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**Special Crash Investigations
Remote Vehicle Fire/Child
Restraint System Investigation
Vehicle: 1998 Subaru Forester
Location: Montana
Crash Date: March 2013**

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16. Abstract This report documents the remote investigation of the post-impact fire in a 1998 Subaru Forester involved in a two-vehicle crash and the child occupant of the Subaru who was seated in a child restraint system. The crash occurred in a four-leg intersection in March 2013 in Montana. The Forrester was driven by a 44-year-old female and occupied by a 7-year-old male. It approached the intersection from the west while a 2004 Dodge Ram 3500 pickup truck was approaching the from the north. The east/west flow of the intersection was controlled by stop signs, but both vehicles entered simultaneously and the left plane of the Subaru was struck by the front of the Dodge. Both vehicles were displaced toward the northwest quadrant of the intersection where the Dodge overturned onto its left side while the Subaru remained upright but its engine caught fire. Passersby were able to remove the 7-year-old male and responding fire personnel removed the driver of the Subaru, who was pronounced deceased after being transported to a hospital. The 7-year-old occupant was treated and released from the hospital, as was the 29-year-old male driver of the Dodge pickup.			
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Table of Contents

BACKGROUND	1
SUMMARY	1
Crash Site	1
Pre-Crash.....	2
Crash	2
Post-Crash.....	2
1998 SUBARU FORESTER	3
Description	3
Exterior Damage	3
NHTSA Recalls and Investigations	3
Interior Damage	3
Manual Restraint Systems.....	3
Supplemental Restraint Systems.....	4
Child Restraint System (CRS)	4
Fire Discussion.....	4
1998 SUBARU FORESTER OCCUPANTS.....	4
Driver Demographics.....	4
Driver Injuries	5
Driver Kinematics	5
Second Row Left Passenger Demographics	5
Second Row Left Passenger Injuries	6
Second Row Left Passenger Kinematics	6
2004 DODGE RAM 3500	6
Description.....	6
Exterior Damage	6
Occupant Data.....	7
CRASH DIAGRAM.....	8

Special Crash Investigations
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Location: Montana
Crash Date: March 2013

BACKGROUND

This report documents the remote investigation of the post-impact fire in a 1998 Subaru Forester (**Figure 1**) involved in a two-vehicle crash and the child occupant of the Subaru who was seated in a child restraint system (CRS). The investigation was intended to determine the 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 include 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 a police report and the case was initiated by the SCI group of the National Highway Traffic Safety Administration in December 2016.



Figure 1. 1998 Subaru Forester (police photo).

The crash occurred in a four-leg intersection in March 2013 in Montana. A 1998 Subaru Forester driven by a 44-year-old female and occupied by a 7-year-old male was approaching the intersection westbound while a 2004 Dodge Ram 3500 pickup truck was approaching northbound. The east/west flow of the intersection was controlled by stop signs, but both vehicles entered simultaneously and the left plane of the Subaru was struck by the front of the Dodge pickup. Both vehicles were displaced toward the northwest quadrant of the intersection, where the Dodge overturned onto its left side while the Subaru remained upright but experienced an engine fire. Passersby were able to remove the 7-year-old male and responding fire personnel removed the driver of the Subaru, who was pronounced deceased after being transported to a hospital. The 7-year-old occupant was treated and released from the hospital, as was the 29-year-old male driver of the Dodge.

SUMMARY

Crash Site

This crash occurred in a four-leg rural intersection. The intersecting asphalt roadways were straight, level, and controlled by stop signs in the east and west directions. The posted speed limit for westbound traffic was 64 km/h (40 mph). The posted speed limit for northbound traffic

was 89 km/h (55 mph). The weather at the nearest reporting station was -2 °C (27 °F), 47 percent humidity, 16 km (10 miles) visibility, overcast, and winds were out of the southwest at 13.0 km/h (8.1 mph).

Pre-Crash

The Subaru was traveling westbound approaching the intersection (**Figure 2**). According to the police report, there were two warning signs prior to the intersection, a yellow “Stop Ahead” sign and then a “Limited Sight Distance Ahead” sign. The Dodge pickup was traveling northbound approaching the intersection (**Figure 3**). Approximately 22 m (74 ft) east of the intersection, the driver of the Subaru began braking but was unable to stop in time and entered the intersection.



Figure 2. Westbound approach (police photo).

Crash

The front plane of the Dodge struck the left plane of the Subaru. Both vehicles were displaced in a northwest direction. The Subaru began a clockwise rotation of approximately 290 degrees, departed the roadway, and came to rest in a ditch near the north/south roadway facing east. The Dodge began a counterclockwise rotation, departed the roadway, and began a right-side-leading rollover (Event 2). During the rollover sequence the Dodge struck a small tree (Event 3). The Dodge came to rest on its left side after rolling three quarter-turns.



Figure 3. Northbound approach (police photo).

Post-Crash

The driver of the Subaru was unconscious and entrapped as a fire began in the engine compartment (Event 4). The first person to arrive on scene was a private passerby. He ran to a nearby house and obtained a fire extinguisher. An off-duty fire captain and a county sheriff were next on scene. The passerby reached into the vehicle and removed the child occupant. The sheriff began to extinguish the vehicle fire. The fire captain assisted in life-saving efforts with the driver until the arrival of fire personnel.

SCI obtained a copy of the incident report from the responding fire department that documented alarm, dispatch, and arrival times for fire personnel. Six apparatus responded with nine fire department personnel.

Command Unit	Rescue Unit	BLS Unit	Police	Tanker 1	Tanker 2	POV1	
0725	0725	0725	0725	0725	0725	0725	Alarm
0725	0725	0725	Unknown	0725	0725	0725	Dispatched
0736	0736	0740	0742	0743	0734	0740	Arrived

Source: Fire Department Incident Report.

One of the fire department tanker crews finished extinguishing the fire. The other tanker crew and the rescue crew conducted the extrication of the Subaru driver. The child occupant and driver were transported by separate private ambulances. The driver was declared deceased upon arrival at hospital. The driver of the Dodge pickup was transported by fire department ambulance to a local hospital. The scene cleared by fire personnel at 0922 hours.

1998 SUBARU FORESTER

Description

The 1998 Subaru Forester was a 4-door sport utility vehicle (SUV). The vehicle was identified by the Vehicle Identification Number (VIN) JF1SF6557WHxxxxxx. It was equipped with a 2.5-liter, 4-cylinder, gasoline engine and all-wheel drive.



Figure 4. Left side, 1998 Subaru Forester (police photo).

Exterior Damage

The Subaru sustained severe damage to the left plane from the impact with the Dodge (**Figure 4**). The damage began at the left front bumper corner and extended rearward to the driver's door. The estimated collision deformation classification (CDC) was 10LYAW3.

NHTSA Recalls and Investigations

A search using the vehicle VIN revealed no active NHTSA recalls or investigations.

Interior Damage

The Subaru sustained moderate interior damage from intrusion. Both left doors were jammed shut; the left front door was removed by EMS during the extrication of the driver. The windshield was fractured and all the left side glazing was disintegrated.

Manual Restraint Systems

The Subaru was equipped with manual lap and shoulder seat belts for the front bucket seats and the second row. The police reported that the driver and second row left occupant were using the seat belts.

Supplemental Restraint Systems

The Subaru was equipped with redesigned frontal air bags that deployed during this crash.

Child Restraint System (CRS)

Goodbaby Evenflo Big Kid

The Goodbaby Evenflo Big Kid CRS was a belt-positioning booster seat with removable backrest (**Figure 5**). Data for this CRS and its use was obtained from the police report and a single police image. At the time of the crash, the CRS was being used without the backrest. According to the police, the CRS and vehicle's lap and shoulder seat belt were being used as designed.



Figure 5. Goodbaby Evenflo Big Kid CRS (police photo).

The occupant parameters for using the seat without the backrest are as follows:

Weight: 18-49 kg (40-110 lbs)

Age: the child must be at least 4 years old

The 7-year-old male child using the CRS met the age parameter. It is not known if he met the weight parameter.

Fire Discussion

A fire began in the engine compartment after the Subaru came to rest while the driver and child occupant were still inside. The child occupant was extricated while efforts were underway to extinguish the fire. The fire had spread into the driver's side floor area before being brought under control. The fire was fully extinguished after fire personnel arrived. The time from crash to fire control was approximately 9- to 14 minutes. There were no reported fire injuries to the driver.

1998 SUBARU FORESTER OCCUPANTS

Driver Demographics

Age/sex:	44 years/female
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Air bags:	Driver frontal air bag deployed
Alcohol/drug data:	None
Egress from vehicle:	Mechanically entrapped, extricated by fire personnel
Transport from scene:	Ambulance to hospital
Type of medical treatment	Declared deceased shortly after arrival

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Comatose with GCS of 3. Loss of consciousness > 1 < 6 hours	161006.3	A-pillar	Probable
2	Lower leg fracture, right	852002.2	Lower IP	Certain
3	Lower leg fracture, left	852002.2	Lower IP	Certain
4 5	Bilateral periorbital ecchymosis	210402.1 210402.1	A-pillar	Probable
6	Right forearm fracture	751900.2	Unknown	Unknown
7	Right humerus fracture	751100.2	Unknown	Unknown
8	Facial deformity	200099.9	A-pillar	Probable

Source: Clinical chart.

Driver Kinematics

The 44-year-old female driver was seated in an unknown posture and was using the manual lap and shoulder seat belt. There was some indication that she may have braked prior to impact. At impact, she was displaced forward and to the left. She likely contacted the driver's door and A-pillar. Her lower extremities probably contacted the intruded lower instrument panel. The driver was entrapped in the vehicle and required extrication by fire personnel. She reportedly had normal vital signs in the field with no episodes of hypotension or tachycardia. She was transported from the scene to a local hospital. She arrived with a Glasgow Coma Scale (GCS) score of 3 and was comatose.

Second Row Left Passenger Demographics

Age/sex: 7 years/male
Height: Unknown
Weight: Unknown
Eyewear: Unknown
Seat type: Bench with folding back
Seat track position: NA
Manual restraint usage: Lap and shoulder belt used with BSS
Usage source: Police report
Air bags: NA
Alcohol/drug data: NA
Egress from vehicle: Removed from vehicle by passerby

Transport from scene: Ambulance
 Type of medical treatment: Treated and released

Second Row Left Passenger Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Laceration, left face	210600.1	Flying glass	Probable
2	Abrasions, dorsal side of right hand	710202.1	Unknown	Unknown
3	Contusion, right iliac crest area	810402.1	Seat belt	Probable

Source: Emergency room records, radiological report.

Second Row Left Passenger Kinematics

The 7-year-old male was seated in an unknown posture in a CRS. He was using the manual lap and shoulder seat belt. At impact, he was displaced forward and to the left. He likely contacted the second row left door. He was removed by a passerby and transported to a local hospital for treatment.

2004 DODGE RAM 3500

Description

The 2004 Dodge Ram 3500 was a 4-door, crew-cab pickup. The vehicle was identified by the VIN 3D7LU38C34Gxxxxxx. The vehicle was equipped with a 5.9-liter, 6-cylinder, diesel engine, a “long box” cargo bed, and 4-wheel drive.

Exterior Damage

The Dodge sustained moderate front plane damage from the impact with the Subaru (**Figure 6**). The CDC was 01FZEW1. The vehicle sustained moderate top plane damage during the rollover (**Figure 7**).

The CDC for the rollover was 00TDYO3. The Dodge struck a tree during the rollover sequence. The location of the damage was probably to the rear plane but this was inconclusive.

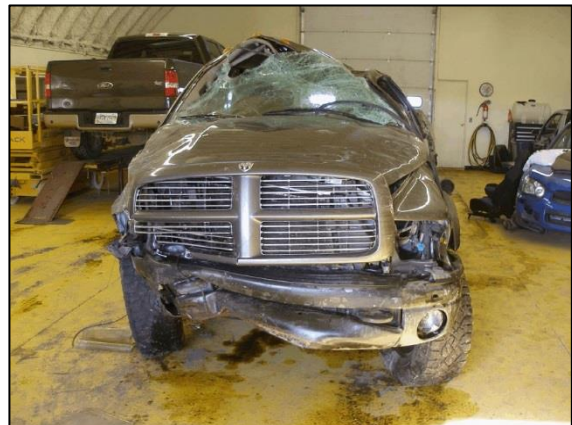


Figure 6. Frontal damage, 2004 Dodge Ram (police photo).

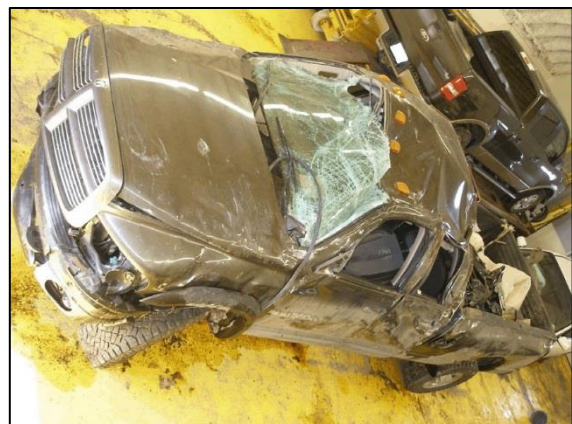
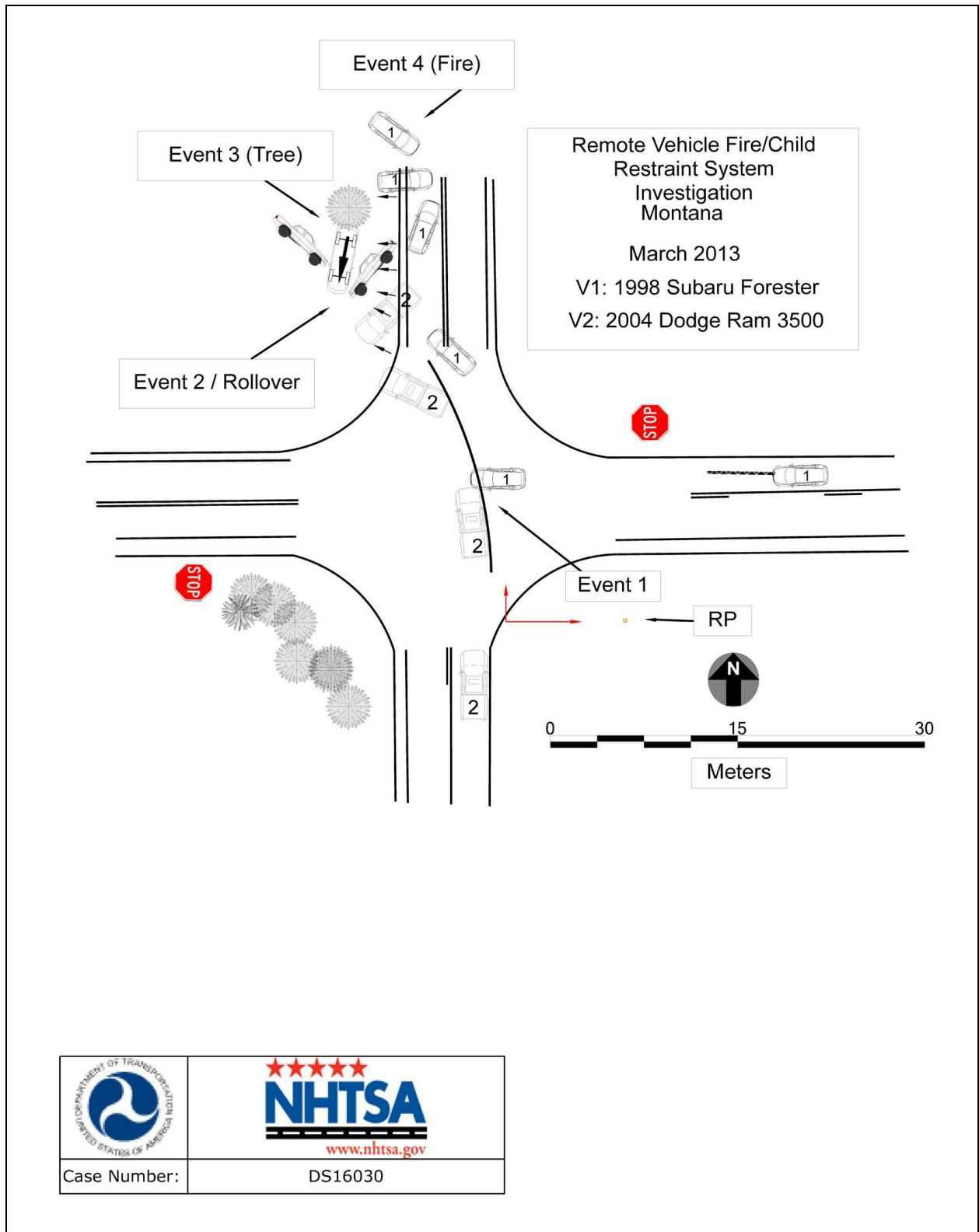


Figure 7. Top damage, 2004 Dodge Ram (police photo).

Occupant Data

The 29-year-old male driver of the Dodge sustained minor unspecified injuries. He was transported by ambulance to a local hospital.

CRASH DIAGRAM



	 www.nhtsa.gov
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