# VEHICLE FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

## MULTIPLE VEHICLE CRASH
## Chattanooga, TN

## HWY15MH009

(25 pages)

**NATIONAL TRANSPORTATION SAFETY BOARD**
**OFFICE OF HIGHWAY SAFETY**
**WASHINGTON, D.C.**

# VEHICLE FACTORS GROUP CHAIRMAN'S FACTUAL REPORT

## A. CRASH INFORMATION

| | |
|---|---|
| Location: | Interstate 75 (I-75) milepost 11.7 Hamilton County, Chattanooga, TN |
| Vehicle #1: | 2007 Peterbilt truck tractor in combination with a 2005 Great Dane refrigerated semitrailer |
| Operator #1: | Cool Runnings Express, Inc. |
| Vehicle #2: | 2010 Toyota Prius |
| Vehicle #3: | 2010 Scion tC |
| Vehicle #4: | 2003 Mazda Tribute |
| Vehicle #5: | 2005 GMC Savana |
| Vehicle #6: | 2001 Ford F150 |
| Vehicle #7: | 2007 Chevrolet Uplander LS |
| Vehicle #8: | 2014 Cadillac CTS |
| Vehicle #9 | 2015 Toyota Tundra |
| Date: | June 25, 2015 |
| Time: | Approximately 7:10 p.m. eastern daylight time |
| **NTSB #:** | **HWY15MH009** |

## B. VEHICLE FACTORS GROUP

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## C. CRASH SUMMARY

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

## D. DETAILS OF THE VEHICLE FACTORS INVESTIGATION

This document is a collection of factual information obtained during the detailed inspection of the striking vehicle in this crash, the 2007 Peterbilt combination unit. General vehicle information on the other eight passenger vehicles involved in the accident is also included.

All passenger vehicles were examined between June 27, and June 28, 2015 at the Chattanooga City-impound lot. The Peterbilt truck tractor and Great Dane semitrailer were inspected between June 29, and July 1, 2015, at Denton's Wrecker Service, located at 4470 Lee Highway, Chattanooga, TN 37421.

### 1. Vehicle 1 – 2007 Peterbilt Combination Unit

#### 1.1. General information

| | |
|---|---|
| TRUCK TRACTOR: | |
| Make/Model: | 2007 Peterbilt / 379 Conventional |
| VIN:[1] | 1XP5DB9X07D[redacted] |
| Company Unit #: | 7 |
| Date of Manufacture: | May 2006 |
| GVWR:[2] | 50,000 lbs |
| GAWR (front axle):[3] | 12,000 lbs |
| GAWR (rear axles): | 19,000 lbs (per axle) |
| Engine: | Caterpillar, C15, Six-Cylinder, 475 hp, Diesel |
| Transmission: | Fuller RTL018918B 18-Speed Manual |

Additional equipment and specifications are included in Peterbilt Chassis Final Bill

| | |
|---|---|
| SEMITRAILER: | |
| Make/Model: | 2005 Great Dane / 7011TZ-1ASLT Refrigerated Semitrailer |
| VIN: | 1GRAA06266B[redacted] |
| Company Unit #: | 5555A |
| Date of Manufacture: | February 2005 |
| GVWR: | 68,000 lbs |
| GAWR: | 20,000 lbs (per axle) |

1. Vehicle Identification Number (VIN).
2. Gross Vehicle Weight Rating (GVWR) is the total maximum weight that a vehicle is designed to carry when loaded, including the weight of the vehicle itself plus fuel, passengers, and cargo
3. Gross Axle Weight Rating (GAWR) is the maximum distributed weight that a given axle is designed to support

### 1.2. Damage Description

The 2007 Peterbilt truck tractor sustained extensive front end damage, displacing the bumper and hood.[4] The headlamps, turn signals, and forward-mounted marker lights were all destroyed in the crash. The right pane of the windshield was cracked. The front-end damage pushed the radiator into the engine fan and accessory drive belts; damage then continued into axle 1 steering and suspension systems. The left- and right-front spring eye mounting brackets were broken and separated from the frame rails. At the time of inspection, the wheels on axle 1 were noted to be at full left rotation and out of alignment with each other. The engine cradle was broken allowing the engine to rest on axle 1. The leading edges of the left and right frame rails were displaced to the right. The driver's side lower step was displaced rearward. The left fuel tank sustained a small dent on the outboard leading edge. The left fuel tank also sustained black transfer and scuff marks along the outboard side. The right-side rear view mirror was damaged, the upper support brace was broken and the lower mount was separated from the cab.[5] The steering gear box was removed from the truck tractor and underwent a detailed external and internal examination at the manufacturer's facility.

The semitrailer was empty at the time of the crash. The refrigeration, unit which was mounted on the front of the semitrailer, sustained minor damage and its left door was missing. In addition to the observed damage, the NTSB Evidence Documentation Team mapped the combination unit using a FARO laser scanner, which generated a 3-dimensional model of the damaged vehicle (see **Figure 1**.)

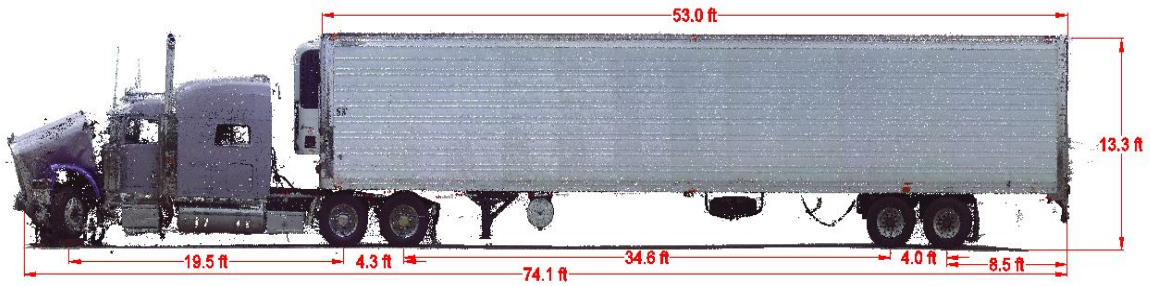


**Figure 1** Driver (left) side profile from the 3-dimensional model of the damaged 2007 Peterbilt combination unit.

### 1.3. Vehicle Recorded Event Data

The accident truck tractor was equipped with an electronically controlled Caterpillar, C15 engine. The engine control module (ECM) had the capability to record parameters that often included vehicle speed, engine rpm, brake circuit status, throttle percentage, and other associated data in the event of sudden deceleration or hard braking events. On June 26, 2015, the Georgia Highway Patrol imaged the ECM. The ECM was not enabled (default setting from the factory) and therefore, limited data was obtained. The full data set and additional details are available in the *NTSB Recorder Specialists Factual Report*, which is included in the docket for this investigation.

4. See Vehicle Photographs 1 and 2– Photographs of the 2007 Peterbilt
5. The mirror damage was sustained in a crash on June 24, 2015, in Bushnell, Florida.

### 1.4. Weights and Measurements

According to the Peterbilt Chassis Final Bill for the truck tractor, it had a wheelbase of 6,658 mm (262 in) from the center of axle 1 to the center of axles 2 and 3, and an estimated overall weight of 18,530 lbs.[6] The overall length noted on the side of the semitrailer was 53 feet. Overall dimensions of the combination unit are included in **Figure 1**. Rolling radius measurements averaged 20 inches for all axles.

On June 29, 2015, the Tennessee Highway Patrol (THP) weighed the truck tractor combination unit using certified portable scales, on a level asphalt surface, in front of Denton's Wrecker Service. **Table 1** contains the axle weights that were measured.

**Table 1** Truck Tractor Combination Unit Weight

| | Axle | Weight (lbs) | |
|---|---|---|---|
| | | Left | Right |
| Truck Tractor | 1 | 5,400 | 4,400 |
| | 2 | 6,400 | 7,600 |
| | 3 | 1,200 | 1,600 |
| Semitrailer | 4 | 2,500 | 2,200 |
| | 5 | 3,000 | 1,600 |
| **Total Weight: 35,900 lbs** | | | |

### 1.5. Driver Controls

The interior of the truck tractor cab provided dash mounted controls to the left and right of the driver's seat and steering wheel. To the left of the steering wheel were the keyed ignition and lighting controls, all of which were found in the off position at the time of inspection. To the right of the steering wheel were fifth wheel, differential lock, air suspension controls, engine brake, cruise control settings, a music radio, climate controls, air pressure gauges, and various component temperature gauges. Most of the on/off switches were found in the off position with exception of the cruise control switch, which was in the on (available) position. Cruise control would still have to be set for use while driving. Due to the unavailable data from the engine's electronic control module, it could not be determined if the cruise control was set and in use at the time of the crash.

Once power was supplied and the key was cycled on, all dash gauges, located in front of the steering wheel, responded. The odometer displayed 1,084,069 miles and 1,629.4 miles for the truck tractor's overall and trip mileage, respectively. The engine-hours display read 41,981.1 hours. The fuel gauge was noted to be approximately ½ full. Primary and secondary air pressure gauges responded as air was pumped into the air reservoirs from an external compressor.

Further exterior and interior damage descriptions are contained in the NTSB Survival Factor's factual report, which can be found in the docket for this investigation. The truck tractor was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team.

6. See Vehicle Attachment 3 – Chassis Final Build

### 1.6. Tires and Wheels

According to the VIN plate, located on the inside of the truck tractor driver's door frame, the vehicle was recommended to be equipped with 295/75R22.5 load range "G" tires mounted on 22.5X8.25 wheels. The tires were recommended to be inflated to 105 psi for axle 1 and 85 psi for axles 2 and 3. Tire size and inflation recommendations listed on the semitrailer VIN plate recommended the vehicle to be equipped with 275/77R22.5 load range "G" size tires mounted on 22.5X8.25 wheels. The tires were recommended to be inflated to 110 psi for both trailer axles. General information about each of the combination's tires and wheels as they were at the time of inspection is included in **Table 2.**

**Table 2** Truck Tractor Combination Unit Tire Information

| **Axle 1** | **Left** | | **Right** | |
|---|---|---|---|---|
| Make | YOKOHAMA | | YOKOHAMA | |
| Model | Super Steel RY617 | | Super Steel RY617 | |
| Size | 285/75R24.5 | | 285/75R24.5 | |
| Load Rating | G (5,675 lbs.) | | G (5,675 lbs.) | |
| Pressure | 110 psi | | Deflated | |
| Tread Depth | 5/32 inch | | 14/32 inch | |
| **Axle 2** | **Left** | | **Right** | |
| | Outside | Inside | Inside | Outside |
| Make | BFGOODRICH | BFGOODRICH | BFGOODRICH | BFGOODRICH |
| Model | DR444 | DR444 | DR444 | DR444 |
| Size | 275/80R24.5 | 275/80R24.5 | 275/80R24.5 | 275/80R24.5 |
| Load Rating | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) |
| Pressure | 100 psi | 96 psi | 96 psi | 96 psi |
| Tread Depth | 19/32 inch | 19/32 inch | 19/32 inch | 19/32 inch |
| **Axle 3** | **Left** | | **Right** | |
| | Outside | Inside | Inside | Outside |
| Make | BFGOODRICH | BFGOODRICH | BFGOODRICH | BFGOODRICH |
| Model | DR444 | DR444 | DR444 | DR444 |
| Size | 275/80R24.5 | 275/80R24.5 | 275/80R24.5 | 275/80R24.5 |
| Load Rating | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) |
| Pressure | 90 psi | 96 psi | 96 psi | 100 psi |
| Tread Depth | 19/32 inch | 19/32 inch | 19/32 inch | 19/32 inch |
| **Axle 4** | **Left** | | **Right** | |
| | Outside | Inside | Inside | Outside |
| Make | GENERAL | GENERAL | GENERAL | GENERAL |
| Model | ST 250 (G) | ST 250 (G) | ST 250 (G) | ST 250 (G) |
| Size | 295/75R22.5 | 295/75R22.5 | 295/75R22.5 | 295/75R22.5 |
| Load Rating | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) |
| Pressure | Deflated | 94 psi | 96 psi | 92 psi |
| Tread Depth | 9/32 inch | 9/32 inch | 9/32 inch | 9/32 inch |

| Axle 5 | Left | | Right | |
|---|---|---|---|---|
| | Outside | Inside | Inside | Outside |
| Make | SUPER CARGO | SUPER CARGO | SUPER CARGO | SUPER CARGO |
| Model | SC05 | SC05 | SC05 | SC05 |
| Size | 295/75R22.5 | 295/75R22.5 | 295/75R22.5 | 295/75R22.5 |
| Load Rating | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) | G (5,675 lbs.) |
| Pressure | 96 psi | 96 psi | 92 psi | 14 psi |
| Tread Depth | 14/32 inch | 10/32 inch | 7/32 inch | 8/32 inch |

During the tire and wheel inspection, several areas of damage were noted. The tire and wheel damage, when possible, was referenced to a clock position with the valve stem being at 12:00. Tire and wheel damage observed during the inspection included the following, tire and wheel positions not listed, exhibited no damage.

- Axle 1 Right – Wheel
  - The circumference of the outboard wheel flange and surface was abraded
  - 10:00: outboard wheel flange and surface gouged
- Axle 1 Right –Tire
  - The tire became separated from the wheel sometime during the crash sequence. The letter ”D” in DOT was used as the 12:00 position for reference while describing damage.
  - 6:30 – 11:45: tread was separated from the inboard and outboard tire shoulders
  - 9:30: impact damage in the tread area – splitting inboard and outboard tire sidewalls
- Axle 1 Left – Wheel
  - 6:00 – 8:45: outboard wheel surface abraded
  - 9:15 – 9:30: outboard wheel surface abraded
- Axle 1 Left – Tire
  - Circumference of outboard tire sidewall was scuffed
  - The outboard tire shoulder tread rib was worn more than the rest of the tread ribs
  - 6:00 – 7:00: outboard tire shoulder chunked
  - 8:15: impact damage in tread area
  - 11:30 – 12:00: impact damage and a piece of tread missing
  - 9:00: chunk of tread missing
  - 9:30 – 11:00: impact damage to the inboard tire shoulder, down to the reinforcement cords

- Axle 2 Left Outside – Wheel
    - Circumference of outboard wheel flange abraded with black transfer
    - 6:00 – 9:30: scuff marks on outboard wheel bead seat
- Axle 2 Left Outside – Tire
    - Circumference of outboard tire sidewall scuffed
    - 9:00 – 12:00: circumferential slice in outboard tire sidewall
- Axle 3 Left Outside – Wheel
    - Circumference of outboard wheel flange abraded with black transfer
- Axle 3 Right Inside – Tire
    - 6:00 – 8:00: flat spot across tread area (pre-crash damage)
- Axle 3 Right Outside – Tire
    - 12:00 – 2:00: flat spot across tread area (pre-existing condition)
- Axle 4 Left Outside – Wheel
    - Circumference of outboard wheel flange abraded with black transfer
    - 10:00 – 11:30: Outboard wheel flange and bead seat sustained a radial collapse
- Axle 4 Left Outside – Tire
    - The outboard tire bead was displaced off of the wheel bead seat
    - 6:00: outboard tire sidewall was punctured
    - 6:30: outboard tire sidewall had a ‘Y” shaped puncture
    - 10:00: outboard tire sidewall was sliced
    - 5:45 – 6:30: tread area chunked
- Axle 4 Left Inside – Tire
    - 1:00 – 2:00: tread area chunked
- Axle 5 Left Outside – Wheel
    - Circumference of outboard wheel flange abraded with black transfer
- Axle 5 Left Outside – Tire
    - Circumference of outboard tire sidewall scuffed

- Axle 5 Right Outside – Wheel
    - Circumference outboard wheel flange abraded
- Axle 5 Right Outside – Tire
    - 12:00 – 2:00: flat spot across tread area

Tire pressure measurements were taken using a commercial grade tire pressure gauge. The Commercial Vehicle Safety Alliance (CVSA) Out-of-Service (OOS) criteria consider a tire to be out-of-service when it is inflated to less than 50% of the maximum inflation pressure listed on the side wall of the tire, 100 to 120 psi in this case.[7] The outside tire on axle 5 right was found inflated to less than 50% of the maximum inflation pressure; a violation that met the CVSA OOS criteria. Tread depth measurements were taken in three separate locations within the major tread grooves of a given tire, the lowest of which is entered in **Table 2** and represents the minimum tread depth. All tread depths measured were within the minimum tread depth regulation for commercial vehicle tires, which is 4/32 of an inch for the steer axle and 2/32 of an inch for all other axles.[8] The semitrailer tires and wheels were not removed for further inspection.

### 1.7. Steering

The truck tractor was equipped with a hydraulic power-assisted steering gear, a power steering pump, a drag link, a pitman arm, a remotely mounted power steering reservoir, a tie rod, and left and right tie rod ends with ball joints. As noted in the damage description, at the time of inspection, the wheels of the front axle of the truck tractor were found to be turned to the left and out of alignment with each other. The steering gear box mounting bosses and mounting bracket were broken. There was only one of three mounting bolts keeping the steering gear attached to the frame rail. The front of the steering gear box was found to have rotated downward to an approximate vertical position. The remotely mounted power steering reservoir was crushed, but there remained a slight amount of hydraulic fluid in the bottom portion of the reservoir. When rotating the steering gear, a small amount of hydraulic fluid flowed out of the supply and return hydraulic hoses, back into the power steering reservoir.

All of the steering arm linkages from the steering wheel down to the steering gear box remained intact and connected. It was possible to rotate the steering gear from stop-to-stop by turning the steering wheel. The tie rod was bowed. All ball joint connections remained intact and free of excessive wear or play.

As mentioned earlier, the TRW steering gear, still connected to the pitman arm, was removed from the vehicle and retained for further examination and testing at TRW facilities. On Tuesday, September 1, 2015, a detailed external and internal examination and component teardown of the steering gear was conducted at TRW Commercial Steering facilities in Lafayette, Indiana.

7. Commercial Vehicle Safety Alliance, North American Standard Out-of-Service Criteria, April 1, 2015, Part II *Section 11(b)(1) which refers to Federal Motor Carrier Safety Regulations*, Title 49 of the US *Code of Federal Regulations* 393.75 (49 CFR 393.75(a)(3))
8. Measured in two adjacent tread grooves at any location on the tire (49 CFR 393.75(b)(c))

This examination was conducted by TRW staff under the direction and in the presence of NTSB investigators. The examination found the steering gear to be mechanically functional, and able to translate movement over its entire intended range.[9]

The recirculating ball bearings left slight indentations on the helical worm gear. These indentations, were consistent with a strike impact with a minor change in input shaft position, and also indicated that the rack piston was being driven downward toward the bottom of the gear (as mounted), putting the worm gear in tension. The location of the recirculating ball bearing impacts, concentrated near the center of the worm gear, indicated that the output shaft was near center. The vehicle's steering was near straight ahead at impact.

### 1.8. Suspension

The suspension for axle 1 of the truck tractor consisted of two-leaf spring packs mounted to the solid axle and shock absorbers mounted on either side of the axle. The left-front spring hanger was broken and separated from the frame rail. The left-rear spring hanger was broken and displaced from its mounting location. The left shock absorber top mounting stud was broken and the shock absorber was bent. The right-rear spring hanger was broken and one mounting bolt was missing. The right-front spring hanger mount was broken and separated from the frame rail.

The suspension for axles 2 and 3, of the truck tractor, consisted of solid axle supports, sway bars, air springs, and torsion bars. The semitrailer suspension for axles 4 and 5 consisted of pivot control beams, shock absorbers, and air springs. All attachments and bushings for axles 2 through 5 were found to be intact and free of excessive wear or play.

### 1.9. Braking

The truck tractor was equipped with a pneumatic drum brake system with 5 ½ inch automatic slack adjusters on all axles. The semitrailer was equipped with a pneumatic drum brake system with 6 inch automatic slack adjusters on axle 4 and 5 ½ inch automatic slack adjusters on axle 5. Axle 1 was equipped with 15- x 4-inch brake drums and size 20 clamp (Type 20) service brake chambers. Axles 2 through 5 were all equipped with 16 ½- x 7-inch brake drums and size 30 clamp service and parking brake chambers (Type 30/30).

Brake pushrod stroke measurements were taken for the truck tractor by utilizing the shop air compressor and connecting it to the steel braided air hose, that was disconnected from the truck tractor's air compressor leading to the air dryer, with a quick disconnect. Sometime prior to this crash, the steel braided air hose had been disconnected from the air dryer and re-routed to bypass the air dryer and go directly to the wet tank. Due to the engine being nonoperational, this process supplied the air systems on the truck tractor as though the engine and air compressor were operational. Once the air system on the truck tractor was replenished, all air systems were fully functional with the exception of axle 1. Due to the damage from the crash, the air brake supply hose, to the quick release valve, had been severed and had to be plugged. The axle 1 air brake chambers were plumbed into individually with a regulated 90 psi of air pressure.

9. See Vehicle Attachment 7 – 2007 Peterbilt – TRW Steering Gear Examination Report from TRW Commercial Steering.

Once the air pressure in the brake system maxed out at approximately 110 psi, per the truck tractor's air gauges, the air hose from the shop air compressor was disconnected from the steel braided hose. There was an audible air leak from the push-pull parking brake valve inside the cab, but the loss was not noticeable on the truck tractor's air gauges. The air brake pressure was exhausted down to 90 psi by depressing and releasing the brake pedal. Air for the brakes was supplied to the semitrailer by utilizing a truck tractor owned by the towing company.

The pushrod stroke measurements, for the truck tractor and semitrailer, were taken by building the air brake pressure to 90 psi, releasing the parking brakes, marking the pushrods, and then applying a full pressure application of the brake pedal. The distance the pushrods traveled during the brake application was recorded as "Pushrod Stroke," shown in **Table 3**. The adjustment limit for the Type 20 front axle brakes was 1 ¾ inches, and the adjustment limit for the Type 30/30 brakes on the remaining axles was 2 inches.[10] None of the brakes were found to be out of adjustment.

**Table 3.** Peterbilt Combination Unit Brake Measurements

| Brake Location | | Brake Type | Pushrod Stroke (**inches**) |
|---|---|---|---|
| Axle 1 | Left | 20 | 1 5/8 |
| | Right | 20 | 1 3/8 |
| Axle 2 | Left | 30/30 | 1 1/2 |
| | Right | 30/30 | 1 5/8 |
| Axle 3 | Left | 30/30 | 1 ½ |
| | Right | 30/30 | 1 1/4 |
| Axle 4 | Left | 30/30 | 1 1/4 |
| | Right | 30/30 | 1 3/4 |
| Axle 5 | Left | 30/30 | 1 1/2 |
| | Right | 30/30 | 1 ½ |

The brake drums and brake pads on all axles were visually inspected. All brake pads were found to be in excess of the minimum thickness limit of 1/4 inch.[11]The upper brake linings on both the right and left sides of axles 2 and 3 were found to be cracked in excess of 1 ½ inches in length and with voids exceeding 1/16 inch.[12,13]

10. According to the CVSA Out-of-Service Criteria, pushrod strokes have to be 1/8 inch or more beyond the adjustment limits to be counted towards the allowable 20% defective brakes before a vehicle is considered to be out of service.
11. Title 49 CFR 393.47(d) states 1/4 inch minimum for air-braked non-steering axles, or 3/16 inch minimum for air-braked front steering axle brakes.
12. See Vehicle Photo 4 – View of axle 2 right cracked upper brake lining.
13. Title 49 CFR 393.47(a) states the maximum a brake lining crack can be is 1 ½ inches and the maximum void width, observable on the edge of a brake lining, to be 1/16 inch.

Low air brake pressure warning tests were conducted on the truck tractor. With the external air supply removed, the air brake pressure was exhausted down from over 110 psi by depressing and releasing the brake pedal. Red low air warning lights for both the primary and secondary air brake systems illuminated once the pressure dropped below 65 psi.[14]

The air in the air brake systems was replenished to over 110 psi, the external air supply was removed, and a leak was introduced by uncoupling the emergency side glad hand, at the rear of the truck tractor (red glad hand), from a glad hand that had been capped off. Once the leak was introduced, the air pressure gauges, in the dash, were observed to drop until the air brake systems were completely exhausted. The tractor protection valve failed to maintain air in the air brake system as required.[15] The tractor protection valve is designed to keep at least 20 psi of air supplied to the truck tractor for a controlled stop in the event of a sudden loss of brakes.

An inspection of the truck tractor and semitrailer was also completed by the THP. The only vehicle-related defects noted by the THP in its post-crash examination of the combination unit were the axle 4 right-side air brake service and emergency air hoses worn through the reinforcement cords.[16] These brake hose violations met the CVSA Out-of-Service criteria.

### 1.9.1. Anti-lock Braking Systems

All air-braked truck tractors manufactured after March 1997, and all other commercial vehicles (such as semitrailers) manufactured after March 1998, are required to be equipped with Anti-lock Braking Systems (ABS).[17] The truck tractor was equipped with Bendix ABS sensors and modulators on four wheels, known as a 4S/4M system. The semitrailer was equipped with a self-contained single axle Meritor 2S/2M ABS system on axle 4. The Bendix ABS module was removed from the truck tractor and was forwarded to the NTSB laboratory for further examination and analysis. The full data set and additional details are available in the *NTSB Recorder Specialists Factual Report,* which is included in the docket for this investigation.

14. In compliance with low air warning devices specified in 49 CFR 393.51 (c).
15. Title 49 CFR 393.43(b)
16. See Vehicle Attachment 5 – 2007 Peterbilt – THP Post-Crash Report.
17. Title 49 CFR Part 393.55 (c).

### 1.10. Maintenance History

Maintenance and inspection records for the Peterbilt truck tractor and Great Dane semitrailer were obtained from Cool Runnings Express Inc. by the Motor Carrier Factors Group Chairman and are included as attachments to the *Motor Carrier Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

On June 22, 2015, there was an invoice for a service call to Horse Cave, KY to fix a broken airline to the air compressor. According to the work order, the mechanic clamped the airline so the truck tractor combination could be driven to London, KY.[18]

On June 23, 2015, there was an invoice from the Peterbilt dealership in London, KY which indicated the Peterbilt was brought in to have the following repairs made;

- Clutch Adjustment
- To Have the Jake Switch in the Dash Replaced
- To Fix The Broken Unloader Airline to the Air Compressor Governor
- To have the Road Speed Set to 75 MPH

According to the invoice and repair order, the repairs were completed on 6/23/2015.[19]

On June 24, 2015, there was an invoice from a roadside repair company, located in Ocala, FL, to repair damages caused by an accident on the same date. The repairs consisted of replacing the lower radiator hose, pulling the fender away from the right-front tire, and reattaching the passenger-side rear-view mirror. The invoice indicated the repairs were completed on June 24, 2015.[20]

## 2. Vehicle 2 – 2010 Toyota Prius

### 2.1. General Information

| | |
|---|---|
| Make/Model: | 2010 Toyota / Prius |
| VIN: | JTDKN3DU8A0[redacted] |
| Date of Manufacture: | 2010 |
| Engine: | 1.8L In-line 4 DOHC Hybrid |
| Transmission: | Continuously Variable |

### 2.2. Damage Descriptions

The vehicle sustained impact damage on all sides, but least to the front with just the front bumper cover being displaced and the rearward displacement of the hood on the right side. Abrasions were present at the rear of the left-front quarter panel, continuing to the driver's door. Abrasions were also on what remained of the left-rear door.

18. The invoice is included in the docket as attachments to the Motor Carrier Group Chairman's Factual Report.
19. The invoice and repair order are included in the docket as attachments to the Motor Carrier Group Chairman's Factual Report.
20. The invoice is included in the docket as attachments to the Motor Carrier Group Chairman's Factual Report.

The left-rear door was peeled apart and bent out. The entire rear of the vehicle was crushed inward, forward of the rear axle. The hybrid powered battery pack was exposed and the case was found cracked open. There was no post-crash fire. There was a strong odor of fuel from the filler neck on the left rear side, which was torn from its connections and exposed. The fuel tank was also crushed under the vehicle. The rear seats were nearly in contact with the front seats and the rear hatch and cargo area was crushed forward into the area of the B pillar. All frontal airbags and side curtains deployed. The windshield and most all other windows were cracked and broken, except the driver's door window.[21]

The left-front wheel had a gouge at the 8:00 position on the outboard wheel flange. Both rear wheels were broken and the tires were off of the wheels. The right-rear wheel had broken flanges from approximately the 5:00 to 7:00 positions, and from the 10:00 to 12:00 positions, along with multiple gouges and cuts to the sidewall. The right-front wheel was cracked with a radial collapse at the 11:00 position.

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Toyota Prius was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Toyota Prius' Airbag Control Module (ACM) was removed and imaged by the NTSB Vehicle Recorder Specialist staff. The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 2.3. Tires and Wheels

**Table 4** includes the tire and wheel information documented on the Toyota Prius at the time of inspection.

**Table 4:** Toyota Prius Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | KUMHO SOLUS KR21 | KUMHO SOLUS KR21 |
| Tire Size | P195/65R15 89T | P195/65R15 89T |
| Pressure | 26 psi | Deflated |
| Tread Depth | 4/32 inch | 4/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | KUMHO SOLUS KR21 | KUMHO SOLUS KR21 |
| Tire Size | P195/65R15 89T | P195/65R15 89T |
| Pressure | Deflated | Deflated |
| Tread Depth | 4/32 inch | 4/32 inch |

21. See Vehicle Photographs 5 through 8– Photographs of the 2010 Toyota Prius

## 3. Vehicle 3 – 2010 SCION

### 3.1. General Information

| | |
|---|---|
| Make/Model: | 2010 Scion tC |
| VIN: | JTKDE3B75A0[redacted] |
| Date of Manufacture: | July 2005 |
| Engine: | 2.4L, In-line 4, DOHC |
| Transmission: | 4-speed Automatic |

### 3.2. Damage Descriptions

The vehicle sustained rear impact damage and a post-crash fire. There was no front-end damage. The left-front fender, rear of the left-front tire, was crushed inward and bent forward. Both doors and the roof had been removed for occupant extrication. The left-rear quarter panel was crushed forward wrapping around the left-rear wheel. The rear of the vehicle was crushed forward, trapping and pushing the left-rear tire into and under the vehicle. Significant cracks and damage were present on the left-rear quarter panel in the area of the fuel filler neck. The rear of the vehicle was crushed in more on the right than on the left. The right-rear quarter panel was displaced forward and to the left. The fire consumed most combustible material inside of the vehicle from the rear of the vehicle all the way through to the instrument panel. The left-front tire and wheel were not damaged. The right-front tire was de-beaded from the outboard wheel flange and had an outboard sidewall gouge from the 5:00 to 6:00 positions. The circumference of the right-front wheel flange was abraded. Both rear tires sustained thermal damage and both rear wheels were cracked and broken. No windows remained intact and the presence of airbags or evidence of airbag deployment was unknown due to the fire. Both front seat belt latch plates were found intact and engaged into the receptacles.[22]

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Scion was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Scion's ACM was removed and imaged by the NTSB Vehicle Recorder Specialist staff. The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 3.3. Tires and Wheels

**Table 5** includes the tire and wheel information documented on the Scion at the time of inspection.

22. See Vehicle Photographs 9 through 11 – Photographs of the 2010 Scion

**Table 5:** Scion Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | FALKEN ZIEX ZE329 | FALKEN ZIEX ZE329 |
| Tire Size | P215/45R17 89W | P215/45R17 89W |
| Pressure | 30 psi | 30 psi |
| Tread Depth | 6/32 inch | 6/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | FALKEN ZIEX ZE329 | FALKEN ZIEX ZE329 |
| Tire Size | P215/45R17 89W | P215/45R17 89W |
| Pressure | Deflated | Deflated |
| Tread Depth | UNKNOWN | UNKNOWN |

## 4. Vehicle 4 – 2003 Mazda Tribute

### 4.1. General information

| | |
|---|---|
| Make/Model: | 2003 Mazda / Tribute |
| VIN: | 4F2CZ96103KM55608 |
| Date of Manufacture: | July 2005 |
| Engine: | 3.0L, 6-cylinder, DOHC |
| Transmission: | 4-speed Automatic |

### 4.2. Damage Description

Impact damage was present on all sides of the vehicle. Override and crushing damage was present at the center left side of the vehicle. Some abrasions were noted at the left-front bumper however, there was no impact damage to the front bumper. The rear of the vehicle was crushed forward. The right rear was displaced forward and crushed inward. Portions of the roof had rotated 360° and were facing downward, with the left side of the vehicle wrapped towards the right side of the vehicle. There was red paint transfer present on the right-front quarter panel as well as on the right-rear quarter panel. The vehicle was found resting on its roof at the initial time of inspection, but was later flipped over by the Chattanooga Fire Department. While on its roof, heavy undercarriage scuff marks and grinding abrasions were noted at the fuel tank skid plate, exhaust system, and driveline components. The left-front axle was separated at the constant velocity (CV) joint. The driveshaft was disconnected and grinding damage was present on the yoke. Both sides of the rear axle were separated at the CV joints. The rear differential was separated at the mount. The right axle shaft was bent. Both rear shocks were broken. The rear suspension linkage was bent on both sides. The left front tire and wheel had contact damage with the fender. There was heavy grinding damage at the left rear wheel. The right-front outboard wheel flange was damaged from the 1:00 to 2:00 positions, and from the 4:00 to 9:00 positions. The windshield and all the other windows were broken out. No airbags had deployed.[23]

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

23. See Vehicle Photographs 12 and 13 – Photographs of the 2003 Mazda

The Mazda was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Mazda contained an older restraint control module that was not supported for imaging.

### 4.3. Tires and Wheels

**Table 6** includes the tire and wheel information documented on the Mazda Tribute at the time of inspection.

**Table 6:** Mazda Tribute Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | YOKOHAMA GEOLANDER H/T-S | YOKOHAMA GEOLANDER H/T-S |
| Tire Size | P235/70R16 104S | P235/70R16 104S |
| Pressure | 30 psi | Deflated psi |
| Tread Depth | 8/32 inch | 8/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | YOKOHAMA GEOLANDER H/T-S | YOKOHAMA GEOLANDER H/T-S |
| Tire Size | P235/70R16 104S | P235/70R16 104S |
| Pressure | Deflated psi | 32 psi |
| Tread Depth | 8/32 inch | 8/32 inch |

## 5. Vehicle 5 – 2005 GMC / SAVANA G1500

### 5.1. General information

| | |
|---|---|
| Make/Model: | 2005 GMC Savana G1500 Cargo Van |
| VIN: | 1GTFG15X551[redacted] |
| Date of Manufacture: | January 2005 |
| GVWR: | 7,200 lbs. |
| Engine: | 4.3L, 6-cylinder, OHV |
| Transmission: | 4-speed Automatic |

### 5.2. Damage Description

The vehicle did not sustain any frontal damage, however the windshield was cracked. There was no left side damage. The vehicle sustained impact damage to the right rear, crushing the right-rear door, quarter panel, and bumper forward and to the left, contacting the right-rear tire. There was right side damage on the rearmost of the two right-side loading doors at the rear hinges and abrasions on the hinges. There was a dent on the lower portion of the passenger door. The passenger rearview mirror was broken and pushed forward. The left-front tire had sidewall abrasions. The left-rear tire was flat and had rolling outboard wheel flange damage. The right-side tires had outboard sidewall abrasions. All windows remained intact except the right-rear door window. No airbags deployed.[24]

24. See Vehicle Photograph 14 – Photograph of the 2005 GMC

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The GMC was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The GMC's ACM was imaged by the NTSB Vehicle Recorder Specialist staff through the GMC's On-Board Diagnostic port (OBD). The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 5.3. Tires and Wheels

**Table 7** includes the tire and wheel information documented on the GMC Savana at the time of inspection.

**Table 7:** GMC Savana Tire Information

| **Front Axle** | **Left** | **Right** |
|---|---|---|
| Tire Make | PRIMEWELL VALERA HT | PRIMEWELL VALERA HT |
| Tire Size | P245/75R16 109S | P245/75R16 109S |
| Pressure | 30 psi | Deflated |
| Tread Depth | 5/32 inch | 3/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | DUNLOP ROVOR HT | PRIMEWELL VALERA HT |
| Tire Size | P245/75R16 109S | P245/75R16 109S |
| Pressure | Deflated | 26 psi |
| Tread Depth | 2/32 inch | 3/32 inch |

## 6. Vehicle 6 – 2001 Ford F150

### 6.1. General information

| | |
|---|---|
| Make/Model: | 2001 Ford / F-150 XLT Crew Cab |
| VIN: | 1FTRW07W61K[redacted] |
| Date of Manufacture: | 2001 |
| GVWR: | 6,600 lbs |
| Engine: | 4.6L, 8-cylinder, SOHC |
| Transmission: | 4-speed Automatic |

### 6.2. Damage Description

The vehicle sustained frontal damage with the left side of the front bumper displaced downward. The left side of the hood was in contact with the left fender and left front quarter panel. The left-front fender and left-front quarter panel were crushed inward with abrasions along the entire left side. The left-front wheel and brake were separated from, and were located under the vehicle. The top of the driver door frame was bent down. Both left doors were crushed inward and abraded. Both frontal airbags deployed.

The windshield was cracked and both left windows were broken out. The right-front passenger window was intact and was found in the down position. The right-rear passenger window was intact and was found in the up position. The rear window of the crew cab was broken out. The left-rear corner of the crew cab was crushed forward. The cargo bed sustained rear impact damage, crushing it forward.

The cargo bed was crushed more on the right then the left, significantly reducing the length of the cargo bed.

Just behind the left side of the crew cab, the fuel filler neck was separated from the fuel tank. The left frame rail, behind crew cab, was torn and bent. The drive axle was separated from the vehicle and the left axle tube was broken away from the differential housing. Only the right-side spring pack remained attached to the axle. The rear of the right frame rail was displaced upward and to the left. Damage and abrasions were also present at the right-rear corner of the crew cab. The vehicle was resting on the outboard side of the left-front tire and wheel. The inboard side of the left-front tire sidewall was punctured at the 9:00 position and the inboard wheel flange was abraded and had a radial collapse from approximately the 11 00 to 1:00 positions. The left-rear tire and wheel were crushed and under the cargo bed. The right-rear tire and wheel were damaged with approximately half of the wheel being radially collapsed. The right-front tire and wheel were not damaged.[25]

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Ford was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Ford's ACM was imaged by the NTSB Vehicle Recorder Specialist staff through the Ford's OBD port. The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 6.3. Tires and Wheels

**Table 8** includes the tire and wheel information documented on the Ford F150 at the time of inspection.

25. See Vehicle Photographs 15 and 16 – Photographs of the 2001 Ford

**Table 8:** Ford F150 Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | DEXTERO OHT2 | DEXTERO OHT2 |
| Tire Size | P225/70R16 109T | P225/70R16 109T |
| Pressure | Deflated | Deflated |
| Tread Depth | 10/32 inch | 9/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | DEXTERO OHT2 | DEXTERO OHT2 |
| Tire Size | P225/70R16 109T | P225/70R16 109T |
| Pressure | Deflated | 32 psi |
| Tread Depth | 10/32 inch | 10/32 inch |

## 7. Vehicle 7 – 2007 Chevrolet Uplander LS

### 7.1. General Information

| | |
|---|---|
| Make/Model: | 2007 Chevrolet / Uplander LS |
| VIN: | 1GNDV23W37D[redacted] |
| Date of Manufacture: | April 2007 |
| GVWR: | 5,842 lbs. |
| Engine: | 3.9L, 6-cylinder, DOHC |
| Transmission: | 4-speed Automatic |

### 7.2. Damage Description

The vehicle sustained front-end damage crushing the front rearward, more on the left than on the right. The rear bumper cover from the Cadillac CTS was found wedged into the front bumper of this vehicle. The hood was collapsed and crushed rearward. The left-front fender was collapsed rearward. The left-rear quarter panel was displaced forward with rear impact damage crushing the rear of the vehicle forward, more on the right than the left. The rear hatch door was crushed inward. The windshield was cracked. Four windows were broken out and four remained intact. The broken windows were the rear most windows on the left side, the back door window, the rearmost window on the right side, and the window on the right side sliding door. The right-rear quarter panel was crushed forward and to the left, trapping the right-rear tire. The right sliding door was damaged. There was red paint transfer at the right rear. There was no damage to the left-front or right-front tires or wheels. The left-rear wheel had abrasions on the hubcap. There were three radial collapses of the right-rear wheel from the 5:00 to 7:00 positions, from the 8:00 to 10:00 positions, and from the 11:00 to 1:00 positions.[26] No airbags deployed.

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Chevrolet was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

26. See Vehicle Photographs 18 and 119 – Photographs of the 2007 Chevrolet

The Chevrolet's ACM was removed and imaged by the NTSB Vehicle Recorder Specialist staff. The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 7.3. Tires and Wheels

**Table 9** includes the tire and wheel information documented on the Chevrolet Uplander at the time of inspection.

**Table 9:** Chevrolet Uplander Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | FIRESTONE PRECISION TOURING | FIRESTONE PRECISION TOURING |
| Tire Size | P225/60R17 98H | P225/60R17 98H |
| Pressure | 34 psi | 24 psi |
| Tread Depth | 7/32 inch | 9/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | FIRESTONE PRECISION TOURING | FIRESTONE PRECISION TOURING |
| Tire Size | P225/60R17 98H | P225/60R17 98H |
| Pressure | Deflated | Deflated |
| Tread Depth | 6/32 inch | 7/32 inch |

## 8. Vehicle 8 – 2014 Cadillac CTS

### 8.1. General information

| | |
|---|---|
| Make/Model: | 2014 Cadillac / CTS |
| VIN: | 1G6AU5S88E0[redacted] |
| Date of Manufacture: | April 2014 |
| Engine: | 3.6L, 6-cylinder, DOHC, twin turbo |
| Transmission: | 8-speed Automatic |

### 8.2. Damage Description

The vehicle sustained frontal impact damage, more on the right than the left. The right-front tire and wheel were displaced rearward and trapped against the rear of the wheel well. All headlamps were damaged. The hood was crumpled rearward, more on the right than the left. All windows were intact. Broken tinted glass from another vehicle was present on the windshield. There were small areas of red paint transfer on the left side, near the driver's rearview mirror. The driver's frontal airbag and both side curtain airbags deployed. There was rear impact damage more on the left than the right. The rear LED tail lamps were damaged, but present. The left-rear wheel was trapped by the left-rear quarter panel. The trunk lid was crushed inward. The right-rear fuel filler area just behind right-rear door was damaged. There were abrasions to the entire surface of the left-front wheel and hubcap. Abrasions were also present at the left-rear wheel and hubcap. Both rear tires had very low tread depths.[27]

27. See Vehicle Photographs 20 and 21 – Photographs of the 2014 Cadillac

The right-rear tire and wheel were not damaged. The right-front tire sidewall was punctured from the 7:00 to 9:00 positions and had outboard wheel flange damage from approximately the 6:00 to 10:00 positions.

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Cadillac was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Cadillac's ACM was removed and imaged by the NTSB Vehicle Recorder Specialist staff. The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 8.3. Tires and Wheels

**Table 10** includes the tire and wheel information documented on the Cadillac CTS at the time of inspection.

**Table 10:** Cadillac CTS Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | PIRELLI PZERO | PIRELLI PZERO |
| Tire Size | P245/40R18 93Y | P245/40R18 93Y |
| Pressure | 26 psi | Deflated psi |
| Tread Depth | 4/32 inch | 7/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | PIRELLI PZERO | PIRELLI PZERO |
| Tire Size | P275/35R18 93Y | P235/70R16 104S |
| Pressure | 30 psi | 32 psi |
| Tread Depth | 1/32 inch | 1/32 inch |

## 9. Vehicle 9 – 2015 Toyota Tundra

### 9.1. General information

| | |
|---|---|
| Make/Model: | 2015 Toyota / Tundra Crew Cab |
| VIN: | 5TFAW5F14FX[redacted] |
| Date of Manufacture: | March 2015 |
| Engine: | 5.7L, 8-cylinder, DOHC |
| Transmission: | 6-speed Automatic |

### 9.2. Damage Description

The vehicle sustained impact damage only to the rear, mostly just to the cargo bed. There was some contact damage on the left rear corner of the crew cab from contact with the cargo bed, but no other damage to the crew cab.[28]

Impact damage was present at the left rear of the cargo bed and bumper, displacing the left rear corner of the cargo bed forward. The tailgate was damaged more on the left than the right. All windows remained intact. No airbags deployed. There was no tire or wheel damage.

Further exterior and interior damage descriptions are contained in the *Survival Factors Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Toyota Tundra was also mapped with a FARO laser scanner by the NTSB Technical Reconstruction Team. The vehicle reference data is contained in the *Technical Reconstruction Group Chairman's Factual Report*, which is included in the docket for this investigation.

The Toyota Tundra's ACM was imaged by the NTSB Vehicle Recorder Specialist staff through the Toyota Tundra's OBD port. The full data set and additional details are available in the *Vehicle Recorder Specialist's Factual Report*, which is included in the docket for this investigation.

### 9.3. Tires and Wheels

**Table 11** includes the tire and wheel information documented on the Toyota Tundra at the time of inspection.

**Table 11:** Toyota Tundra Tire Information

| Front Axle | Left | Right |
|---|---|---|
| Tire Make | BRIDGESTONE DUELER H/L ALENZA | BRIDGESTONE DUELER H/L ALENZA |
| Tire Size | P275/55R20 111H | P275/55R20 111H |
| Pressure | 34 psi | 32 psi |
| Tread Depth | 10/32 inch | 10/32 inch |
| **Rear** | **Left** | **Right** |
| Tire Make | BRIDGESTONE DUELER H/L ALENZA | BRIDGESTONE DUELER H/L ALENZA |
| Tire Size | P275/55R20 111H | P275/55R20 111H |
| Pressure | 32 psi | 30 psi |
| Tread Depth | 10/32 inch | 10/32 inch |

28. See Vehicle Photograph 22 – Photograph of the 2015 Toyota Tundra

## E. DOCKET MATERIAL

The following attachments and photographs are included in the docket for this investigation:

*LIST OF ATTACHMENTS*

Vehicle Attachment 1 – 2007 Peterbilt – Recalls, Investigations, and Complaints

Vehicle Attachment 2 – 2007 Peterbilt – CECU and ABS module locations

Vehicle Attachment 3 – 2007 Peterbilt – Chassis Final Build

Vehicle Attachment 4 – 2007 Peterbilt – THP post-crash inspection

Vehicle Attachment 5 – 2007 Peterbilt – TRW Steering Gear Inspection Report

Vehicle Attachment 6 – Specifications and recall information for the 2010 Toyota Prius

Vehicle Attachment 7 – Specifications and recall information for the 2010 Scion tC

Vehicle Attachment 8 – Specifications and recall information for the 2003 Mazda Tribute

Vehicle Attachment 9 – Specifications and recall information for the 2005 GMC Savana

Vehicle Attachment 10 – Specifications and recall information for the 2001 Ford F150

Vehicle Attachment 11 – Specifications and recall information for the 2007 Chevrolet Uplander

Vehicle Attachment 12 – Specifications and recall information for the 2014 Cadillac CTS

Vehicle Attachment 13 – Specifications and recall information for the 2015 Toyota Tundra

*LIST OF PHOTOGRAPHS*

Vehicle Photograph 1 – Overall Truck-Tractor Damage Facing Left-Front Corner

Vehicle Photograph 2 – Overall Truck-Tractor Damage Facing Radiator

Vehicle Photograph 3 – TRW Steering Gear Box Removed From the Peterbilt

Vehicle Photograph 4 – Truck Tractor – View of axle 2 right cracked upper brake lining.

Vehicle Photograph 5 – Toyota Prius – Overall Damage Facing Left-Side Passenger Doors

Vehicle Photograph 6 – Toyota Prius – Overall Damage Facing Rear Cargo Area

Vehicle Photograph 7 – Toyota Prius – Overall Damage Facing Right-Rear Wheel Well

Vehicle Photograph 8 – Toyota Prius – Overall Damage Facing Right-Front Wheel Well

Vehicle Photograph 9 – Scion – Overall Damage Facing Right-Front Corner

Vehicle Photograph 10 – Scion – Overall Damage Facing Driver’s Door

Vehicle Photograph 11 – Scion – Overall Damage Facing Right-Rear Corner

Vehicle Photograph 12 – Mazda Tribute – Overall Damage Facing Left-Rear Corner

Vehicle Photograph 13 – Mazda Tribute – Overall Damage Facing Right-Side Passenger Door

Vehicle Photograph 14 – GMC Savana – Overall Damage Facing Right-Rear Corner

Vehicle Photograph 15 – Ford F150 – Overall Damage Facing Left-Front Corner

Vehicle Photograph 16 – Ford F150 – Overall Damage Facing Right-Rear Corner

Vehicle Photograph 17 – Ford F150 – Overall Damage Facing Left-Rear Corner

Vehicle Photograph 18 – Chevrolet Uplander – Overall Damage Facing Radiator

Vehicle Photograph 19 – Chevrolet Uplander – Overall Damage Facing Right-Rear Corner

Vehicle Photograph 20 – Cadillac CTS – Overall Damage Facing Right-Front Corner

Vehicle Photograph 21 – Cadillac CTS – Overall Damage Facing Trunk

Vehicle Photograph 22 – Toyota Tundra – Overall Damage Facing Left-Rear Corner

END OF REPORT

Jerome F. Cantrell
Vehicle Factors Investigator