



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

**VEHICLE FACTORS GROUP CHAIRMAN'S
FACTUAL REPORT**

GREENVILLE, ALABAMA – HWY21MH009

A. CRASH INFORMATION & CRASH SUMMARY

Refer to the *Crash Information and Crash Summary Report* in the docket for this investigation.

B. VEHICLE FACTORS GROUP

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C. DETAILS OF THE VEHICLE FACTORS INVESTIGATION

The Vehicle Factors Factual Report is a collection of information obtained during the detailed inspections of the involved vehicles, in conjunction with the Alabama Law Enforcement Agency (ALEA). The vehicles were inspected between June 22 and June 28, 2021, at Till's Wrecker Service, 6043 Mobile Road, Greenville, Alabama.

All major mechanical systems on the two commercial vehicles involved, a 2020 Volvo combination and a 2005 Freightliner combination, were examined, including the steering, braking, and suspension systems. Overall accident damage, along with any damage or anomalies within major vehicle mechanical systems were documented. Some areas of the vehicle could not be reliably documented due to extensive collision and fire damage. Supporting photographs, vehicle specifications, maintenance records, and prior inspection reports were collected.

Inspections of an additional 10 involved passenger vehicles entailed photographs and overall damage documentation. The Event Data Recorders (EDR's) of six of the involved

passenger vehicles were removed and imaged using Bosch Crash Data Retrieval software. The EDR's of the remaining four vehicles were consumed in post-crash fires.

Additional information contained within this document was obtained through commercial carrier records and data received from vehicle manufacturers.

1. Vehicle Inspections

1.1. 2020 Volvo Auto Hauler truck-tractor in combination with a 2020 Cottrell Autohauler trailer



Figure 1: The damaged Volvo combination viewed from the left front corner

1.1.1. General Information

Tractor

VIN ¹ :	4V5RC9EH7LN235052
Manufacturer:	Volvo
Model:	VAH64300
Manufactured:	2019
Unit #:	1347
GVWR ² :	52,600lbs
GAWR ³ #1:	14,600lbs

¹ Vehicle Identification Number (VIN) is used by the automotive industry to identify individual motor vehicles.

² Gross Vehicle Weight Rating (GVWR) is the total weight a vehicle is rated to carry as specified by the manufacturer.

³ Gross Axle Weight Rating (GAWR) is the maximum weight a given axle is designed to carry as specified by the manufacturer of the axle.

GAWR⁴ #2: 19,000lbs
GAWR #3: 19,000lbs
Engine: D13 425HP Diesel
Transmission: ATO2612F
Steering Gear: TRW
Brake System: Meritor Pneumatic Drum Brakes
Fuel Tank Capacity: 125 Gallons (Left) 50 Gallons (Right)

Trailer

VIN: 5E0AA1649LG328501
Manufacturer: Cottrell
Model: CX-09LSFA Autohauler
Manufactured: 4/2019
Unit #: 1347T
GVWR: 47,000lbs
GVWR #3: 18,750lbs
GVWR #4: 18,750lbs

1.1.2. Damage Description

The entire cab and engine were severely fire damaged. The portion of the Volvo truck-tractor to the rear of the cab did not sustain severe fire damage. The entire left side fuel tank located under the driver's door was consumed by fire, with only the mounting straps remaining. The fuel tank located on the right side behind the passenger door had an approximate 3-inch by 3-inch hole in the forward portion of the tank. The diesel exhaust fluid tank behind the cab on the left side was damaged and deformed by heat.

There was contact damage to the left front bumper. The right front frame rail was shifted left approximately 2-inches. The left side of the front bumper was torn away from the left frame rail. Attached to the front bumper on the left and right ends were 2-inch by 4-inch steel box support beams for the car hauler structure over the cab. The beams on the left side were shifted right approximately 11-inches. There were deep contact striations in the metal on the left outside corner of the box beams located approximately 18-inches and 40-inches high as measured from the ground. Both left and right ladders leading to the upper rack of the car carrier were warped.

The right-side door had an 8-inch by 6-inch tear in the sheet metal. There was also a fold in the door's sheet metal. The door was still in the frame. Just aft of the right door was a fold in the top of the frame rail.

The left-side door was still attached to the "A" pillar, which was shifted rearward approximately 12-inches. The top portion of the pillar had been cut and was missing. The car hauler trailer had an aluminum tread on the left side which was folded approximately 10-inches upward. There was also a tear in the aluminum bracket at the rear of the trailer.

⁴ For consistency in describing the axles of the truck-tractors, the front (steer) axle will be referred to as Axle #1, the drive axles as Axles #2 and #3.

1.1.3. Driver's Controls

Due to the extensive collision and fire damage to the truck, very few driver controls were able to be documented. The steel frame of the driver's seat was located in the driver's area of the wreckage.

1.1.4. Steering

Due to the extensive collision and fire damage sustained by the vehicle, a functional check of the steering system was not able to be performed. All of the steering components sustained heavy damage. The steel hoop that made up the steering wheel core was located near the upper steering shaft. The upper steering shaft was connected to the upper splined intermediate steering shaft by means of a universal joint. The upper splined portion of the intermediate steering shaft was pulled out of the lower portion of the intermediate steering shaft and was located near the steering wheel and driver's seat frame in the wreckage. Both pinch bolts were tight, and the upper and lower universal joints of the intermediate steering shaft were found to be securely connected during the post-crash inspection.

The lower portion of the intermediate shaft remained connected to the input shaft of the TRW steering gear, connected by means of another universal joint.

The drag link connected to the pitman arm was deformed and displaced upward, but still connected to the steering knuckle.

1.1.5. Suspension

The suspension for the #1 axle consisted of a solid axle with 2 leaf springs with shock absorbers at each axle end. The right-side springs were warped upward. The bushing at the top of the right-side shock was melted away.

The suspension for the rear axles (# 2 and #3) consisted of solid axles with a single leaf spring, an air spring, and a shock absorber attached to each axle end. No damage was noted to either #2 or #3 axle or their components.

1.1.6. Brakes

The Volvo truck-tractor semitrailer combination was equipped with pneumatic drum brakes on all axles. On axle #1, all hoses were melted, and the brake chambers were damaged by fire, so it was not possible to conduct functional tests of the brakes on this axle, however, the brakes on all other axles were tested and measured.

Brake pushrod stroke measurements for the truck-tractor and semitrailer were taken by connecting an external air source to the service side of each individual brake chamber. Each pushrod was marked, then air pressure regulated at 90 psi was applied to the chamber, and the distance the pushrod traveled was measured. This distance is recorded as "Pushrod Stroke" in **Table 1**.

Table 1: Volvo Truck-Tractor Semitrailer Combination Brake Measurements

Brake Location	Axle 1		Axle 2	
	Left	Right	Left	Right
Brake Type	Drum	Drum	Drum	Drum
Brake Size	Type 24-C	Type 24-C	Type 24-L	Type 24-L
Pushrod Stroke (in.)	Not Measured	Not Measured	1 5/8	1 1/2
Brake Location	Axle 3		Axle 4	
	Left	Right	Left	Right
Brake Type	Drum	Drum	Drum	Drum
Brake Size	Type 24-L	Type 24-L	Type 24-C	Type 24-C
Pushrod Stroke (in.)	1 7/8	1 3/4	1 1/4	1 1/4
Brake Location	Axle 5			
	Left	Right		
Brake Type	Drum	Drum		
Brake Size	Type 24-C	Type 24-C		
Pushrod Stroke (in.)	1 1/8	1 1/8		

The brake drums and brake pads on all axles were visually inspected and measured. All brake pads were found to be in compliance with the regulatory minimum thickness limits.

1.1.6.1. Anti-lock Braking System (ABS)

The Volvo truck-tractor and semitrailer were both equipped with ABS. An inspection of the ABS wiring, sensors and modules on the rear axles of the truck-tractor provided no evidence of the ABS being defective. All sensors and modules were in place and no visible wires appeared to be damaged other than on axle #1. Power was supplied to the trailer which resulted in the cycling of the ABS system and the ABS light activating and deactivating as required.⁵

1.1.7. Tires and Wheels

The manufacturer plate was not located on the Volvo truck-tractor due to fire damage. Tire pressure measurements were taken using a commercial grade tire pressure gauge. Tread depth measurements were taken in 2 locations within the major tread grooves of a given tire, the lowest of which is entered in **Table 2** for the truck-tractor and represents the minimum tread depth.

⁵ 49 CFR Part 393.55 (e) requires each trailer be equipped with an ABS malfunction indicator lamp.

Federal Motor Carrier Safety Administration (FMCSA) regulations require any tire mounted on the steering axle of a bus, truck, or truck tractor to have a major tread groove depth of at least 4/32^{nds} of an inch when measured at any point. The measurements shall not be made where tie bars, humps, or fillets are located. Tires mounted on axles other than steering axles shall have a major tread groove depth of at least 2/32^{nds} of an inch when measured at any point.⁶

Table 2: Volvo Truck-Tractor Tire Information

Axle 1	Left		Right	
Tire Make	Consumed		Consumed	
Tire Model				
Tire Size				
Pressure				
Tread Depth	12/32" Partial Tread		12/32" Partial Tread	
DOT #				
Radius				
Load Rating				
Wheel Type	Alloy		Alloy	
Axle 2	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Michelin	Michelin	Michelin	Michelin
Tire Model	XDE2	XDE2	XDE2	XDE2
Tire Size	265/70 R19.5	265/70 R19.5	265/70 R19.5	265/70 R19.5
Pressure	94 psi	94 psi	90 psi	96 psi
Tread Depth	13/32"	9/32"	9/32"	9/32"
DOT #	FWDP02X4620	FWDP02X4620	FWDP02X4620	FWDP02X4620
Radius	20.5-inches	20.5-inches	20.5-inches	20.5-inches
Load Rating	5,205 lbs. Dual	5,205 lbs. Dual	5,205 lbs. Dual	5,205 lbs. Dual
Wheel Type	Alloy	Alloy	Alloy	Alloy
Axle 3	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Michelin	Michelin	Michelin	Michelin
Tire Model	XDE2	XDE2	XDE2	XDE2
Tire Size	265/70 R19.5	265/70 R19.5	265/70 R19.5	265/70 R19.5
Pressure	100 psi	100 psi	100 psi	94 psi
Tread Depth	6/32"	6/32"	13/32"	13/32"
DOT #	FWDP02X0920	FWDP02X0920	FWDP02X0920	FWDP02X0920
Radius	20.5-inches	20.5-inches	20.5-inches	20.5-inches
Load Rating	5,205 lbs. Dual	5,205 lbs. Dual	5,205 lbs. Dual	5,205 lbs. Dual
Wheel Type	Alloy	Alloy	Alloy	Alloy

⁶ 49 CFR Part 393.75

The manufacturers label for the trailer was located on the left side. The label specified a tire size of 265/70R19.5 for both trailer axles. Inflation pressures were not specified on the label. **Table 3** includes the tire and wheel information documented on the Cottrell trailer at the time of inspection.

Table 3: Cottrell Trailer Tire Information

Axle 4	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Michelin	Michelin	Michelin	Michelin
Tire Model	X-Multi	X-Multi	X-Multi	X-Line
Tire Size	265/70 R19.5	265/70 R19.5	265/70 R19.5	265/70 R19.5
Pressure	106 psi	104 psi	106 psi	110 psi
Tread Depth	18/32"	18/32"	17/32"	17/32"
DOT #	3LDP01KX10	3LDP01KX10	3LDP01KX10	FWDP00AX0519
Radius	20.5-inches	20.5-inches	20.5-inches	20.5-inches
Load Rating	5,205 lbs. Dual	5,205 lbs. Dual	5,205 lbs. Dual	5,675 lbs. Dual
Wheel Type	Alloy	Alloy	Alloy	Alloy
Axle 5	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Michelin	Michelin	Michelin	Michelin
Tire Model	X-Line	X-Line	X-Line	X-Multi
Tire Size	265/70 R19.5	265/70 R19.5	265/70 R19.5	265/70 R19.5
Pressure	106 psi	102 psi	102 psi	104 psi
Tread Depth	13/32"	13/32"	13/32"	14/32"
DOT #	FWDP00AX0519	FWDP00AX0519	FWDP00AX0519	3LDP01KX10
Radius	20.5-inches	20.5-inches	20.5-inches	20.5-inches
Load Rating	5,675 lbs. Dual	5,675 lbs. Dual	5,675 lbs. Dual	5,205 lbs. Dual
Wheel Type	Alloy	Alloy	Alloy	Alloy

As noted above, the two tires on axle #1 were mostly consumed in the fire. The tires and wheels on the other axles were examined and damage was noted to several. The tire and wheel damage, when possible, is referenced to a clock position with the valve stem being at 12:00. The damage observed during the inspection included the following:

- #1 Axle, left side: outside wheel flange partially melted between 6:00 and 10:00.
- #1 Axle, left side: depression in outside wheel flange at 3:00.
- #2 Axle, left side: burn in tire sidewall between 4:00 and 5:00. Did not rupture the tire.
- #2 Axle, left side: depression in outside wheel flange at 11:30.

1.1.8. Vehicle Recorded Event Data and Collision Mitigation

The Volvo engine was controlled by an engine control module. The electronic control module (ECM) on this engine had the capability to capture or record events which often include vehicle speed, engine rpm, brake circuit status, throttle percentage, and other associated data in the event of a sudden decelerations or hard braking. The module was consumed in the fire. Data contained in the build sheet for the truck-tractor indicate the programmed maximum road speed was 68 miles per hour.⁷

A Samsara video camera system was also installed in the truck-tractor. This camera uploaded external and internal facing video, along with telematics data to the cloud on a continuous basis, depending on connectivity. This system provides audio alerts to the driver and notification to the carrier when specific programmed safety parameters are exceeded. Although the camera interfaces with the vehicle's ECM, it is not connected with any vehicle systems such as steering and braking and therefore does not provide automated emergency braking or lane keeping. See the Technical Reconstruction Group Chairman's Factual Report for additional information.

1.1.9. Maintenance

The maintenance records for the truck-tractor and semitrailer were reviewed in detail and document regular as needed repairs and scheduled preventative maintenance events between May 31, 2019, and May 24, 2021.⁸

Commercial vehicles must be inspected at a minimum of every 12 months to ensure compliance with the requirements set forth in the Federal Motor Carrier Safety Regulations (FMCSRs).⁹ The Volvo truck-tractor and Cottrell trailer were inspected in May 2021 and were found to have met the requirements of an annual inspection under the FMCSRs. Another inspection of the truck-tractor would not have been required until May 2022.

Records for the Volvo truck-tractor include:

- Annual vehicle inspection report dated May 24, 2021
- Maintenance and repair records
- Post-crash CVSA inspection¹⁰

Records for the semitrailer include:

- Annual vehicle inspection report dated May 24, 2021
- Maintenance and repair records

⁷ See *Vehicle Attachment – 2020 Volvo – Manufacturer build sheet.*

⁸ See *Vehicle Attachment – 2020 Volvo – Maintenance records and annual inspections*

⁹ Title 49 Code of Federal Regulations (CFR), part 396.17(c)

¹⁰ See *Vehicle Attachment – 2020 Volvo – Post-crash CVSA inspection*

1.2. 2020 Ford Explorer



Figure 2: The damaged Ford Explorer viewed from the right front corner

1.2.1. General Information

VIN: 1FM5K8DH6LGC*****
Manufacturer: Ford
Model: Explorer
Engine: 4 Cylinder Gasoline

1.2.2. Damage Description

The front bumper was torn away from the frame rail and deformed. The left front frame rail was displaced downward. The radiator was displaced rearward. The hood was scratched, deformed, and folded. The windshield was shattered and partially missing. The left front wheel was detached from the vehicle but present. The tire was detached from the wheel and the wheel was fractured laterally. The left A pillar was displaced to the left. The left front door frame was displaced down and to the left at the top. The glass in the door was shattered but in place. The left rear door sustained slight damage. The left rear wheel was damaged. The rear of the vehicle was displaced upward, and the roof folded. The right rear door glass was intact. The rear bumper fascia was detached and missing. The rear bumper was displaced forward on the right side to the rear axle. The rear hatch was displaced forward and to the left. The hatch frame was deformed. The right rear tire was torn from the wheel and the wheel was folded and chipped. Both right side doors were missing with the B pillar cut. The right front wheel flange was scuffed around its

circumference and the tire was flat. The right front quarter panel was displaced to the left and the right-side A pillar also shifted left.

1.2.3. Event Data Recorder

The event data recorder of the Explorer was successfully imaged by the Alabama Law Enforcement Agency Traffic Homicide Unit on June 22, 2021.¹¹ See the Technical Reconstruction Group Chairman's Factual Report for additional information

1.3. 2017 Ford F-350 Transit Van



Figure 3: The damaged Ford Transit Van as viewed from the left front corner

1.3.1. General Information

VIN: 1FBZX2YM2HKBxxxxx
Manufacturer: Ford
Model: F-350 Transit
Engine: 6 Cylinder Gasoline

1.3.2. Damage Description

Nearly the entire vehicle was consumed by fire. All passenger controls and interior features were burned, leaving only the frames of the seats. All doors had been removed from the van and the A, B, and C support pillars cut during extrication. The rear axle was displaced forward and upward. The bottom of the rear bumper was approximately 72-inches from the ground. The rear leaf spring suspension was deformed and both sides were detached from their respective hangers.

¹¹ See *Vehicle Attachment – 2020 Ford Explorer – Event data recorder image*

The front frame rails were deformed. The left rail was shifted left approximately 10-inches and the right rail shifted right approximately 40-inches. The driveline was detached at the rear differential.

1.4. 2005 Freightliner Cascadia truck-tractor in combination with a 2009 Wabash National Corporation van trailer



Figure 4: The damaged Freightliner Truck-Tractor viewed from the left side

1.4.1. General Information

Tractor

VIN:	1FUJBBCG25LN96875
Manufacturer:	Freightliner
Model:	CST 120
Manufactured:	10/2004
Unit #:	6875
GVWR:	52,000lbs
GAWR #1:	12,000lbs
GAWR #2:	20,000lbs
GAWR #3:	20,000lbs
Engine:	Detroit Diesel 6067MV6E
Transmission:	Eaton Fuller FR-15210B
Steering Gear:	TRW
Brake System:	Pneumatic Drum Brakes
Fuel Tank Capacity:	110 Gallons (Left) 110 Gallons (Right)

Trailer

VIN:	1JJV532W99L318518
Manufacturer:	Wabash National Corporation
Model:	53 Foot Van Trailer
Manufactured:	2009
Unit #:	TA994825

GVWR: 65,000lbs

1.4.2. Damage Description

The Freightliner truck-tractor sustained severe fire damage to all areas, affecting all major mechanical systems. The Freightliner sustained contact damage to the right front bumper, which was displaced rearward approximately 18-inches. Both left and right saddle fuel tanks were consumed by the fire.¹²

The entire van trailer also sustained severe fire damage. Both sides of the trailer were consumed in the fire. The front panel and rear trailer doors were mostly consumed, with the remaining structure folded down and inward. A portion of the bottom of the trailer had disengaged from the upper structure and remained connected to the truck-tractor at the fifth wheel.

Damage specific to many of the vehicle components will be described in greater detail later in the appropriate sections of this document.

1.4.3. Driver Controls

Due to the extensive collision and fire damage to the Freightliner, driver controls were unable to be documented.

1.4.4. Steering

Due to the extensive collision and fire damage sustained by the Freightliner, a functional check of the steering system could not be performed. All steering components sustained heavy fire damage. The steel hoop that made up the steering wheel core was located detached from the upper steering shaft and in the cab debris. The upper steering shaft was connected to the upper splined intermediate steering shaft by means of a universal joint. The upper splined portion of the intermediate steering shaft was still connected to the lower portion of the intermediate shaft. Both pinch bolts were tight, and the upper and lower universal joints of the intermediate steering shaft were found to be securely connected during the post-crash inspection.

The lower steering shaft was still connected to the steering gear box, which was still securely mounted to the frame rail. The pitman arm and drag link remained connected and attached to the left steering knuckle. The right steering arm was found to be bent, however, remained connected to the right steering knuckle.

1.4.5. Suspension

The truck-tractor's steer axle (axle #1) suspension consisted of a solid axle with a 2-leaf spring pack, and shock absorbers attached to each axle end. Due to debris melted onto the suspension components, it was not possible to inspect the connection points for the leaf springs. The right-side of the axle was displaced rearward.

¹² For uniform description, "left" will refer to the driver's side, and "right" will refer to the passenger side of a vehicle.

The suspension for the truck-tractor's drive axles (axles #2 & #3) consisted of single leaf springs mounted to the solid drive axle, and a set of shock absorbers. The ends of the leaf springs had detached from their mounts on the frame rail. All shock absorbers were warped and deformed. The #3 axle on the right side was broken free from its mount and shifted rearward approximately 14-inches.

1.4.6. Brakes

The Freightliner truck-tractor semi-trailer combination was equipped with pneumatic drum brakes on all axles. Axle #1 had type 24 long stroke brake chambers, axle #2 had type 30/30 long stroke brake chambers, and axle #3 had type 30 long stroke chambers. All hoses had melted and the brake chambers on axle #2 had detached at the clamp between the service/parking brake sides. It was not possible to conduct functional tests of the braking system.

The brake drums and brake pads on all axles were visually inspected, and where possible, measured. All brake pads were found to exceed the minimum thickness limits of 1/4-inch.¹³

1.4.7. Tires and Wheels

All tires were fully or partially consumed in the fire. Tread measurements were taken on any tire remnants when possible. Tire make and model information could not be ascertained. **Tables 4 and 5** show the limited tire data collected.

¹³ 49 CFR Part 393.47(d)(2) states 1/4 inch minimum for air-braked non-steering axles, or 1/16 inch minimum for air-braked front steering axle brakes

Table 4: Freightliner Truck-Tractor Tire Data

Axle 1	Left		Right	
Tire Make	Consumed		Partially Consumed	
Tread Depth			17/32" Partial Tread	
Wheel Type	Alloy		Alloy	
Axle 2	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Partially Consumed	Consumed	Consumed	Consumed
Tread Depth	7/32"			
Wheel Type	Alloy	Steel	Steel	Alloy
Axle 3	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Partially Consumed	Consumed	Consumed	Partially Consumed
Tread Depth	17/32"			16/32"
Wheel Type	Alloy	Steel	Steel	Alloy

Table 5: Wabash Trailer Tire Data

Axle 4	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Consumed	Consumed	Consumed	Consumed
Tread Depth				
Wheel Type	Steel	Steel	Steel	Steel
Axle 5	Left		Right	
	Outside	Inside	Inside	Outside
Tire Make	Consumed	Consumed	Consumed	Consumed
Tread Depth				
Wheel Type	Steel	Steel	Steel	Steel

The wheels on all axles were examined and damage was noted to several. The wheel damage, when possible, is referenced to a clock position with the valve stem being at 12:00. The damage observed during the inspection included the following:

- #1 Axle, right and left alloy wheel partially melted
- #2 Axle, right and left outside alloy wheel melted, inside steel wheel intact
- #3 Axle, right and left outside alloy wheel melted, inside steel wheel intact
- #4 Axle, left side: outside wheel flange collapsed between 10:00 and 2:00.

1.4.8. Vehicle Recorded Event Data and Collision Mitigation

The Detroit engine was controlled by an engine control module. The electronic control module (ECM) on this engine had the capability to capture or record events which often include vehicle speed, engine rpm, brake circuit status, throttle percentage, and other associated data in the event of a sudden decelerations or hard braking. The module was consumed in the fire. Information from the post-crash driver's interview indicates the truck-tractor's programmed maximum road speed was 68 miles per hour

1.4.9. Maintenance History

The maintenance inspection records for the Freightliner truck-tractor and semitrailer were reviewed in detail, and document regular as needed repairs and scheduled preventative maintenance events between May 27, 2019, and June 14, 2021.¹⁴

Records for the truck-tractor include:

- Annual vehicle inspection report dated 10/24/2020
- Repair records
- Recall and warranty repair records
- 3 Roadside CVSA inspections¹⁵

Records for the semitrailer include:

- Annual vehicle inspection report dated 10/24/2020
- Repair records

The Freightliner involved in this collision was inspected on 10/24/2020 and was found to have met the requirements of an annual inspection. Another inspection of the Freightliner would not have been required until October 2021. The semitrailer was inspected on the same date as the Freightliner.

The truck-tractor was the subject of two recalls and two field service campaigns.¹⁶ All recalls, and service campaigns had been completed.

Recalls:

- Steering shaft assembly defect involving an incorrectly machined lower yoke which could result in a possible loss of steering.
- Issue concerning water leakage into the power distribution module.

Field service campaigns:

- Alternator cable clamps may wear into the cable insulation.
- Rear drive axle lock screw may shear causing gear damage.

¹⁴ See *Vehicle Attachment – 2005 Freightliner - Maintenance and annual inspection records.*

¹⁵ See *Vehicle Attachment – 2005 Freightliner – Roadside CVSA Inspections.*

¹⁶ See *Vehicle Attachment – 2005 Freightliner – Recalls and service campaigns*

1.5. 2016 Ram 1500



Figure 5: The damaged Ram 1500 viewed from the right side

1.5.1. General Information

VIN: 1C6RR7PT9GS1xxxxx
Manufacturer: Ram
Model: 1500
Engine: 8 Cylinder Gasoline

1.5.2. Damage Description

The entire vehicle had extensive fire damage. All tires were consumed by fire and all windows were missing. All passenger controls and interior features were burned, leaving only the frames of the seats. The front bumper was detached on the left side, deformed and the left bumper horn was shifted right approximately 8-inches. The radiator was missing, consumed by fire. The left front quarter panel was displaced rearward. The hood brace was fractured and deformed. The right front alloy wheel was totally consumed by fire and the left front, right rear and left rear were mostly consumed. The left rear door panel was dented as was the right front door, which was still mounted in the frame, but warped and unable to close.

1.6. 2017 Volkswagen Passat



Figure 6: The damaged Volkswagen Passat viewed from the left front corner

1.6.1. General Information

VIN: 1VWBT7A36HC0xxxxx
Manufacturer: Volkswagen
Model: Passat
Engine: 4 Cylinder Gasoline

1.6.2. Damage Description

Nearly the entire vehicle was consumed by fire. All passenger controls and interior features were burned, leaving only the frames of the seats. The front bumper fascia was consumed but the bumper was in place with no damage. The hood was displaced downward and deformed. The left front quarter panel was missing, and the right front quarter panel was displaced to the rear. All tires were consumed by the fire. The left and right front wheels were partially consumed with evidence of contact damage and grinding around the circumference of the outer wheel flange. All glass was missing. The right front door had an approximately 24-inch wide by 8-inch hole in the bottom of the door panel. The right rear door was damaged at connection with the “C” pillar. The roof was displaced downward near the sunroof. The right rear bumper and quarter panel were displaced forward to the rear axle and shifted to the left approximately 16-inches. The left rear quarter panel did not have as much contact damage but was shifted to the left. The right rear wheel was partially consumed by fire and the left rear was totally consumed. The left rear door was deformed inward between 17 to 25-inches from the bottom of the panel. All door latches were consumed.

1.7. 2021 Chrysler Pacifica



Figure 7: The damaged Chrysler Pacifica viewed from the right front corner

1.7.1. General Information

VIN:	2C4RC3GG3MR5xxxxx
Manufacturer:	Chrysler
Model:	Pacifica
Engine:	6 Cylinder Gasoline

1.7.2. Damage Description

The front bumper fascia and grill were displaced, torn away from the vehicle but present. The front bumper was displaced rearward on its left side. The hood was displaced rearward and deformed. The left headlight was missing from its mount. The windshield was still present in its frame but shattered and partially displaced rearward. The left front door was missing and the left side sliding door was hanging from its rear mount. The B pillar on the left side was missing. The left front tire was flat, but the wheel was undamaged. The left rear tire was also flat, and the wheel was scratched. The rear bumper fascia was missing, and the bumper was damaged on its right side. The right front tire was inflated but the wheel was scuffed. The right rear tire was inflated but had scuff marks and blue paint transfer on it. The right front door was displaced to the left and the glass was missing. There were scratches down the entire right side with blue paint transfer near the right rear corner. The glass was still in place on the right-side sliding door and the far rear window. The right-side sliding door and quarter panel were displaced to the left.

1.7.3. Event Data Recorder

The event data recorder of the Pacifica was successfully imaged by the Alabama Law Enforcement Agency Traffic Homicide Unit on June 22, 2021.¹⁷ See the Technical Reconstruction Group Chairman's Factual Report for additional information.

1.8. 2020 Acura TLX



Figure 8: The damaged Acura TLX viewed from the right side

1.8.1. General Information

VIN: 19UUB3F87LA0xxxxx
Manufacturer: Acura/Honda
Model: TLX
Engine: 6 Cylinder Gasoline

1.8.2. Damage Description

The front bumper fascia was detached on the right side. The front bumper was displaced approximately 2-inches rearward at the midpoint. The hood was displaced to the rear and was deformed. The windshield was partially in its frame and shattered. The left front tire was intact and undamaged. The left front door was damaged at the B pillar, which was cut. The left rear door was folded toward the rear. The left rear wheel and tire were displaced forward under the rear seat of the vehicle. The rear bumper was displaced forward and folded at its midpoint. The left side glass was missing, the right front door glass was also missing, but the right rear door glass was intact. The back window was missing. The trunk was detached from its mounting brackets. The

¹⁷ See *Vehicle Attachment – 2020 Chrysler Pacifica – Event data recorder image*

rear of the vehicle was displaced forward and to the left. There was blue paint transfer down the entire right side. The right front quarter panel was missing. There was a scrape along the bottom of the right side and a tear in the right front door near the handle. There was a gouge beginning at the right front door handle extending rearward to the right rear door handle. The right rear tire was displaced and canted away from the vehicle. The right front outside wheel flange was partially ground away, and the entire flange was scraped around the circumference.

1.8.3. Event Data Recorder

The event data recorder of the Acura was successfully imaged by the Alabama Law Enforcement Agency Traffic Homicide Unit on June 22, 2021.¹⁸ See the Technical Reconstruction Group Chairman's Factual Report for additional information

1.9. 2017 Buick Lacrosse



Figure 9: The damaged Buick Lacrosse viewed from the left front corner

1.9.1. General Information

VIN:	1G4ZN5SS8HU2xxxxx
Manufacturer:	Buick
Model:	Lacrosse
Engine:	6 Cylinder Gasoline

¹⁸ See *Vehicle Attachment – 2020 Acura TLX – Event data recorder image*

1.9.2. Damage Description

There was damage to the front bumper fascia on both the right and left side. The left front quarter panel was displaced to the left and deformed. The windshield was still in its mount but cracked. The left front tire was flat, but the wheel was undamaged. The left rear tire was also flat and there was wheel damage. There were scratches down the left side, more severe on the left rear door, with red paint transfer present. The left side glass was intact. The left rear quarter panel was displaced forward. The rear bumper fascia and bumper were displaced forward. The rear window was missing. The bottom portion of the right rear quarter panel was displaced and hanging from its mount. The right-side glass was intact. The right rear and right front tires were flat and the wheel both were scuffed around the entire outside flange.

1.9.3. Event Data Recorder

The event data recorder of the Lacrosse was successfully imaged by the Alabama Law Enforcement Agency Traffic Homicide Unit on June 22, 2021.¹⁹ See the Technical Reconstruction Group Chairman's Factual Report for additional information.

1.10. 2017 Kia Sedona (Grey)



Figure 10: The damaged Kia Sedona viewed from the left side

¹⁹ See *Vehicle Attachment – 2017 Buick Lacrosse – Event data recorder image*

1.10.1. General Information

VIN: KNDMB5C13H63xxxxx
Manufacturer: Kia
Model: Sedona
Engine: 6 Cylinder Gasoline

1.10.2. Damage Description

The front bumper fascia was detached, but present. The front bumper was intact. The radiator was displaced rearward. The hood was deformed, folded, and displaced rearward. The windshield was shattered but present in its frame. The left front quarter panel was missing. The left front sheet metal door skin was missing and was the glass from the door frame. The left rear door had a lateral scrape at its midpoint. The left rear quarter panel was displaced forward to the rear wheel well. The left front tire was flat, and the wheel was scuffed near the lug nuts. The left rear tire was inflated but there was heavy scuffing on the wheel flange. The rear bumper was displaced forward, with more displacement on the left. The bumper was torn just to the left of the left frame rail. The rear hatchback was displaced forward to the rear seatbacks and the glass was missing. The rear bumper fascia was detached but present. The bottom portion of the right rear quarter panel was missing, and the top portion of the panel was scratched and displaced to the left. The roof was folded and displaced downward between the C and D pillars. The right rear glass was missing. The right rear tire was flat with minor wheel flange scratches. The right-side sliding door and right front door glass was intact, but there were scratches throughout. There was a dent in the sheet metal below the right-side mirror. The right front tire was flat and the outside wheel flange was scraped around its circumference. The right front quarter panel was displaced rearward.

1.10.3. Event Data Recorder

The airbag control module of the Sedona was removed from the vehicle by the Alabama Law Enforcement Agency Traffic Homicide Unit on June 22, 2021. The module was then sent to an expert with the technology needed to image the module. The expert successfully imaged the event data recorder on July 1, 2021.²⁰ See the Technical Reconstruction Group Chairman's Factual Report for additional information.

²⁰ See *Vehicle Attachment – 2017 Kia Sedona – Event data recorder image*

1.11. 2017 Toyota Camry



Figure 11: The damaged Toyota Camry viewed from the left side

1.11.1. General Information

VIN:	4T1BF1FKXHU3xxxxx
Manufacturer:	Toyota
Model:	Camry
Engine:	4 Cylinder Gasoline

1.11.2. Damage Description

The front bumper fascia was missing but the bumper was in place and undamaged. The hood was displaced rearward and folded. The left front quarter panel was displaced rearward to the wheel well. There were scratches down the entire left side of the vehicle. The left front door had a dent in the sheet metal at the midpoint. The left front tire was inflated but the wheel flange was scuffed around its lug nuts. The left rear tire and wheel were intact and undamaged. All glass but the right rear door and rear windows was intact. The rear bumper fascia was detached but present. The rear bumper was torn from its frame mounts and missing. The right-side frame rail was displaced forward to the rear tire. Both right rear and left rear quarter panels were displaced forward to the rear tires. The trunk was displaced forward and to the right. The right rear tire was flat, but the wheel was undamaged. The right front tire and wheel were undamaged. The right rear door was displaced to the left with a 5-inch high and 10-inch-long tear in the sheet metal.

1.11.3. Event Data Recorder

The event data recorder of the Camry was successfully imaged by the Alabama Law Enforcement Agency Traffic Homicide Unit on June 22, 2021.²¹ See the Technical Reconstruction Group Chairman's Factual Report for additional information

1.12. 2019 Ford F-150 King Ranch Crew Cab



Figure 12: The damaged overturned Ford F-150 viewed from the left front corner

1.12.1. General Information

VIN: 1FTEW1E53KFCxxxxx
Manufacturer: Ford
Model: F-150 King Ranch
Engine: 8 Cylinder Gasoline

1.12.2. Damage Description

The Ford pick-up was on its roof and nearly entirely consumed by fire. All passenger controls and interior features were burned, leaving only the frames of the seats. The front bumper was detached from its mounts on the right side of the frame rail. One left side door frame was visible, but all other doors were missing or consumed. The left tow hook mounted to the frame rail was deformed. The drivetrain was melted at the rear differential. The rear leaf springs and shocks of the suspension system were warped away from the frame with the rear axle still attached. All

²¹ See *Vehicle Attachment – 2017 Toyota Camry – Event data recorder image*

tires and wheels were consumed. The rear bumper was displaced approximately 10-inches and forward. The tailgate was partially detached and laying on the ground.

DOCKET MATERIAL

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

LIST OF ATTACHMENTS

Vehicle Attachment – 2005 Freightliner - Maintenance and annual inspection records

Vehicle Attachment - 2005 Freightliner – Roadside CVSA Inspections

Vehicle Attachment - 2005 Freightliner – Recalls and service campaigns

Vehicle Attachment – 2020 Volvo – Manufacturer build sheet

Vehicle Attachment – 2020 Volvo – Maintenance records and annual inspections

Vehicle Attachment – 2020 Volvo – Post-crash CVSA inspection

Vehicle Attachment – 2020 Chrysler Pacifica – Event data recorder image

Vehicle Attachment – 2020 Acura TLX – Event data recorder image

Vehicle Attachment – 2017 Buick Lacrosse – Event data recorder image

Vehicle Attachment – 2020 Ford Explorer – Event data recorder image

Vehicle Attachment – 2017 Kia Sedona – Event data recorder image

Vehicle Attachment – 2017 Toyota Camry – Event data recorder image

LIST OF PHOTOGRAPHS

Vehicle Photo 1 - 2020 Volvo combination - Damage viewed from the left front corner

Vehicle Photo 2 - 2020 Ford Explorer - Damage viewed from the right front corner

Vehicle Photo 3 - 2017 Ford Transit Van - Damage viewed from the left front corner

Vehicle Photo 4 -2005 Freightliner Combination – Damage viewed from the left side

Vehicle Photo 5 -2016 Ram 1500 – Damage viewed from the right side

Vehicle Photo 6 -2017 Volkswagen Passat – Damage viewed from the left front corner

Vehicle Photo 7 -2020 Chrysler Pacifica – Damage viewed from the right front corner

Vehicle Photo 8 -2020 Acura TLX – Damage viewed from the right side

Vehicle Photo 9 -2017 Buick Lacrosse – Damage viewed from the left front corner

Vehicle Photo 10 -2017 Kia Sedona – Damage viewed from the left side

Vehicle Photo 11 -2017 Toyota Camry – Damage viewed from the left side

Vehicle Photo 12 -2019 Ford F-150 - Damage viewed from the left front corner (overturned)

END OF REPORT

Brian Bragonier

Vehicle Factors Group Chairman