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of Transportation

**National Highway  
Traffic Safety  
Administration**



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July 2020

**Special Crash Investigations:  
Remote Vehicle Fire/Child  
Restraint System Investigation;  
Vehicle: 2005 Dodge Ram 1500;  
Location: California;  
Crash Date: May 2017**

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<b>16. Abstract</b> This report documents the remote vehicle fire/child restraint system (CRS) investigation of a post-crash fire in a 2008 Dodge Ram 1500 involved in a two-vehicle crash with a 1994 Ford Bronco and the two child occupants of the Dodge who were seated in CRSs. The crash occurred at night in May 2017 in rural California. The Dodge was traveling southbound and the Ford was traveling northbound. The occupants in the Dodge included a 44-year-old belted male driver, a 43-year-old belted female front-right occupant, a 7-year-old male second-row left occupant seated in a CRS, a 19-year-old belted female second-row center occupant, a 22-month-old female second-row right occupant seated in a CRS, and a 24-year-old male occupant lying in the unenclosed cargo bed. The driver of the Ford was a 24-year-old male. For unknown reasons, the Ford crossed the centerline and struck the Dodge head-on. The vehicles came to rest with their front planes engaged and a post-crash fire spread to both vehicles. Both drivers sustained fatal injuries. The surviving adult occupants of the Dodge were transported by ambulance to local hospitals, where they were hospitalized. The child occupants were transported by ambulance to a local hospital, where they were treated and released.			
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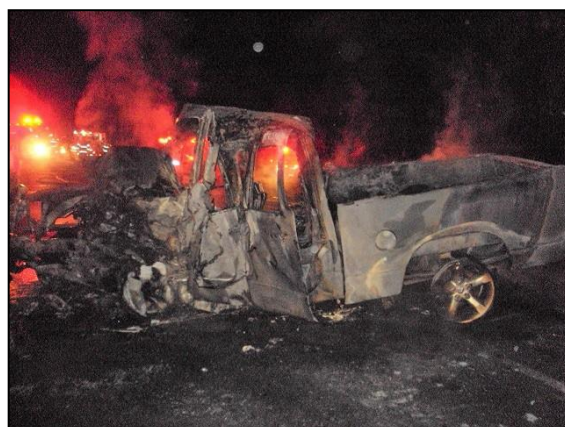
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**Special Crash Investigations**  
**Remote Vehicle Fire/Child Restraint System Investigation**  
**Case Number: DS19015**  
**Vehicle: 2008 Dodge Ram 1500**  
**Location: California**  
**Crash Date: May 2017**

**BACKGROUND**

This report documents the remote vehicle fire/child restraint system (CRS) investigation of a post-crash fire in a 2008 Dodge Ram 1500 (**Figure 1**) involved in a head-on crash with a 1994 Ford Bronco and the two child occupants of the Dodge who were seated in CRSs. The investigation was intended to examine the events leading to the fire, how quickly the fire spread to the occupant compartment, the magnitude of the fire, the time sequence in which emergency medical services (EMS) and other responders arrived on-scene, occupant CRS usage, occupant restraint usage, and demographics and injury data. The crash was identified during a review of Fatality Analysis Reporting System (FARS) crash reports. The criteria for the crash type include a front- or side-plane impact, a fire that spreads to the occupant compartment, and at least one occupant seated in a CRS. The Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration assigned the case in July 2019. The police report, on-scene photos, and medical records were obtained.



**Figure 1.** The 2008 Dodge Ram 1500 (police photo).

This two-vehicle crash occurred at night in May 2017 on a two-way, undivided, three-lane, north/south, State highway in rural California. The Dodge was traveling southbound, and the Ford was traveling northbound. The occupants in the Dodge were a belted 44-year-old male driver, a belted 43-year-old female front-right occupant, a 7-year-old male second-row left occupant seated in a CRS, a belted 19-year-old female second-row center occupant, a 22-month-old female second-row right occupant seated in a CRS, and a 24-year-old male occupant lying supine in the unenclosed cargo bed. The driver of the Ford was a 23-year-old male whose restraint usage was unknown. Conditions were dark without illumination, cloudy, and wet. For unknown reasons, while negotiating a curve the Ford crossed the centerline entering the southbound lane, where the front plane of the Ford struck the front plane of the Dodge head-on. The vehicles came to rest with their front planes engaged and a post-crash fire spread to the exterior and interior of both vehicles.

The drivers of both vehicles sustained fatal injuries. The surviving adult occupants of the Dodge sustained police-reported “A” (incapacitating) injuries and were transported by ambulance to local hospitals, where they were admitted and hospitalized for unknown durations. The child occupants seated in CRSs sustained “B” (non-incapacitating) injuries and were transported to a

local hospital, where they were treated and released. The Dodge sustained major burn damage to the exterior and both rows of the interior. The Ford sustained major burn damage to the front exterior and the front-row interior.

## SUMMARY

### *Crash Site*

The crash occurred on a two-way, undivided, north/south, State highway in rural California. The roadway included two northbound lanes and one southbound lane each measuring 3.6 m (11.8 ft) wide (**Figure 2**). The northbound lanes were delineated by a dashed white painted stripe and were separated from the southbound lane by a double yellow painted stripe configured with a rumble strip. The roadway was bordered by paved asphalt shoulders measuring approximately 2.1 m (6.8 ft) wide. The roadway curved left in the southbound direction at a radius measuring approximately 317 m (1,040 ft) at the right fog line. According to the police report, the southbound lane had a downhill slope of approximately 5 percent. The speed limit was 89 km/h (55 mph). Conditions at the time of the crash were dark without illumination, cloudy, and wet. A crash diagram is included at the end of this report.



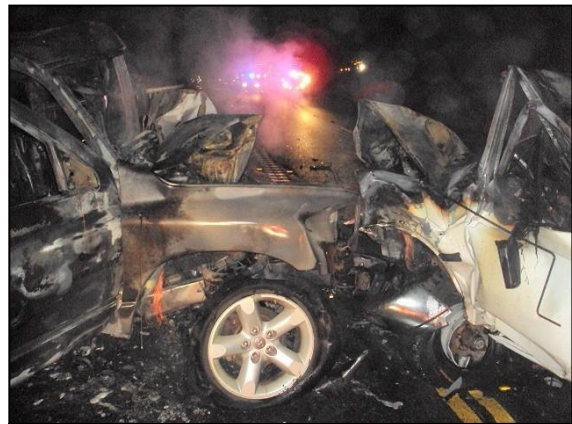
**Figure 2.** Crash site, looking south (police photo).

### *Pre-Crash*

The Dodge was traveling southbound at an unknown speed and the Ford was traveling northbound in an unknown lane at an unknown speed. For unknown reasons, the Ford departed the northbound lanes and crossed over into the southbound lane. It is unknown whether either driver steered or braked to avoid the other vehicle. The Dodge remained in its original lane.

### *Crash*

The crash occurred in the southbound lane where the front plane of the Dodge struck the front plane of the Ford head-on. The vehicles remained engaged as each initiated counterclockwise rotations of approximately 40 degrees. The Dodge came to rest in the southbound lane, facing east. The Ford came to rest in the second northbound lane from the right, facing west (**Figure 3**). Following the crash, both vehicles caught fire, which spread to their interiors.



**Figure 3.** At rest positions, the Dodge, left, and the Ford, right, (police photo).

### *Post-Crash*

Both drivers sustained fatal injuries and were declared deceased on-scene. The surviving adult occupants of the Dodge sustained police-reported “A” (incapacitating) injuries and were transported by ambulance to local hospitals, where they were admitted and hospitalized for unknown durations. The child occupants seated in CRSs sustained “B” (non-incapacitating)

injuries and were transported by ambulance to a local hospital where they were treated and released. The Dodge sustained burn damage to the full exterior and interior. The Ford sustained burn damage to the front exterior and the front-row interior.

## **2008 DODGE RAM 1500**

### ***Description***

The 2008 Dodge Ram 1500 was a 4-door, light pickup identified by the Vehicle Identification Number (VIN) 1D7HA18N98Sxxxxxx. The date of manufacture was March 6, 2008, and the odometer reading was unknown. The vehicle was configured with two rows to seat five occupants, an 8-cylinder, 4.7-liter, gasoline engine, rear-wheel-drive, and hydraulic brakes. The vehicle manufacturer recommended size P275/60R20 tires for the front and rear with a recommended air pressure of 351 kPa (35 psi). The front row was configured with bucket seats. The front occupants' seat track settings were unknown. The second row was configured with a bench seat.

### ***Exterior Damage***

The Dodge sustained major severity crush to the front plane in the impact with the Ford and unknown severity damage caused by the post-crash fire. The estimated Collision Deformation Classification (CDC) for the Dodge in Event 1 was 12FDEW3. The vehicle sustained burn damage to all exterior planes and both interior rows of seats.

### ***Child Restraint System Discussion***

Unknown make/model CRS #1: The 7-year-old male seated in the second-row left position was likely using a forward-facing booster safety seat of an unknown make/model in combination with the vehicle's lap and shoulder seat belt. He was reported by the police to have used a CRS and to have sustained seat-belt-related abrasions. Efforts to obtain additional CRS data were unsuccessful.

Unknown make/model CRS #2: The 22-month-old female seated in the second-row right position was using an unknown make/model CRS in a forward-facing orientation. She was reported by the police to have used a CRS and to have sustained minor abrasions to the torso. Efforts to obtain additional CRS data were unsuccessful.

### ***Vehicle Fire Discussion***

Both vehicles sustained post-crash fires. The local fire department was dispatched via radio communication at 19 minutes after the crash and arrived on-scene in five minutes with three apparatus units and seven personnel. They suppressed both vehicle fires using approximately 750 gallons of tank water in addition to providing care to occupants prior to their transport. Following extinguishment of the fires, the fire department assisted in extrication of both drivers, who were declared deceased on-scene. The fire incident report did not mention any investigation or data relating to the cause and source of the fires. The vehicles remained engaged following the crash, and the origin of the fire was not determined. A secondary fire department provided an unknown level of on-scene support, and they did not generate an incident report documenting their activity. The fire units were cleared from the scene four hours and 37 minutes after the crash.

**Interior Damage**

The Dodge’s interior sustained unknown damage caused by impact forces and major damage caused by fire (Figure 4). All glazing was disintegrated or displaced. According to the police report, the driver’s legs were trapped between his seat cushion and the steering column, suggesting longitudinal intrusion or seat deformation was likely present in the front row. One occupant’s medical records indicated that intrusion measuring 30-46 cm (12-18 in) was present in the vehicle.



**Figure 4.** Second-row damage, the 2008 Dodge Ram 1500 (police photo).

**Manual Restraint Systems**

The Dodge was equipped with three-point continuous lap and shoulder seat belts for the driver and front right occupant. The police report stated that both front-row occupants were belted at the time of the crash. The vehicle was equipped with lap and shoulder belts for the three second-row seat positions. The second-row outboard seat positions were configured with Lower Anchors and Tethers for Children (LATCH). The police report stated that the second-row center occupant was belted, and that the second-row left and right occupants were using CRSs. Efforts to obtain additional seat belt usage for the CRS-restrained occupants were unsuccessful.

**Supplemental Restraint Systems**

The Dodge was equipped with frontal air bags and seat belt pretensioners for the front-row and side-impact inflatable curtain air bags for both rows. The police report and one occupant’s medical records indicated that both frontal air bags deployed. It was unknown whether the IC air bags deployed. The post-crash fire destroyed the vehicle’s air bags.

**NHTSA Recalls and Investigations**

A VIN search last queried in April 2020 revealed no open recalls for the Dodge.

**2008 DODGE RAM 1500 OCCUPANTS**

**Driver Demographics**

Age/sex:	44 years/male
Height:	168 cm (66 in)
Weight:	66 kg (145 lb)
Eyewear:	Unknown
Seat type:	Bucket with adjustable head restraint
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Air bags:	Frontal air bag deployed, IC air bag unknown if deployed
Alcohol/drug data:	Positive for methamphetamine (1,200 ng/mL), amphetamine (240 ng/mL), and cotinine (unspecified) [Cotinine is a byproduct of nicotine from tobacco use]

Egress from vehicle: Declared deceased prior to being removed  
 Transport from scene: None  
 Type of medical treatment: None

**Driver Injuries**

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Burns, 4th degree over most of body	912032.6	Vehicle fire	Certain
2	Lacerations, posterior left atrium, left and right ventricle	441016.6	Tandem IPC Frontal air bag, steering wheel rim, spokes, hub, shoulder portion of seat belt	Certain Probable Possible
3	Laceration, right frontal lobe, cerebrum	140688.3	Left IP	Probable
4	Fractures, bilateral ribs, displaced L3-L5, anterior and lateral, L6, lateral, R1-R7	450203.3	Tandem IPC Frontal air bag, steering wheel rim, spokes, hub, shoulder portion of seat belt	Certain Probable Possible
5	Hemopericardium	441603.3	Tandem IPC Frontal air bag, steering wheel rim, spokes, hub, shoulder portion of seat belt	Certain Probable Possible
6	Fracture, left femur	853000.3	Left lower IP	Possible
7	Intraventricular hemorrhage	140678.2	Left IP	Probable
8	Fracture, sternum	450804.2	Tandem IPC Frontal air bag, steering wheel rim, spokes, hub, shoulder portion of seat belt	Certain Probable Possible
9	Lacerations, liver	541820.2	Steering wheel rim, spokes, hub	Probable
10	Fracture, left tibia	854000.2	Floor	Probable
11	Fracture, right tibia	854000.2	Floor	Probable
12	Fracture, mandible, left aspect	250600.1	Left IP	Probable

Source: autopsy report.

***Driver Kinematics***

The belted 44-year-old male driver was seated in an unknown posture. At impact with the other vehicle, the driver was displaced forward in response to the 12 o'clock direction of force. This was likely a deployment level event and the driver's frontal air bag deployed. The driver loaded the seat belt and continued forward contacting the deployed air bag and steering column with his chest and abdomen, which caused internal injuries, including fractures to the bilateral ribs and sternum, multiple lacerations to the heart and liver, and the hemorrhaging of soft tissue around the bladder. His head and neck continued to be displaced forward in a hyper-extended motion until they likely contacted the instrument panel, which caused a laceration to the right frontal lobe of the cerebrum and an intraventricular hemorrhage. The driver's left thigh probably contacted the left IP, and his left lower left possibly contacted the floor, which caused fractures to the left femur, tibia, and fibula. Following the impact and during the vehicle fire, the driver's legs were trapped between his seat cushion and the steering column. He remained in his seated position until the fire was extinguished. The autopsy stated that he sustained 4th degree burns over most of his body, and that, while some of the fracture may have been crash related, distinguishing heat-related fractures from crash-related fractures was not possible due to the severity of burn injuries. He was declared deceased on-scene prior to his body's being removed from the vehicle. The driver's toxicology report yielded the presence of multiple drugs in his system, and his condition was determined by the police to be under drug influence.

***Front-Row Right Occupant Demographics***

Age/sex: 43 years/female  
Height: 160 cm (63 in)  
Weight: 100 kg (220 lb)  
Eyewear: Unknown  
Seat type: Bucket with adjustable head restraint  
Seat track position: Unknown  
Manual restraint usage: Lap and shoulder belt used  
Usage source: Police report  
Air bags: Frontal air bag deployed, IC air bag unknown if deployed  
Alcohol/drug data: None  
Egress from vehicle: Unknown  
Transport from scene: Ambulance to hospital, transferred to another hospital  
Type of medical treatment: Hospitalization

***Front-Row Right Occupant Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Fracture NFS, sternum	450804.2	Tandem IPC Frontal air bag, right IP, shoulder portion of seat belt	Certain Probable Possible

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
2	Fractures NFS, multiple ribs	450210.2	Tandem IPC Frontal air bag, right IP, shoulder portion of seat belt	Certain Probable Possible
3	Contusion, scalp	110402.1	Right IP	Possible
4	Contusion, abdomen	510402.1	Lap seat belt	Probable
5	Dislocation NFS, left wrist	772499.1	Right IP	Possible

Source: medical records.

### ***Front-Row Right Occupant Kinematics***

The belted 43-year-old female front row right occupant was seated in an unknown posture. At impact with the other vehicle, she was displaced forward in response to the 12 o'clock direction of force. This was a deployment level event, and her frontal air bag deployed. She loaded the seat belt and deployed frontal air bag and contacted the right IP with her chest and abdomen, which caused internal injuries, including fractures to the ribs and sternum and a contusion to the abdomen. Her head and neck continued to be displaced forward in a hyper-extended motion until they likely contacted the instrument panel, which caused a contusion to the scalp. Her left hand and forearm probably contacted the right IP, which caused an unspecified dislocation of the left wrist. The occupant was transported by ambulance to a local hospital and was later transferred to another hospital, where she was treated for an unknown duration.

### ***Second-Row Left Occupant Demographics***

Age/sex: 7 years/male  
Height: Unknown  
Weight: Unknown  
Eyewear: Unknown  
Seat type: Bench  
Seat track position: Not adjustable  
Manual restraint usage: Lap and shoulder seat belt used with CRS  
Usage source: Police report  
Air bags: IC air bag available, unknown if deployed  
Egress from vehicle: Exited with assistance  
Transport from scene: Ambulance to hospital  
Type of medical treatment: Treated and released

***Second-Row Left Occupant Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Abrasion, left shoulder and chest	710202.1	Shoulder seat belt	Probable
2	Abrasion, right hip	810202.1	Lap seat belt	Probable

Source: medical records.

***Second-Row Left Occupant Kinematics***

According to the police report, the 7-year-old male was using a CRS at the time of the crash. His age and injury data suggests that he was wearing the vehicle’s lap and shoulder seat belt in combination with a booster safety seat. At impact with the other vehicle, the occupant was displaced forward in response to the direction of force. He loaded the shoulder seat belt, which caused associated abrasions and a complaint of pain to the left shoulder. Following the crash, the occupant exited the vehicle with assistance and was transported by ambulance to a local hospital, where he was treated and released approximately six hours after his arrival.

***Second-Row Center Occupant Demographics***

Age/sex: 19 years/female  
 Height: Unknown  
 Weight: 54 kg (120 lb)  
 Eyewear: Unknown  
 Seat type: Bucket with adjustable head restraint  
 Seat track position: Not adjustable  
 Manual restraint usage: Lap and shoulder belt used  
 Usage source: Police report, medical records  
 Air bags: None available  
 Alcohol/drug data: None  
 Egress from vehicle: Unknown  
 Transport from scene: Ambulance to hospital, transferred to another hospital  
 Type of medical treatment: Hospitalization

***Second-Row Center Occupant Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Contusion NFS, left lung	441402.3	Shoulder seat belt	Probable
2	Perforation, small bowel	541423.3	Lap seat belt	Probable
3	Fracture NFS, lumbar spine L1	650616.2	Lap seat belt	Probable

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
4	Fracture NFS, right rib	450200.1	Shoulder seat belt	Probable
5	Abrasions, left and right lower abdomen	510202.1	Lap seat belt	Certain
6	Abrasions, lower extremities	810202.1	Front row seat back	Probable

Source: medical records.

### ***Second-Row Center Occupant Kinematics***

The belted 19-year-old female occupant was seated in an unknown posture. At impact with the other vehicle, the occupant was displaced forward in response to the direction of force. She loaded the lap and shoulder seat belt, which caused a perforation to the small bowel, fracture to the lumbar spine at L1, a contusion to the left lung, and abrasions to the abdomen. Her legs likely contacted the front-row seat back, which caused abrasions. Following the crash, the occupant exited the vehicle in an unknown manner. She was treated on-scene by fire and EMS units until ambulance was made available, then transported by ambulance to a local hospital, and later transferred to another hospital, where she was treated for an unknown duration.

### ***Second-Row Right Occupant Demographics***

Age/sex: 22 months/female  
Height: Unknown  
Weight: 10 kg (22 lb)  
Eyewear: Unknown  
Seat type: Bench  
Seat track position: Not adjustable  
Manual restraint usage: Lap and shoulder seat belt used with CRS  
Usage source: Police report  
Air bags: IC air bag available, unknown if deployed  
Egress from vehicle: Removed due to age  
Transport from scene: Ambulance to hospital  
Type of medical treatment: Treated and released

### ***Second-Row Right Occupant Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Abrasions, right neck	310202.1	CRS harness	Probable

Source: medical records.

### ***Second-Row Right Occupant Kinematics***

The 22-month-old female was using a forward-facing CRS in the second-row right seat position. At impact with the other vehicle, the CRS and occupant were displaced toward the front of the vehicle in response to the direction of force. She loaded the CRS harness, which caused an abrasion to the right aspect of her neck. Following the crash, the occupant was removed from the vehicle in an unknown manner and transported by ambulance to a local hospital, where she was treated and released approximately four hours and 22 minutes after her arrival.

### ***Other Location Occupant Demographics***

Age/sex: 24 years/male  
Height: 180 cm (71 in)  
Weight: 59 kg (130 lb)  
Eyewear: Unknown  
Seat type: Not in a seat  
Seat track position: Not applicable  
Manual restraint usage: None available  
Usage source: Police report, medical records  
Air bags: None available  
Alcohol/drug data: None  
Egress from vehicle: Exited unenclosed cargo bed with assistance  
Transport from scene: Ambulance to hospital  
Type of medical treatment: Admitted for unknown duration

### ***Other Location Occupant Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>Injury Severity AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Contusion NFS, right lung	441402.3	Exterior of occupant's vehicle	Probable
2	Fracture NFS, sacrum	856100.2	Exterior of occupant's vehicle	Probable
3	Contusions, thorax	410402.1	Exterior of occupant's vehicle	Probable
4	Abrasions, bilateral hands	710202.1	Exterior of occupant's vehicle	Probable

Source: medical records.

### ***Other Location Occupant Kinematics***

The unbelted 24-year-old male occupant was sleeping supine in the unenclosed rear cargo bed of the Dodge. At impact with the other vehicle, the occupant was displaced forward, likely contacting the forward aspect of the cargo bed. He stated to police that, following the crash, an unidentified man assisted him from the cargo bed and laid him on the ground approximately 5 to 6 m (15 to 20 ft) from the vehicle. He sustained a fracture to the sacrum, contusion to the right

lung, abrasions to both hands, contusions to unspecified areas of the torso, and a self-reported loss of consciousness. Following the crash, he was transported by an ambulance to a local hospital and hospitalized for an unknown duration.

## 1994 FORD BRONCO

### *Description*

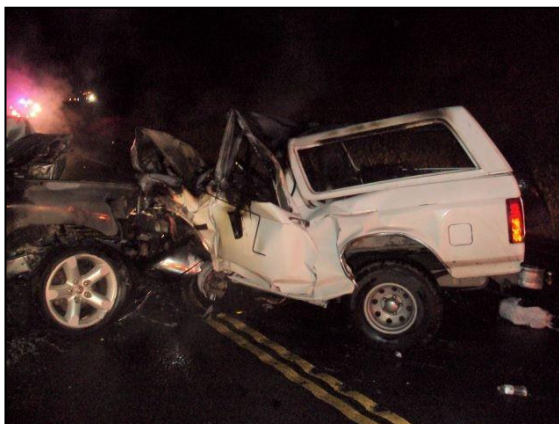
The 1994 Ford Bronco was identified by the police using the VIN 1FMEU15H6RFxxxxxx. The Ford was a 2-door, large utility vehicle equipped with an 8-cylinder, 5.8-liter, gasoline engine, hydraulic brakes, and 4-wheel-drive.

### *Exterior Damage*

The Ford sustained disabling damage to the front plane (**Figure 5**) caused by the Event 1 impact with the Dodge and major damage to all planes caused by the fire. The estimated CDC for the Ford in Event 1 was 12FDEW4.

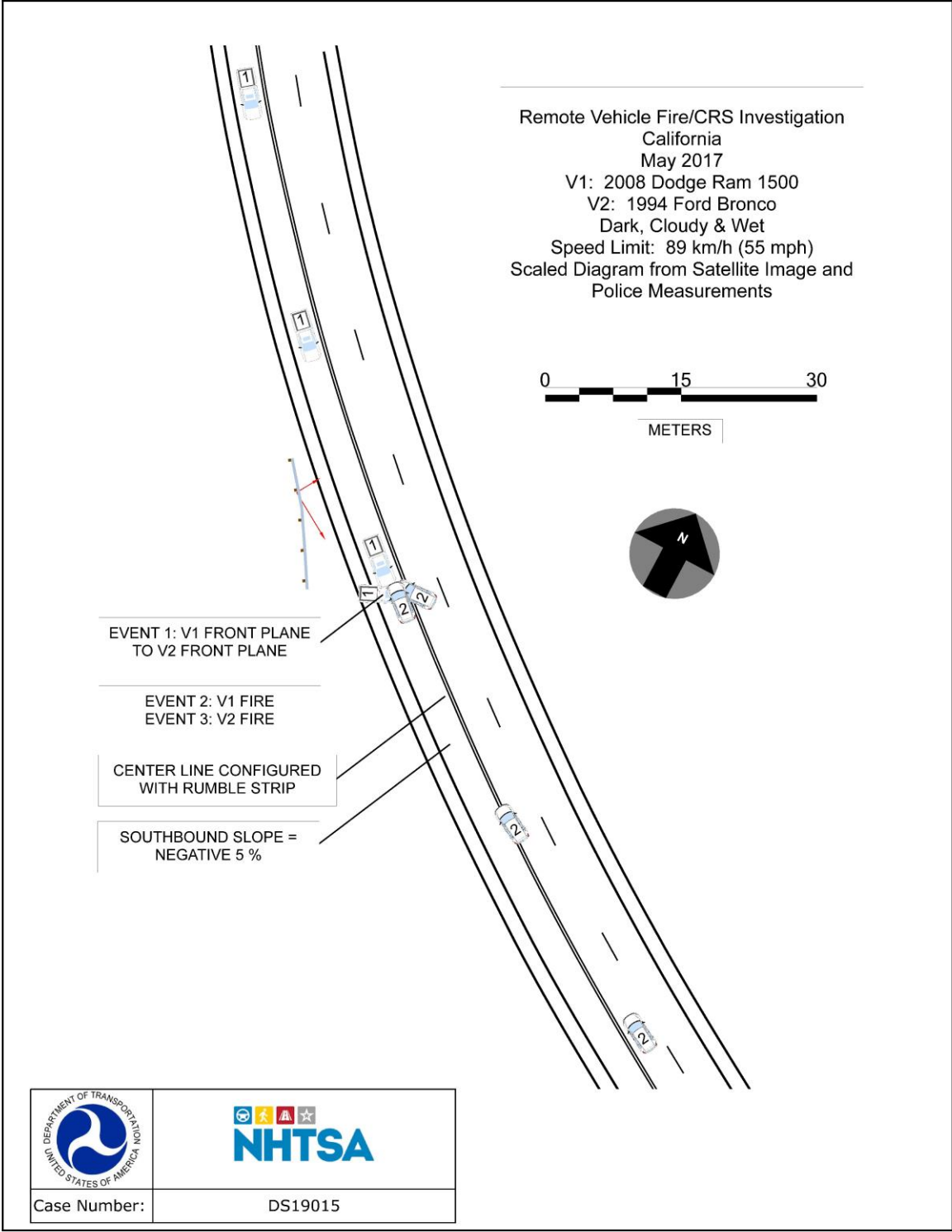
### *Occupant Data*

The 23-year-old male driver sustained police-reported fatal injuries attributed to crash-related trauma and the subsequent fire. His level of restraint was unknown. The driver's toxicology report yielded the presence of unspecified drugs in his system, and his condition was determined by the police to be under drug influence.



**Figure 5.** The 1994 Ford Bronco (police photo).

# CRASH DIAGRAM



DOT HS 812 977  
July 2020



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14868-071420-v2