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Special Crash Investigations: Remote Vehicle Fire/Child Restraint System Investigation; Vehicle: 2012 Ram 1500; Location: Missouri; Crash Date: December 2017

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15. Supplementary Notes

Each crash represents a unique sequence of events and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.

16. Abstract

This report documents the remote vehicle fire/child restraint system (CRS) investigation of a post-crash fire in a 2012 Ram 1500 pickup involved in a two-vehicle crash and the child occupant of the Ram who was seated in a CRS. The Ram was being driven eastbound by a belted 28-year- old male. The second row left seat was occupied by a 7-year-old male seated in an unknown model booster CRS. A 1999 Chevrolet Silverado 1500 pickup driven by a 23-year-old male was traveling westbound. The crash occurred as the Ram crossed over the centerline and struck the Chevrolet head-on. The Ram rotated counterclockwise and came to rest partially in a ditch facing northeast. The Chevrolet rotated clockwise and came to rest partially in a ditch on the north side of the roadway facing northwest. Then both vehicles caught fire. Both the driver of the Ram and second row left occupant sustained police-reported "B" severity (evident-not disabling) injuries and were transported by ambulance to a local trauma center. The driver of the Chevrolet was fatally injured.

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Remote Vehicle Fire/Child Restraint System Investigation
Vehicle: 2012 Ram 1500
Location: Missouri
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BACKGROUND

This report documents the remote vehicle fire/child restraint system (CRS) investigation of a post-crash fire in a 2012 Ram 1500 pickup (**Figure 1**) involved in a two-vehicle crash and the child occupant of the Ram who was seated in a CRS. The investigation intended to determine events leading to the fire, how quickly the fire spread to the occupant compartment, the magnitude of the fire, how quickly EMS and other responders arrived on- scene, occupant restraint usage, demographics, injury data, and CRS data. The crash was identified during a review of Fatality Analysis Reporting System (FARS) crash reports. The criteria for the crash type includes an impact not involving the rear plane, fire that spreads to the occupant compartment and at least one occupant seated in a CRS. The Special Crash Investigations (SCI) team obtained the on-scene images and the case was initiated by the SCI group of the National Highway Traffic Safety Administration in August 2019. Both vehicles were supported by the Bosch Crash Data Retrieval system. The police were unable to image either air bag control module due to fire damage.

Figure 1. 2012 Ram 1500 (police photo).

This two-vehicle crash occurred in the morning in December 2017 in a rural area. The crash site was a straight east/west two-lane undivided county road. The travel lanes were separated by double yellow painted lines. The posted speed limit was 89 km/h (55 mph). The Ram was being driven eastbound by a belted 28-year-old male. The second row left seat was occupied by a 7-year-old male seated in a booster seat. A 1999 Chevrolet Silverado 1500 pickup driven by a 23-year-old male was traveling westbound. The crash occurred as the Ram crossed over the centerline and struck the Chevrolet head-on. The Ram rotated counterclockwise and came to rest partially in a ditch facing northeast. The Chevrolet rotated clockwise and came to rest partially in a ditch on the north side of the roadway facing northwest. After coming to rest, both vehicles caught fire.

Both the driver of the Ram and second row left occupant sustained police-reported “B” severity (evident-not disabling) injuries and were transported by ambulance to a local trauma center. The driver of the Chevrolet was fatally injured.

SUMMARY

Crash Site

The crash site was a straight, east/west, two-lane, undivided, county road in a rural area in Missouri. The roadway had a limited sight distance due to a hillcrest 109.7 m (359.9 ft) west of the crash site. The eastbound travel lane was separated from the westbound travel lane by double yellow lines. Each travel lane measured approximately 3.0 m (9.8 ft) across. Solid white lines delineated the outside edges of the travel lanes. The roadway was further bordered by grass ditches, trees and private driveway entrances. The police reported that there were no large cracks, deep potholes, or roadway imperfections that contributed to this crash. The reported speed limit was 89 km/h (55 mph). The weather at the nearest reporting station was 15.5 C° (60 F°), 28 percent humidity, clear with winds out of the southwest at 27.8 km/h (17.3 mph). A crash diagram is included at the end of this report.

Pre-Crash

The Ram was being driven eastbound at an unknown speed (**Figure 2**) by a belted 28-year-old male. The second row left seat was occupied by a 7-year-old male seated in an unknown model booster CRS. The Chevrolet was traveling westbound at an unknown speed (**Figure 3**). For unknown reasons, the Ram crossed the centerline and entered the westbound travel lane.

Figure 2. Eastbound view (police image).

Crash

The front plane of the Ram struck the front plane of the Chevrolet in a head-on configuration (Event 1). The CDC-only option of the WinSMASH program calculated a total delta V of 45 km/h (28 mph) for the Dodge. The longitudinal and lateral components were -45 km/h (-28 mph) and 0 km/h, respectively. The driver's frontal air bag deployed but it is unknown if any other air bag deployed. The program calculated a total delta V of 57 km/h (35 mph) for the Chevrolet. The longitudinal and lateral components were -57 km/h (-35 mph) and 0 km/h, respectively. The results are considered borderline due to a lack of crush measurements and are included for informational purposes only.

Figure 3. Westbound view (police image).

Post-Crash

The Ram rotated counterclockwise and came to rest partially in a ditch facing northeast. The Chevrolet rotated clockwise and came to rest partially in a ditch on the north side of the roadway facing northwest. After coming to rest, both vehicles caught fire (Events 2 and 3). It appears that

the fire began in the Ram and spread to the Chevrolet (**Figure 4**). The driver and second row left occupant of the Ram were removed from the vehicle by passersby. EMS was dispatched 7 minutes after the crash and arrived on-scene 24 minutes after the crash. They provided care and assessment to both of the Ram occupants but due to a road closure from this crash both patients were transferred to a second EMS service. The driver was transferred 65 minutes after the crash and the passenger was transferred 90 minutes after the crash. Both were then transported by ambulance to a local trauma center. The driver of the Ram was admitted and hospitalized for 6 days. The second row left occupant was admitted and hospitalized for 2 days. The driver of the Chevrolet was transported by ambulance to an area trauma center where he was declared deceased.

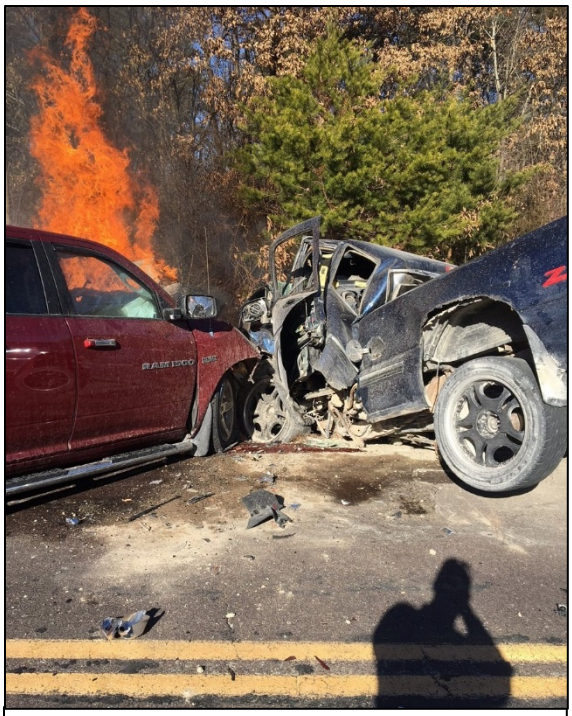


Figure 4. Vehicle fire, Ram on left, Chevrolet on right (police image).

Two fire units, including an engine and a tanker, and four personnel were assigned to this incident. They were notified 7 minutes after the crash and arrived 16 minutes after the notification and found both vehicles fully involved in fire upon their arrival. They were on the scene for approximately 3 hours. The fire was extinguished using 3,000 gallons of water with foam applied. SCI obtained a fire incident report which documented alarm, arrival, and departure times for fire personnel.

2012 RAM 1500

Description

The 2012 Ram 1500 quad-cab pickup was identified by the Vehicle Identification Number (VIN) 1C6RD7GT7CSxxxxxx. It was equipped with a 5.7-liter, 8-cylinder, gasoline engine, a 6-speed automatic transmission, 4-wheel drive, a 6-ft box, 32 gallon fuel tank and 4-wheel ABS. A CARFAX report indicated that the vehicle had three previous owners and there were no previous crashes. The last reported mileage was 130,575 km (81,136 miles) in August 2017.

The front row was configured with bucket seats and the second row was configured with a 60/40 split bench seat.

Figure 5. Exterior damage, 2012 Ram 1500 on right, 1999 Chevrolet Silverado on left (police photo).

Exterior Damage

The Ram sustained severe frontal damage from the head-on impact with the Chevrolet (**Figure 5**).

Two crush measurements were estimated from post-crash baseline dimension measurements taken by police investigators at the bumper corners as follows: C1 = 88 cm (34.6 in) and C2 = 78 cm (30.7 in). The Collision Deformation Classification (CDC) was 12FDEW3. Shortly after the vehicle came to rest, a fire began in the engine compartment. The fire eventually consumed the entire vehicle.

NHTSA Recalls and Investigations
There were no related recalls or investigations for this vehicle. The most recent database query occurred in March 2020.

Interior Damage
The Ram sustained severe fire-related damage.

Manual Restraint Systems
The front row was equipped with driver and front right passenger lap and shoulder seat belts. The driver's belt was equipped with continuous loop belt webbing, a sliding latch plate, an emergency locking retractor (ELR), and an adjustable anchor. The driver reported that he was restrained. The belt webbing was burned away. The police investigator found the driver's seatbelt latch in the receiver. It is believed that the belt webbing was cut during extrication. The front row seat belts were equipped with retractor pretensioners; it is unknown if they actuated. The second row was equipped with lap and shoulder seat belts for all three seat positions. It has been reported that the second row left seat belt was used to secure the child occupant with a booster. The police could not find the seat belt components.

Supplemental Restraint Systems
The Ram was equipped with dual-stage frontal air bags for the driver and front right passenger positions and seat-mounted side-impact air bags. The police indicated that the driver's frontal air bag deployed but it was unknown if any other air bags deployed.

Child Restraint System
The 7-year-old child occupant in the second row left seat position was seated in an unknown model booster CRS and was using the manual lap and shoulder seat belt, according to the police investigator.

2012 RAM 1500 OCCUPANTS

Driver Demographics

Age/sex:	28 years/male
Height:	Unknown
Weight:	99 kg (218 lbs)
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt
Usage source:	Police report
Air bags:	Driver frontal air bag deployed; unknown if seat-mounted air bags deployed.
Alcohol/drug data:	None noted
Egress from vehicle:	Assisted by passersby
Transport from scene:	Ambulance to trauma center
Type of medical treatment:	Hospitalized for 6 days.

Driver Injuries

Inj. No.	Injury	Injury Severity AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1 2	Rib fractures, left 6-10 with left pneumothorax	450203.3 442202.2	Tandem IPC Seatbelt, Left steering wheel hub air bag and wheel	Certain Probable Probable
3 4	Ulnar/radius fracture, left	753200.2 752800.2	Steering wheel rim	Probable
5	Tibial avulsion fracture, right	854000.2	Lower instrument panel	Probable
6 7	Hip dislocation with right acetabulum T-type fracture	873030.2 856200.2	Lower instrument panel	Probable
8	Small 1.5 cm grade 2 splenic laceration	544220.2	Lap belt	Probable
9	Multiple 2.5 cm (1.0 in) lacerations, right side of forehead	210602.1	Unknown	Unknown

Source: Admission records, EMS records

Driver Kinematics

The 28-year-old male driver was belted, according to police. The driver reported to the police that he did not recall the crash. There was no evidence of pre-impact braking. At impact, he was displaced forward and probably engaged the lap and shoulder belt and the deployed air bag.

Second Row Left Passenger Demographics

Age/sex:	7 year/male
Height:	Unknown
Weight:	27 kg (60 lbs)
Eyewear:	Unknown
Seat type:	60/40 split bench
Manual restraint usage:	Lap and shoulder seat belt with booster seat
Usage source:	Police report
Egress from vehicle:	Removed by passersby
Transport from scene:	Ambulance to trauma center
Type of medical treatment:	Hospitalized for 2 days

Second Row Left Passenger Injuries

Inj. No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Left iliac crest fracture	856100.2	Lap belt	Certain
2	Right radius fracture	752800.2	Driver seat back	Probable
3	Laceration, near left eye	210602.1	Unknown	Unknown
4	Contusion/abrasion lower abdomen	510202.1	Lap belt	Certain
5	Contusion, right wrist and hand	710402.1	Driver seat back	Probable

Source: Admission records, EMS records

Second Row Left Passenger Kinematics

The 7-year-old male second row left passenger was seated in a booster CRS and was using the vehicle's lap and shoulder belt, according to the police. At impact, he was displaced forward and probably loaded the seat belt webbing, causing the pelvic iliac crest fracture. In additional to the documented injuries, his medical record indicated that he possibly sustained a small Grade 1 hepatic laceration. His right hand probably contacted the driver's seat back, causing the radius fracture.

1999 CHEVROLET SILVERADO

Description

The 1999 Chevrolet Silverado 1500 Z71 pickup was identified by the VIN 2GCEK19T7X1xxxxxx. It was equipped with a 5.3-liter, 8-cylinder, gasoline engine, 4-speed automatic transmission, 4-wheel drive, and 4-wheel disc brakes. The build date was December 1998.

Exterior Damage

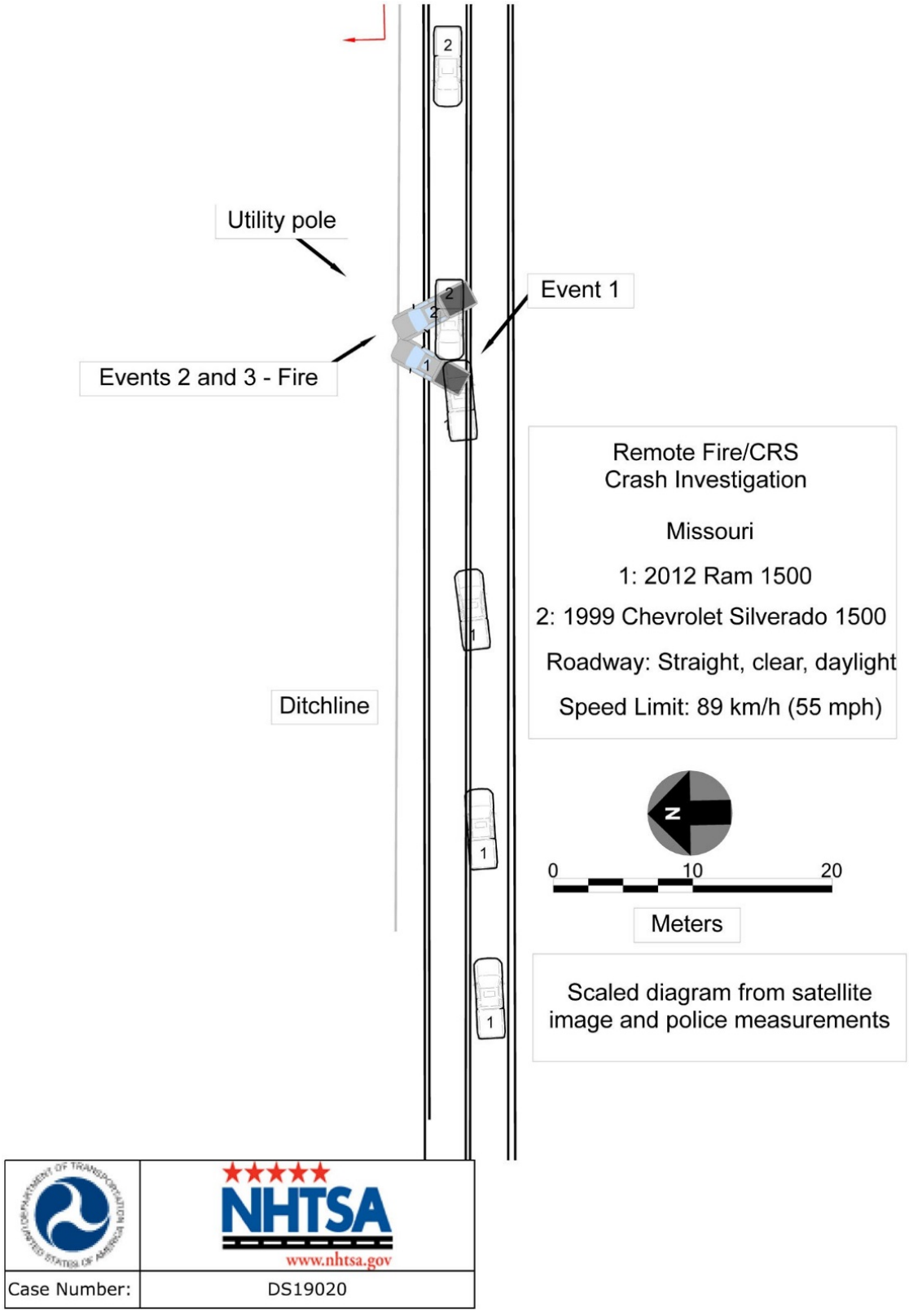
The Chevrolet sustained severe frontal damage from the head-on impact with the Ram (**Figure 6**). The CDC was 12FDEW2. Shortly after the vehicle came to rest, a fire began in the engine compartment. The fire eventually consumed the entire vehicle.

Figure 6. 1999 Chevrolet Silverado 1500 Z71 pickup (police photo).

Occupant Data

The 23-year-old male driver of the Chevrolet was fatally injured. He was transported by ambulance to an area trauma center where he was declared deceased. The police were unable to determine if there was any restraint usage due to the fire-related damage.

CRASH DIAGRAM



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