Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number (DS9928)

1998 Dodge Ram pickup

California

August/1998

Technical Report Documentation Page

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16. Abstract

This remote investigation focused on the redesigned air bag system deployment of a 1998 Dodge Ram pickup truck. The case was generated through the Fatal Accident Reporting System. It was conducted as a remote investigation. This crash occurred during the late evening hours in August, 1998. The crash occurred within a four-leg intersection. The westbound/eastbound roadways are comprised of four travel lanes and one turn lane. The roadway is straight and was dry at the time of the crash. There were no roadway defects noted. There are no applicable traffic controls. The northbound/southbound roadways are comprised of four travel lanes. These roadways are controlled by stop signs in both directions. Directly below the signs are yellow reflective warning signs which state: “CROSS TRAFFIC DOES NOT STOP.” There are streetlights in place which were operating at the time of the crash. The speed limit is 89 km/h (55 mph) for all the roadways.

Vehicle 1 (case vehicle), a 1998 Dodge Ram pickup driven by a 17-year-old male (178 cm/70 in, 73 kg/160 lbs), was traveling northbound approaching the intersection. The front middle seat was occupied by an unrestrained 15-year-old female. The front right seat was occupied by an unrestrained 18-year-old male (185 cm/73 in, 75 kg/165 lbs). This occupant was fatally injured in this crash.

Vehicle 2, a 1996 Dodge Neon driven by an unrestrained 23-year-old female (170 cm/67 in, 75 kg/165 lbs), was traveling westbound at a driver reported speed of 89 km/h (55 mph). The front right seat was occupied by a restrained 25-year-old female (165 cm/65 in, 83 kg/183 lbs). This occupant was fatally injured in this crash. The middle rear seat was occupied by a restrained 16–year-old male.

Vehicle 1 failed to stop at the stop sign and entered the intersection traveling at an unknown rate of speed. The front of Vehicle 1 (01FZEW1) struck the left front of Vehicle 2 (10LFEW3). Both front air bags in both Vehicle 1 and Vehicle 2 deployed at this point. Vehicle 1 was redirected in a counterclockwise direction. Vehicle 2 was redirected in a clockwise direction. There was a second, “side-slap type” impact between the right rear of Vehicle 1 and the left rear of Vehicle 2. Vehicle 2 continued its clockwise rotation and came to rest facing east in the northern leg of the intersection approximately 65 ft north of the intersection. Vehicle 1 continued its counterclockwise rotation, tripped, and then rolled over onto its right side, the roof, and finally came to rest on its left side.

The driver of Vehicle 1 complained of pain to his neck and right hip. He was transported to a local hospital for treatment. The front middle occupant sustained an abrasion to her right forearm and right elbow. She was transported to a local hospital for treatment. The front right occupant sustained fatal head and neck injuries. These were as a result of being partially ejected through the left side window during the rollover sequence. Essentially, this occupant’s head and neck were crushed by the roof rail.

The driver of Vehicle 2 sustained an abrasion to her left lower leg. She also complained of pain to her neck. She was transported to a local hospital for treatment. The rear middle occupant sustained a broken left clavicle and contusion to his left arm and left side of his face. He was transported to a local hospital for treatment. The front right occupant was initially diagnosed as having a variety of seatbelt contusions. She was transported to a local hospital complaining of abdominal and neck pain. She was treated and released. She continued to complain of abdominal pain throughout the next day. At some point during the evening she had a bout of coffee ground emesis and collapsed. She was transported to a local hospital at 2329 hours. She was in full arrest upon arrival at the hospital. She was pronounced dead at 2357 hours. An autopsy revealed that she had sustained ruptured/perforation of the jejunum.

17. Key Words	18. Distribution Statement
Redesigned, air bag, occult injury, fatal injury	

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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Dodge Ram pickup truck. The case was generated through the Fatal Accident Reporting System. It was conducted as a remote investigation. This crash occurred during the late evening hours in August, 1998. The crash occurred within a four-leg intersection. The westbound/eastbound roadways are comprised of four travel lanes and one turn lane. The roadway is straight and was dry at the time of the crash. There were no roadway defects noted. There are no applicable traffic controls. The northbound/southbound roadways are comprised of four travel lanes. These roadways are controlled by stop signs in both directions. Directly below the signs are yellow reflective warning signs which state: "CROSS TRAFFIC DOES NOT STOP." There are streetlights in place which were operating at the time of the crash. The speed limit is 89 km/h (55 mph) for all the roadways.


Figure 1. Exterior, Vehicle 1 (case vehicle)

Crash Events

Vehicle 1 (case vehicle), a 1998 Dodge Ram pickup driven by a 17-year-old male (178 cm/70 in, 73 kg/160 lbs), was traveling northbound approaching the intersection. The front middle seat was occupied by an unrestrained 15-year-old female. The front right seat was occupied by an unrestrained 18-year-old male (185 cm/73 in, 75 kg/165 lbs). This occupant was fatally injured in this crash.


Figure 2. Exterior, Vehicle 2

Vehicle 2, a 1996 Dodge Neon driven by an unrestrained 23-year-old female (170 cm/67 in, 75 kg/165 lbs), was traveling westbound at a driver reported speed of 89 km/h (55 mph). The front right seat was occupied by a restrained 25-year-old female (165 cm/65 in, 83 kg/183 lbs). This occupant was fatally injured in this crash. The middle rear seat was occupied by a restrained 16–year-old male.

Vehicle 1 failed to stop at the stop sign and entered the intersection traveling at an unknown rate of speed. The front of Vehicle 1 (01FZEW1) struck the left front of Vehicle 2 (10LFEW3). Both front air bags in both Vehicle 1 and Vehicle 2 deployed at this point. Vehicle 1 was redirected in a counterclockwise direction. Vehicle 2 was redirected in a clockwise direction. There was a second, "side-slap type" impact between the right rear of Vehicle 1 and the left

rear of Vehicle 2. Vehicle 2 continued its clockwise rotation and came to rest facing east in the northern leg of the intersection approximately 65 ft north of the intersection. Vehicle 1 continued its counterclockwise rotation, tripped, and then rolled over onto its right side, the roof, and finally came to rest on its left side.

The driver of Vehicle 1 complained of pain to his neck and right hip. He was transported to a local hospital for treatment. The front middle occupant sustained an abrasion to her right forearm and right elbow. She was transported to a local hospital for treatment. The front right occupant sustained a craniocerebral trauma and a cervical fracture. These were as a result of being partially ejected through the left side window during the rollover sequence. Essentially, this occupant's head and neck were crushed by the roof rail.

The driver of Vehicle 2 sustained an abrasion to her left lower leg. She also complained of pain to her neck. She was transported to a local hospital for treatment. The rear middle occupant sustained a broken left clavicle and contusion to his left arm and left side of his face. He was transported to a local hospital for treatment. The front right occupant was initially diagnosed as having a variety of seatbelt contusions. She was transported to a local hospital complaining of abdominal and neck pain. She was treated and released. She continued to complain of abdominal pain throughout the next day. At some point during the evening she had a bout of coffee ground emesis[1] and collapsed. She was transported to a local hospital at 2329 hours. She was in full arrest upon arrival at the hospital. She was pronounced dead at 2357 hours. An autopsy revealed that she had sustained ruptured/perforation of the jejunum.

[1]Hematemesis or "coffee ground" emesis indicates an upper gastrointestinal source of bleeding, almost always above the ligament of Treitz. Coffee ground emesis results from bleeding that has slowed or stopped and from conversion of red Hb to brown hematin by gastric acid.

Table 1. Delta V

	Case Vehicle		Other Vehicle	
	km/h	mph	km/h	mph
Total	13.2	8.2	23.1	14.4
Longitudinal	-11.4	-7.1	-11.5	-7.1
Lateral	-6.6	-4.1	20	12.4

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Dodge Ram pickup
VIN	1B7HC13Z6WJxxxxxx
CDC	Impact #1: 01FZEW1 Impact #2: 09RBEW2 Impact #3: 00TYDO3

Figure 3. Exterior, Vehicle 1

Figure 4. Exterior, Vehicle 1

Interior of Case Vehicle

The interior of this vehicle sustained considerable damage. There was intrusion to the roof–particularly above the backlight area. There was integrity loss through the backlight and possibly through the left side glass.

Case Vehicle Occupant Protection Systems

This vehicle was equipped with dual front air bags, both of which deployed during this crash. It is not known if there was any damage to the air bags/module covers or if there was any contact evidence. In the front seat, this vehicle was equipped with outboard lap and shoulder belts and a middle lap belt. The front left occupant was the only person using the seat belts.

Case Vehicle Occupant Demographics

	Occupant 1	Occupant 2	Occupant 3
Age/Sex:	17/Male	15/Female	18/Male
Seated Position:	Front left	Front middle	Front right
Seat Type:	Unknown	Unknown	Unknown
Height (cm/in:):	178 70.1	Unk	185 73
Weight (kg/lbs).:	73 161	Unk	75 165
Pre-existing Medical Condition:	Unknown	Unknown	None noted
Body Posture:	Unknown	Unknown	Unknown
Hand Position:	Unknown	Unknown	Unknown
Foot Position:	Unknown	Unknown	Unknown
Restraint Usage:	Lap and shoulder used	Lap not used	Lap and shoulder not used
Air bag:	Deployed	NA	Deployed

Occupant Injuries

Table 3. Injuries - Vehicle 1

Injury	Injury Severity (AIS)	Injury Mechanism
Driver		
Complaint of pain to neck and right hip	Not codeable	
Front middle occupant		
Abrasion, right forearm	790202.1,1	Unknown
Abrasion, right elbow	790202.1,1	Unknown
Front right occupant		
Craniocerebral trauma with cervical fracture	113000.6,0	Exterior of case vehicle/ground
Cervical neck fracture	650216.2,6	Exterior of case vehicle/ground
Fracture/dislocation right wrist	751800.2,1 751430.2,1	Exterior of case vehicle/ground
Abrasions on tops of both hands, especially the left hand	790202.1,1 790202.1,2	Unknown
Laceration between thumb and first finger on right hand	790600.1,1	Exterior of case vehicle/ground
Abrasion, 4 x 3 in., right side of back and shoulder	790202.1,1	Ground
Contusions/abrasions to face	290202.1,9 290402.1,9	Unknown

Table 4. Injuries - Vehicle 2

Injury	Injury Severity (AIS)	Injury Mechanism
Driver		
Abrasion, lower left leg	890202.1,2	Unknown
Front middle occupant		
Fracture, left clavicle	752200.2,2	Unknown
Contusions, left arm	790202.1,2	Unknown
Contusions, left side of face	290202.1,2	Unknown
Front right occupant		
rupture/perforation jejunum	541424.3,8	Lap belt
Contusion, upper anterior torso, front right shoulder towards center of chest, up to 2 in. wide	490402.1,2	Torso belt
Contusion, across abdomen	490402.1,3	Lap belt
Three contusions to lower left leg	890402.1,2	Instrument panel
Contusion, right leg @ mid shin	890402.1,1	Instrument panel
Subgaleal contusion, left temporal parietal area	190402.1,2	Unknown

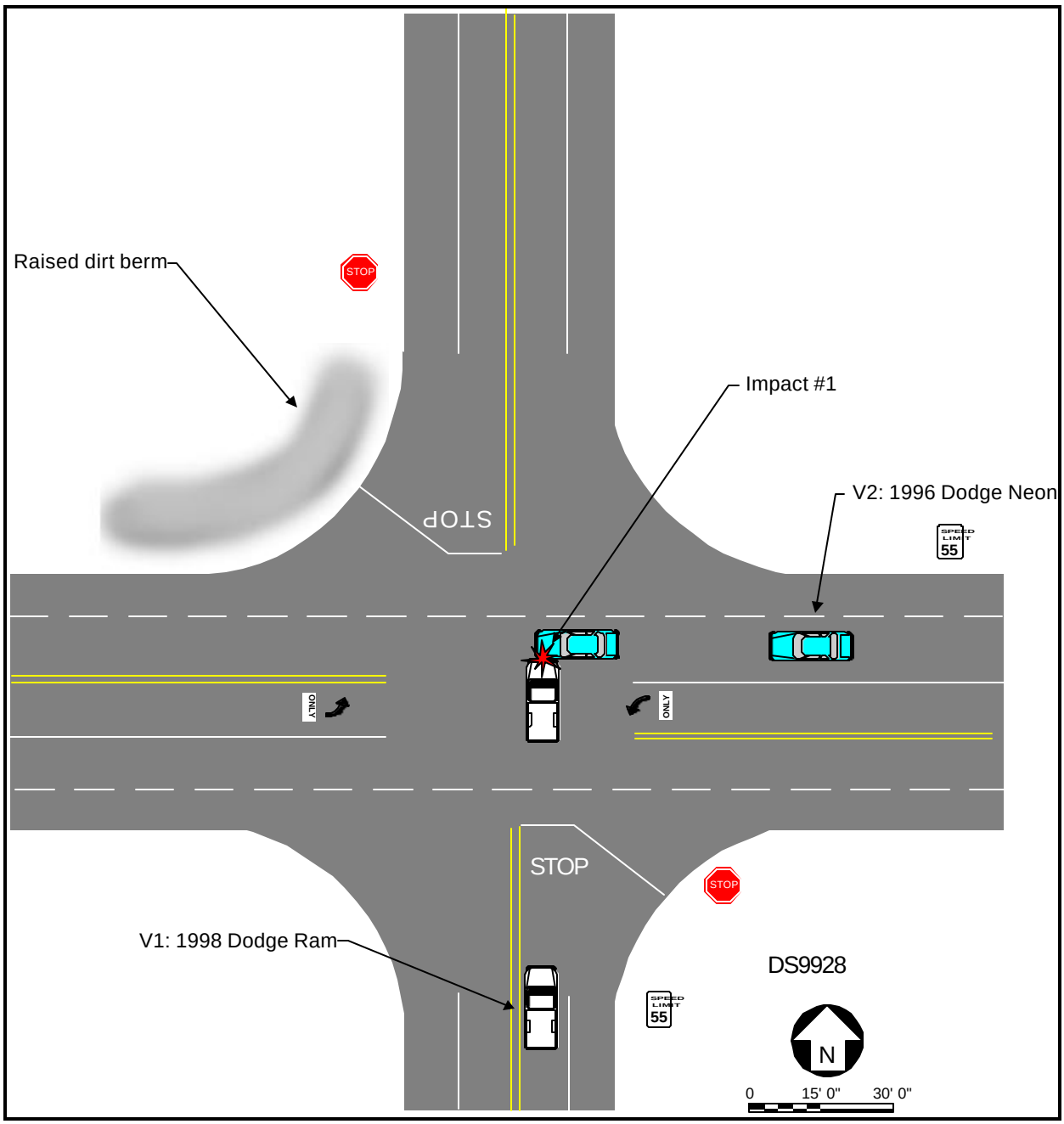
Occupant Kinematics

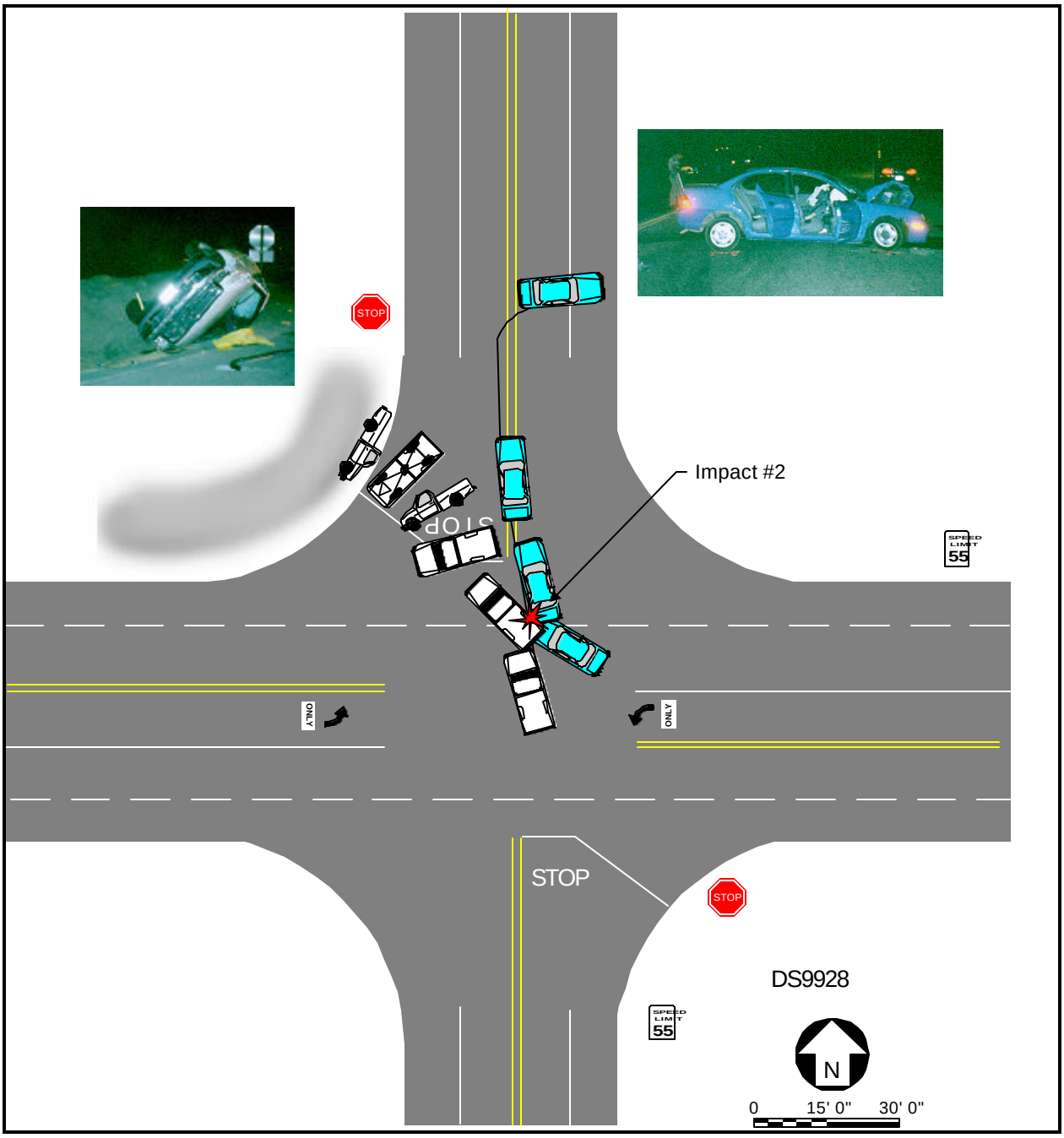
The driver of Vehicle 1 was seated in an upright position in the front left seating position. He was wearing the available lap and shoulder belt. He indicated to the police that had just adjusted his seat and steering wheel to make himself more comfortable. During the first impact, he reacted to the 30E direction of force by moving forward and to the right–loading the seat belt and engaging the deploying air bag. During the second impact, he reacted to the 90E direction of force by moving sharply to the right–possibly injuring his right hip as he engaged the lap belt. During the rollover, he would have pitched to the left and likely came into contact with the front right occupant.

The front middle occupant was seated in an upright position. According to her statement, she was in the process of putting on her lap belt. During the first impact, she reacted to the 30E direction of force by moving forward and to the and possibly engaged the deploying passenger side air bag with her right arm. During the second impact, she reacted to the 90E direction of force by moving sharply to the right.

The front right occupant was seated in an upright position. He was not wearing the available lap and shoulder belt. During the first impact, he reacted to the 30E direction of force by moving forward and to the right and engaged the deploying air bag. During the second impact, he reacted to the 90E direction of force by moving sharply to the right. During the rollover, he pitched to the left and was partially ejected out the left front window. As the vehicle continued its rollover, he head was caught beneath the vehicle. He was declared dead at the scene with massive head injuries. The injuries were not related to the air bag deployment.

Scene Diagram




Impact #2
STOP
STOP
STOP
STOP
ONLY
ONLY
SPEED LIMIT 55
SPEED LIMIT 55
DS9928
N
0
15' 0"
30' 0"