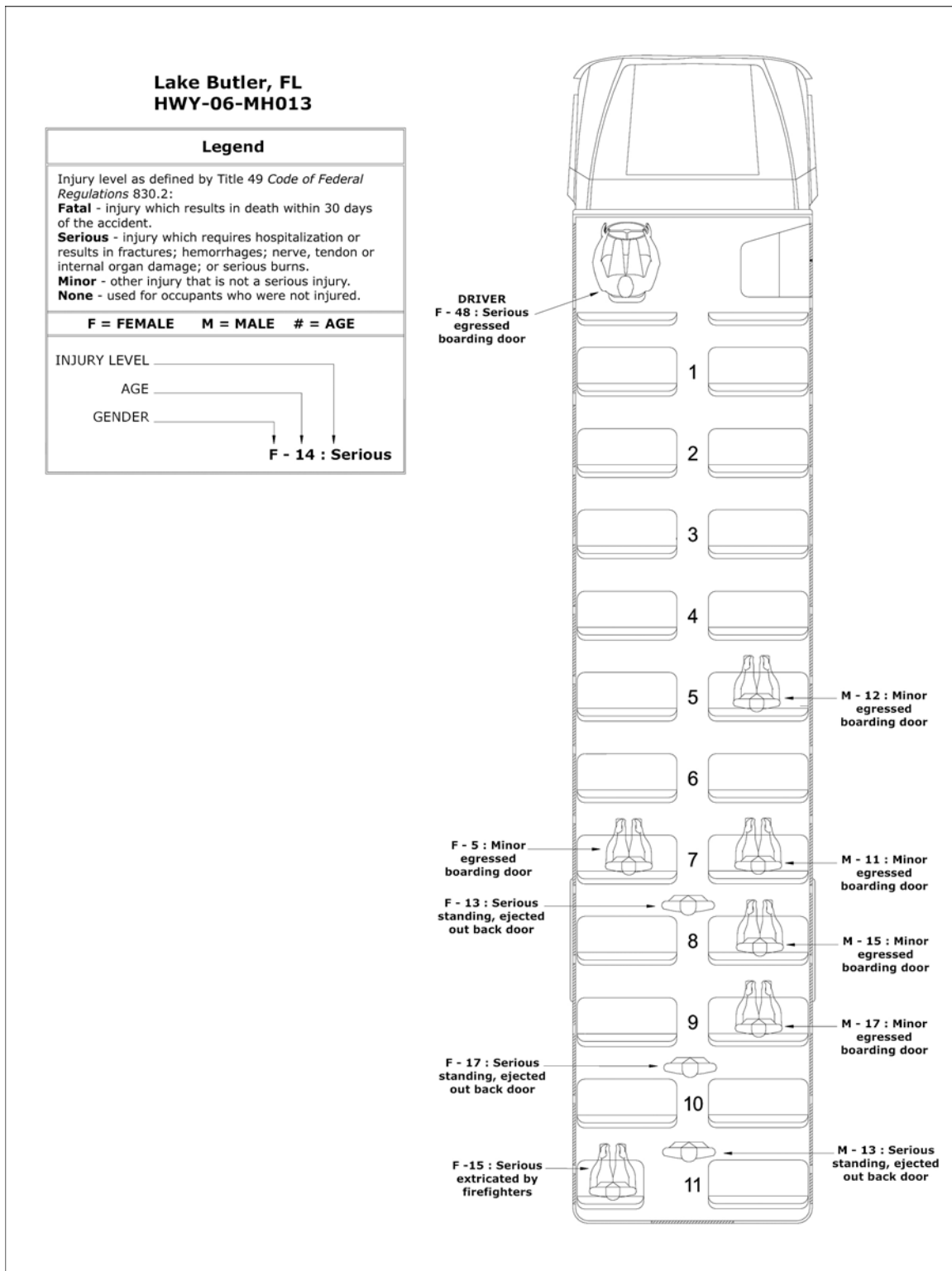
About 2:40 p.m. on Wednesday, January 25, 2006, a 31-year-old truck driver, operating a 75,360-pound 2004 Freightliner truck tractor and 1998 Wabash box trailer combination unit (Freightliner), departed High Springs, Florida, on an 85-mile trip to a company warehouse in Jacksonville, Florida. The driver was transporting a load of bottled water. Meanwhile, about 3:05 p.m., a 48-year-old school bus driver began her afternoon route in a 1996 Thomas Built school bus, Union County bus no. 13.

The northbound school bus was stopped on State Route (SR) 121 at bus stop no. 10, near 75th SW Terrace, to discharge two students. A 1993 Pontiac Bonneville—occupied by a 15-year-old driver and six passengers, ages 20 months to 15 years—was stopped behind the school bus. As the school bus was beginning to proceed, the Freightliner collided with the rear of the Pontiac and the bus. Police estimated the speed of the Freightliner to be 62 mph.

The Freightliner and the Pontiac continued forward from the impact area, departing the travel lanes to the right. The Freightliner then traveled 260 feet and collided with a 21-inch-diameter pine tree. The Pontiac was pushed 272 feet to its final position, where it was destroyed in a postcrash fire. The school bus was pushed a distance of 328 feet and came to rest on the right side of the road. Both the Freightliner and the school bus sustained extensive impact damage.

All seven occupants of the Pontiac were killed. Three of the nine students on the school bus were ejected from the rear of the vehicle and landed on highway pavement, seriously injured. One other student sustained serious injuries and was extricated from the bus by firefighters. The school bus driver, who was wearing a lap shoulder belt, also sustained serious injuries. Five

students and the truck driver received minor injuries. The students who had been discharged from the bus just before the accident were not injured. Figure 1 shows the seating chart for the school bus, and table 1 provides injury information.



**Figure 1.** Seating chart, Union County school bus.

**Table 1.** Injuries.

<b>Injury<sup>A</sup></b>	<b>School bus driver</b>	<b>School bus passengers</b>	<b>Pontiac occupants</b>	<b>Truck driver</b>	<b>Total</b>
Fatal	0	0	7	0	7
Serious	1	4	0	0	5
Minor	0	5	0	1	6
None	0	0	0	0	0
<b>Total</b>	<b>1</b>	<b>9</b>	<b>7</b>	<b>1</b>	<b>18</b>

<sup>A</sup>Title 49 *Code of Federal Regulations* (CFR) 830.2 defines fatal injury as any injury that results in death within 30 days of the accident. It defines serious injury as any injury that requires hospitalization for more than 48 hours, commencing within 7 days of the date of injury; results in a fracture of any bone (except simple fractures of the fingers, toes, or nose); causes severe hemorrhages, or nerve, muscle, or tendon damage; involves any internal organ; or involves second- or third-degree burns, or any burns affecting more than 5 percent of the body surface.

## Highway

The accident occurred on SR 121 at milepost 5.4. The Florida Department of Transportation (FDOT) classifies SR 121 as a rural minor arterial roadway.<sup>1</sup> According to FDOT, the average daily traffic on this roadway in 2004 in the vicinity of the accident was 6,100 vehicles, with buses accounting for 1 percent and trucks accounting for 22 percent of the total vehicular traffic.

At the accident location, SR 121 is a two-lane undivided asphalt roadway running north–south. The paved area consists of two 12-foot-wide main travel lanes, marked by solid 6-inch white lines, with a 5-foot-wide shoulder on either side. The paved shoulders border 3-foot-wide grass areas. A 6-inch yellow dashed centerline separates the northbound and southbound lanes. The speed limit was 60 mph, and speed limit signs were located 2.7 miles prior to the accident scene.<sup>2</sup> Figure 2 presents a view of SR 121 northbound, 375 feet prior to the accident location.

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<sup>1</sup> American Association of State Highway and Transportation Officials, *A Policy on Geometric Design of Highways and Streets*, fifth edition (Washington, DC: AASHTO, 2004) 9. AASHTO classifies a rural minor arterial roadway as follows: “The rural minor arterial road system, in conjunction with the rural principal arterial system, forms a network with the following service characteristics: 1. Linkage of cities, larger towns, and other traffic generators (such as major resort areas) that are capable of attracting travel over similarly long distances. 2. Integrated interstate and intercounty service. 3. Internal spacing consistent with population density, so that all developed areas of the state are within reasonable distances of arterial highways. 4. Corridor movements consistent with items (1) through (3) with trip lengths and travel densities greater than those predominantly served by rural collector or local systems.”

<sup>2</sup> A speed study conducted by Safety Board investigators on January 30, 2006, from 3:00–4:00 p.m., in the northbound lanes of SR 121, showed the 85<sup>th</sup> percentile speed as 65 mph.



**Figure 2.** SR 121 approaching accident location.

The 2003 *Manual on Uniform Traffic Control Devices* (MUTCD) recommends that *School Bus Stop Ahead* signs be installed in advance of school bus stops where the bus is not visible to road users for a distance of 500 feet.<sup>3</sup> FDOT provides similar guidance.<sup>4</sup> No school bus signs were located in the vicinity of the accident. The Safety Board conducted a sight distance test on January 31 and February 1, 2006, assisted by the Florida Highway Patrol, which showed that the school bus was visible for a distance of 3,087 feet, far above the recommended 500 feet. The alternating red warning lights on the rear of the school bus were visible at 1,382 feet. A regulatory sign stating *All Traffic Both Directions STOP While School Buses Load or Unload* was located about 4 miles in advance of the accident site.

## **Vehicles**

### **School Bus**

The accident bus was a 65-passenger school bus manufactured in 1996 by Thomas Built Buses, Inc. The bus weighed 17,250 pounds and had a body length of 417.9 inches.

The bus sustained the majority of damage at the rear end, where it was struck by the Freightliner. The rear of the bus was pushed inward just left of center, which affected the entire rear surface area of the bus, to just below roof level. (See figure 3.) The maximum point of

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<sup>3</sup> U.S. Department of Transportation, Federal Highway Administration, *Manual on Uniform Traffic Control Devices for Streets and Highways*, Part 7, Traffic Controls for School Areas (Washington, DC: FHWA, 2003) 7B-3.

<sup>4</sup> Florida Department of Transportation, *Design Standards, School Signs, and Markings*, Sheet No. 4 of 6, Index No. 17344 (Tallahassee, FL: FDOT, 2006).

inward intrusion was about 5 feet. The entire bus body was deformed from the rear-end damage, and the driver's seat was sheared off its pedestal mounting.



**Figure 3.** Accident school bus.

The tires on the bus met recommended manufacturer specifications and were in good condition. The steering and the suspension systems appeared to be normal. The brake on the left front axle was found to be out of adjustment and would have resulted in the bus being out of service according to the Commercial Vehicle Safety Alliance North American Standard Out-of-Service Criteria. However, the bus was nearly stopped at the time of the accident, and the braking system was not causal to the accident.

Statements from the bus driver, passengers, and a witness driving in the opposite direction indicated that the bus warning lights and strobe light were activated while the bus was stopped and discharging passengers. Statements from the bus driver and passengers also indicated that, at the time of impact, the school bus door was closed, the warning lights were turned off, and the bus was beginning to move forward. The Safety Board laboratory examination of the lights revealed that none of the filaments contained hot stretching damage.<sup>5</sup>

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<sup>5</sup> The Safety Board examined the warning lights in the dash; the top-rear, bottom-rear, top-front, and bottom-front stop sign light bulbs; and the left-rear, middle-rear, right-rear, left-side, and right-side clearance lights.

## ***Passenger Car***

The passenger car involved in the accident was a 1993 Pontiac Bonneville. The sedan had a precrash curb weight of 3,355 pounds, a length of 200.9 inches, a width of 73.7 inches, and an overall height of 55.6 inches.

The vehicle was extensively damaged by the impact of the Freightliner and the postcrash fire, which consumed most of its nonmetal components. (See figure 4.) The Florida State Fire Marshal determined that the origin of the fire was the fuel tank located at the rear of the vehicle; the tank was found to have been breached as a result of the crash and to have come into contact with the pavement, introducing an ignition source. The fuel tank had a small tear from being ground into the pavement.



**Figure 4.** Remains of accident passenger car.

## ***Tractor-Trailer Combination Unit***

The accident truck tractor was a 2004 Freightliner, and the trailer was a 1998 Wabash box trailer 53 feet long, 13.5 feet tall, and 8.5 feet wide. The total weight of the truck tractor-trailer combination unit was estimated to be 75,360 pounds.

The tractor and the front of the trailer, shown in figures 5 and 6, sustained the majority of the damage. The cab portion of the tractor was completely detached and separated from the tractor chassis.



**Figure 5.** Cab portion of accident tractor.



**Figure 6.** Front of accident box trailer.

The tires on the tractor were slightly narrower than the width recommended by the tractor specifications.<sup>6</sup> However, this discrepancy would not have affected the rolling radius or vehicle handling. Damage to the steering and suspension systems appeared to be a direct result of the accident. The brakes of the tractor and trailer were found to be in adjustment and in good condition.

The tractor was equipped with a Detroit Diesel model DDEC-V electronic engine control module (ECM). Although the ECM data were analyzed, no precrash data associated with the accident were identified. This ECM was not designed or intended to function as an event data recording device.

## **Motor Carriers**

### ***Union County School District***

The Union County School District—which covers about 80 square miles with 21 bus routes—has one elementary school, one middle school, and one high school. The school bus fleet consisted of twenty 65-passenger buses, three 71-passenger buses, one 47-passenger bus, and two special needs buses. At the time of the accident, the school district employed 19 full-time drivers, 4 substitute drivers, 2 full-time mechanics, and a transportation specialist who also did mechanical work.

### ***Crete Carrier Corporation***

Operating since 1966, Crete Carrier Corporation is an interstate, authorized for-hire carrier of general freight, building materials, and produce.<sup>7</sup> At the time of the accident, Crete employed 4,823 company drivers and 391 owner/operators. Of the company drivers, 202 are team drivers; and of the owner/operators, 44 are team drivers. Sixty-eight of the Crete drivers operate in intrastate commerce only. Crete's fleet includes 5,170 truck tractors and 12,482 semitrailers. In 2005, Crete's fleet traveled a total of 635.8 million miles.

Roadside inspections for the 12 months prior to the accident indicate that 3,808 Crete vehicles were inspected, and 447 were placed out of service (12 percent). Additionally, of 6,157 driver inspections, 145 drivers were placed out of service (2 percent).<sup>8</sup> The accident rate<sup>9</sup> for Crete was 0.64 per million miles traveled.

A postcrash compliance review conducted by the Federal Motor Carrier Safety Administration (FMCSA) on March 15, 2006, resulted in a proposed conditional rating, but because of a consent agreement, the rating remained "satisfactory." In response to the compliance review, Crete developed a safety management plan, signed a consent agreement with

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<sup>6</sup> The 275/80R22.5-size tires on the tractor were just under 1 inch narrower than the 295/80R22.5-size tires recommended in the tractor specifications.

<sup>7</sup> Dba Crete Carrier Corp Shaffer Trucking HTL Truck Line.

<sup>8</sup> The national out-of-service rate for fiscal year (FY) 2006 was 7.0 percent for truck drivers and 23.7 percent for trucks. In FY 2007, the national out-of-service rate was 6.8 percent for truck drivers and 22.4 percent for trucks. See <<http://www.fmcsa.dot.gov/facts-research/art-safety-progress-report.htm>>.

<sup>9</sup> Accident rate is defined as the number of recordable accidents per million miles traveled. The FMCSA has determined that motor carriers with an accident rate of 1.5 or greater are deficient in the accident area of the compliance review rating process.



the FMCSA to settle all assessed fines, and agreed to three progress reviews over the following 18 months.<sup>10</sup> The most recent compliance review, and the last of the three required progress reviews, was conducted on May 25, 2007, and Crete received a satisfactory rating. The last time Crete had been subjected to an FMCSA compliance review was 10 years prior to the accident, on December 7, 1995.

## **Driver Information**

### ***Bus Driver***

The 48-year-old school bus driver possessed a valid Florida class B commercial driver's license (CDL) with no restrictions and a passenger bus endorsement. The license was originally issued on September 26, 1997. The driver had no record of traffic violations since January 2000.

### ***Automobile Driver***

The driver of the Pontiac Bonneville was a 15-year-old high school student. She held a valid Florida class E learner's permit and had no record of traffic violations. However, at the time of the accident, she was operating without a qualified driver in violation of Florida law.

### ***Truck Driver***

The 31-year-old truck driver possessed a valid Florida class A CDL, originally issued in December 2003, with no restrictions and a hazardous materials endorsement. His Florida driving record showed no traffic violations since October 2001. He had 2 years of truck driving experience, including 10 months driving with Crete (since March 2005) as a company driver. The driver had a valid medical certificate and was in good general health. No ethyl alcohol or drugs were detected in the toxicological sample obtained from the truck driver by the Florida Department of Law Enforcement.

Data from the DDEC indicated that—in the 72 hours prior to the accident—the truck had been driven a total of 24 hours 57 minutes and had idled for 8 hours 38 minutes. The truck driver, through his lawyer, declined to be interviewed by Safety Board investigators. The following summary of his work–rest history is based on the truck driver's statement taken on May 7, 2008.<sup>11</sup> Qualcomm<sup>12</sup> data supported his statement. He had been driving a regular route between Jacksonville and High Springs, Florida, for about 2 months prior to the accident. A round trip took about 5 hours—2 hours from Jacksonville to High Springs, 30–60 minutes loading or switching trailers, and 2 hours for the return trip.

On Saturday, January 21, the truck driver began driving at 1:27 p.m. and continued until 6:30 p.m. The following day, he worked from 12:42 p.m. until 6:00 p.m. He was off duty until

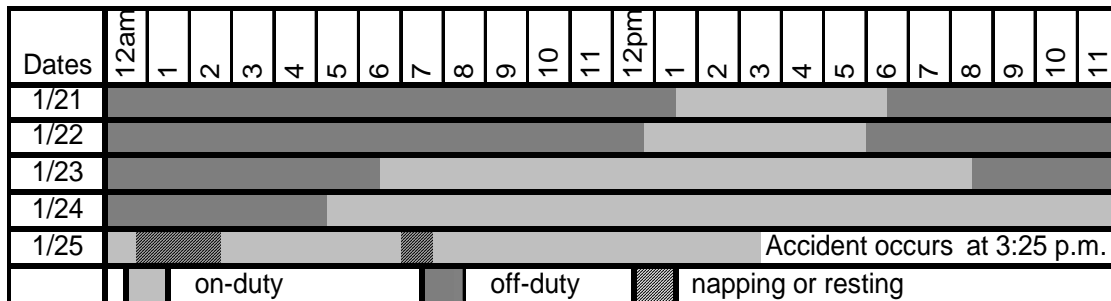
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<sup>10</sup> If improvements were not achieved during the 18-month period, the safety rating would have reverted to conditional.

<sup>11</sup> *State of Florida v. Alvin E. Wilkerson*, Examination Under Oath Taken by Plaintiff, May 7, 2008, at Alachua County State Attorney's Office, case no. 63-2006-CF-000204-A.

<sup>12</sup> The Qualcomm Qtracs system uses a transmitter/receiver that allows objects to be continually tracked through global positioning satellites. The system identifies the location of each truck every hour, as well as the corresponding time and date and whether the truck engine is running.

6:29 a.m. on Monday, January 23, and worked until 8:23 p.m. that evening, a total of 14 hours. On Tuesday, January 24, he began driving at 5:19 a.m., making two round trips from Jacksonville to High Springs and a half trip back to High Springs shortly after midnight on January 25. The driver said he slept in the sleeper berth for a couple of hours while the truck was being loaded. Then he made the return trip to Jacksonville. The driver said he “rested his head across the steering wheel” for an hour or two when he returned to Jacksonville. He made another trip to High Springs on the morning of January 25 and was on his way back to Jacksonville when the accident occurred, at 3:25 p.m. (See figure 7.) Prior to the accident, the last period of time the driver had to obtain significant sleep was when he was off duty from 8:23 p.m. on January 23 until 5:19 a.m. on January 24. With the exception of a 2-hour sleep period in the early morning of January 25 and 1–2 hours of rest about 7:00 a.m., the truck driver was awake for about 30 hours, and it had been 34 hours since his last substantial off-duty period. The DDEC showed that the truck had been driven a total of 13.5 hours and idled for 4 hours 13 minutes during this period.



**Figure 7.** Duty status of Freightliner driver, January 21–25, 2006.

The reduced quantity and quality of sleep would have made the truck driver susceptible to fatigue and impaired performance. Research has shown that—in spite of individual variations—a specific amount of uninterrupted sleep is necessary for each 24-hour period, usually about 8 hours, and subsequent alertness will be compromised without that sleep.<sup>13</sup> Additionally, sleeping less than 4 consolidated hours can impair performance for tasks that require vigilance.<sup>14</sup> Fatigue impairs information processing and reaction times, increasing the probability of errors.<sup>15</sup>

Because of the body’s natural circadian rhythms, there are two periods of maximal sleepiness in a 24-hour day—one roughly between 3:00–5:00 a.m. and a second, less pronounced

<sup>13</sup> (a) Mary A. Carskadon and William C. Dement, “Normal Human Sleep: An Overview,” *Principles and Practice of Sleep Medicine*, second edition, eds., M. Kryger, T. Roth, and W. C. Dement (Philadelphia, PA: W. B. Sanders Company, 1994) 16–26. (b) Thomas Roth, Timothy A. Roehrs, Mary A. Carskadon, and William C. Dement, “Daytime Sleepiness and Alertness,” *Principles and Practice of Sleep Medicine*.

<sup>14</sup> P. Naitoh, “Minimal Sleep to Maintain Performance: the Search for Sleep Quantum in Sustained Operations,” *Why We Nap: Evolution, Chronobiology and Functions of Polyphasic and Ultrashort Sleep*, ed., C. Stampi (Boston, MA: Birkhauser, 1992) 199–216.

<sup>15</sup> (a) D. F. Dinges, “The Nature of Sleepiness: Causes, Context, and Consequences,” *Perspectives in Behavioral Medicine: Eating, Sleeping, and Sex*, eds., A. Stunkard and A. Baum (Hillsdale, NJ: Lawrence Erlbaum, 1989) 147–179. (b) D. F. Dinges, “Probing the Limits of Functional Capability: the Effects of Sleep Loss on Short-Duration Tasks,” *Sleep, Arousal and Performance: Problems and Promises*, eds., R. J. Broughton and R. Ogilvie (Boston, MA: Birkhauser-Boston, Inc., 1992).

period, from 3:00–5:00 p.m. The Lake Butler accident occurred about 3:25 p.m., a time when the driver may have been predisposed to sleepiness, particularly after being awake for approximately 34 hours with short periods of time as the only opportunities for sleep.

FDOT determined that the accident truck driver was classified as an interstate operator because he had traveled outside the State of Florida to Georgia in November 2005 and to Arizona, California, Mississippi, Nevada, South Carolina, Tennessee, Texas, and Utah in October 2005. Because the driver had operated in interstate commerce, he was considered to be an interstate operator and subject to the Federal hours-of-service regulations.

As codified in 49 CFR 395, Federal hours-of-service regulations permit a person to drive for 11 hours following 10 consecutive hours off duty. Additionally, a person cannot drive beyond the 14<sup>th</sup> hour after coming on duty following 10 consecutive hours off duty. The 60/70-hour rule states that a person cannot drive after having been on duty 60 hours in 7 consecutive days or 70 hours in 8 consecutive days. The accident driver was in violation of the regulations for driving and being on duty without receiving 10 consecutive hours off duty and also in violation of the 60/70-hour rule for having been on duty more than the permitted time.

The U.S. Department of Transportation defines a driver as operating in interstate or intrastate commerce based on the particular load origination and destination at the time of shipment. Consequently, the FMCSA classified this driver and this shipment as an intrastate operation not subject to Federal hours-of-service regulations.

At the time of the accident, Florida permitted a driver in intrastate commerce to drive for 15 hours in a 24-hour period, following 8 hours off duty, if the driving was done within a 200-mile radius. Additionally, a driver could not drive over 72 hours in 7 days or 84 hours in 8 days. The Qualcomm data for the Freightliner indicate a loss of signal for about 9 hours, from 8:23 p.m. on January 23 until 5:19 a.m. on January 24. The driver was on duty from 5:19 a.m. that morning until the accident occurred at 3:25 p.m. the following day, January 25, approximately 34 hours. The driver did not receive an additional 8-hour off-duty period within 24 hours, placing him in violation of Florida regulations.

Florida revised its hours-of-service regulations for intrastate commerce on October 1, 2006. The maximum 24-hour driving time was reduced to 12 hours following 10 consecutive hours off duty and no more than 70 hours in 7 days or 80 hours in 8 days. The accident driver would not have been in compliance with these revised State regulations.

In total, the accident driver made three and a half round trips between Jacksonville and High Springs, Florida, from January 24–25. Had he not been involved in the accident, he would have completed four round trips. Even with only three round trips between the two locations, it would have been very difficult to remain in compliance with the hours-of-service regulations. Qualcomm communication data show that the driver was asked to make three round trips on this route or at least two and a half runs, thus pressuring the driver to the outer limits of the State regulation. Furthermore, the Qualcomm data show the location of the truck and should have alerted Crete that the driver was making more trips than would have been allowable.

## **Probable Cause**

The National Transportation Safety Board determines that the probable cause of this accident was the failure of the truck driver to maintain alertness due to fatigue from obtaining inadequate rest. Contributing to the accident was the failure of Crete Carrier Corporation to exercise proper oversight of the driver's hours of service.

**Adopted:** August 22, 2008