Remote, Redesigned Air Bag Special Study

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Dynamic Science, Inc., Case Number (1998-049-804E)

1998 Dodge Durango

Texas

July, 1998

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16. Abstract

This remote investigation focused on the redesigned air bag system deployment of a 1998 Dodge Durango sport utility vehicle. This minor injury crash occurred in July, 1998 in the evening. The weather was clear and the concrete roadway was dry. It was daylight at the time of the crash. The crash occurred on a four lane, undivided, urban roadway. The two-way roadway is comprised of two northbound travel lanes and two southbound travel lanes separated by a double yellow painted line. The roadway is bordered by concrete curbs on both road edges. The speed limit for this road is 48 km/h (30 mph). There are no traffic controls at the area of impact. The road is level at this area. Vehicle 1, a 1998 Dodge Durango sport utility vehicle (case vehicle) driven by a 28 year old female (150 cm/59 in, 54 kg/118 lbs), was traveling north, in the right northbound travel lane, at a driver estimated speed of 48-64 km/h (30-40 mph), negotiating a slight leftward curve in the road. The driver was restrained by the available manual lap/shoulder restraint. There were no other occupants in Vehicle 1. A second non-contact vehicle (believed by V1 driver to be a white Chevrolet pickup truck) was traveling north, in the left northbound lane, adjacent to Vehicle 1. The non-contact vehicle attempted to change lanes from the left lane into the right lane. To avoid striking the second vehicle, the driver of Vehicle 1 applied the brakes (unknown lockup) and steered to the right. This steering input caused Vehicle 1 to depart the right road side, climb the concrete curb, and strike the end of a guardrail (event 1) with the front plane of the vehicle (12FDEW2). A Delta V could not be calculated for this impact due to the guardrail being an energy absorbing (yielding) object. A barrier speed was calculated for this impact, utilizing WinSMASH, as 26 km/h (16 mph). As a result of the impact, the supplemental restraint system (driver and passenger side redesigned air bags) of the case vehicle deployed. After the guardrail impact, Vehicle 1 re-enterd the roadway and came to rest in the northbound right travel lane facing north. The non-contact second vehicle continued traveling north, in the northbound right lane, and left the scene of the crash. The driver of Vehicle 1 sustained minor injuries in the crash but did not seek medical attention and was not transported to a medical facility from the crash scene.

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Summary

This remote investigation focused on the redesigned air bag system deployment of a 1998 Dodge Durango sport utility vehicle. This minor injury crash occurred in July, 1998 in the evening. The weather was clear and the concrete roadway was dry. It was daylight at the time of the crash. The crash occurred on a four lane, undivided, urban roadway. The two-way roadway is comprised of two northbound travel lanes and two southbound travel lanes separated by a double yellow painted line. The roadway is bordered by concrete curbs on both road edges. The speed limit for this road is 48 km/h (30 mph). There are no traffic controls at the area of impact. The road is level at this area.

Figure 1. Exterior, Vehicle 1 (Dodge Durango)

Vehicle 1, a 1998 Dodge Durango sport utility vehicle (case vehicle) driven by a 28 year old female (150 cm/59 in, 54 kg/118 lbs), was traveling north, in the right northbound travel lane, at a driver estimated speed of 48-64 km/h (30-40 mph), negotiating a slight leftward curve in the road. The driver was restrained by the available manual lap/shoulder restraint. There were no other occupants in Vehicle 1.

A second non-contact vehicle (believed by V1 driver to be a white Chevrolet pickup truck) was traveling north, in the left northbound lane, adjacent to Vehicle 1.

Crash Events

The non-contact vehicle attempted to change lanes from the left lane into the right lane. To avoid striking the second vehicle, the driver of Vehicle 1 applied the brakes (unknown lockup) and steered to the right. This steering input caused Vehicle 1 to depart the right road side, climb the concrete curb, and strike the end of a guardrail (event 1) with the front plane of the vehicle (12FDEW2).

A Delta V could not be calculated for this impact due to the guardrail being an energy absorbing (yielding) object. A barrier speed was calculated for this impact, utilizing WinSMASH, as 26 km/h (16 mph).

As a result of the impact, the supplemental restraint system (driver and passenger side redesigned air bags) of the

case vehicle deployed.

After the guardrail impact, Vehicle 1 re-entered the roadway and came to rest in the northbound right travel lane facing north. The non-contact second vehicle continued traveling north, in the northbound right lane, and left the scene of the crash.

The driver of Vehicle 1 sustained minor injuries in the crash but did not seek medical attention and was not transported to a medical facility from the crash scene.

Vehicle 1 became disabled due to damage sustained in the crash and was towed from the scene.

Figure 2. Approach to guardrail impact

Figure 3. Impact with guardrail

Table 1. Delta V

	Case Vehicle	
	km/h	mph
Total	Unknown	Unknown
Longitudinal	Unknown	Unknown
Lateral	Unknown	Unknown
Barrier speed	26	16.2

Exterior of Case Vehicle

Table 2. Vehicle Information

Model year, make and model	1998 Dodge Durango
VIN	1B4HS28Z1WF
CDC	12FDEW2

Figure 4. Exterior, Vehicle 1 (1998 Dodge Durango)

Figure 5. Exterior, Vehicle 1 (1998 Dodge Durango)

Table 3. Crush Measurements

Plane of Impact	Field L cm/in.	C1 cm/in.	C2 cm/in.	C3 cm/in.	C4 cm/in.	C5 cm/in.	C6 cm/in.
Bumper	96	0	39	30	10	0	0
	37.8	0	15.4	11.8	3.9	0	0

Interior of Case Vehicle

The interior of the Dodge Durango sustained minor damage from occupant contact. There were no areas of intrusion into the passenger compartment. There was occupant contact evidence to the front left air bag and front left door panel.

The case vehicle was equipped with bucket seats in the front left and front right seating positions. The front left seat was adjusted to the forward most track position. The front right seat was adjusted between the forward most and middle track positions. Both front seats were equipped with integral head restraints which were not damaged. The second row of the vehicle consisted of split bench seats with folding back(s). The second left and second right seats were equipped with integral head restraints which were not damaged. The second center seat was not equipped with head restraints. The third row of seats was not present in the vehicle at the time of the crash.

Case Vehicle Occupant Protection Systems

The Dodge Durango sport utility vehicle was equipped with a redesigned air bag system which consisted of front left and front right air bag modules which housed air bags and depowered inflator units.

The front left air bag was housed in the steering wheel hub and was concealed by rectangular, asymmetrical H-configuration cover flaps. The circular air bag was equipped with two tether straps and no vent ports. A small scuff was found on the top right quadrant of the front of the bag from contact with the driver's face.

The front right air bag was housed in the mid-instrument panel position. The single air bag cover flap was in the shape of an inverted "D". The oval shaped air bag was not equipped with either tethers or vent ports. There were no indications of damage or contact to either the air bag or the module cover.

Figure 6. Interior, case vehicle. Driver's side air bag.

Figure 7. Interior, case vehicle. Passenger's side air bag.

Case Vehicle Occupant Demographics

Table 4. Case Vehicle Occupant Demographics

	Occupant 1	
Age/Sex:	28/Female	
Seated Position:	Front left	
Seat Type:	Bucket, leather covered	
Height (cm/in:):	150	59
Weight (kg/lbs).:	54	118
Pre-existing Medical Condition:	None noted	
Body Posture:	Normal, upright facing forward	
Hand Position:	Both hands on steering wheel	
Foot Position:	Feet on floor or foot controls	
Restraint Usage:	Manual lap & shoulder restraint	
Air bag:	Deployed redesigned air bag system	

Occupant Injuries

Table 5. Case Vehicle Occupant(s) Injuries

Occupant #	Injury	Injury Severity (AIS)	Injury Mechanism
1	Neck abrasion	1	Air bag
1	Chest skin contusion	1	Shoulder belt

Occupant Kinematics

The driver (case occupant) of the Dodge Durango was seated in a normal upright posture in the front left position of the vehicle. She was properly wearing the manual lap/shoulder restraint. Seat belt usage was determined by visual inspection by the researcher, interview data, and observations of the investigating officer at the scene of the crash. Prior to impact, the driver applied the brakes and steered the vehicle to the right in an attempt to avoid the non-contact vehicle. The driver reacted to this braking input by moving forward and left, loading the lap/shoulder restraints.

At impact, the driver reacted to the 0 degree principal direction of force by moving sharply forward, again loading the locked lap/shoulder restraint-causing the chest skin contusion. The driver also engaged the deploying air bag-causing the neck abrasion. A small scuff was found on the bag from the contact. Three scuffs were also found on the front left door panel from contact with the driver's left flank. No injuries were sustained from these contacts.

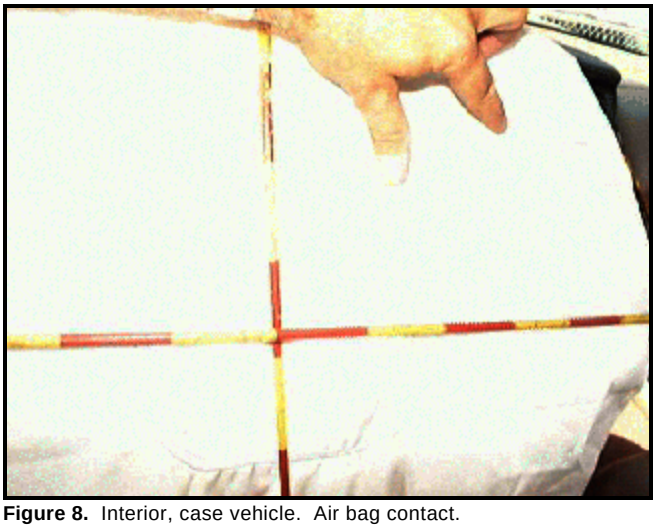

Figure 8. Interior, case vehicle. Air bag contact.

Figure 9. Interior, case vehicle.

Scene Diagram

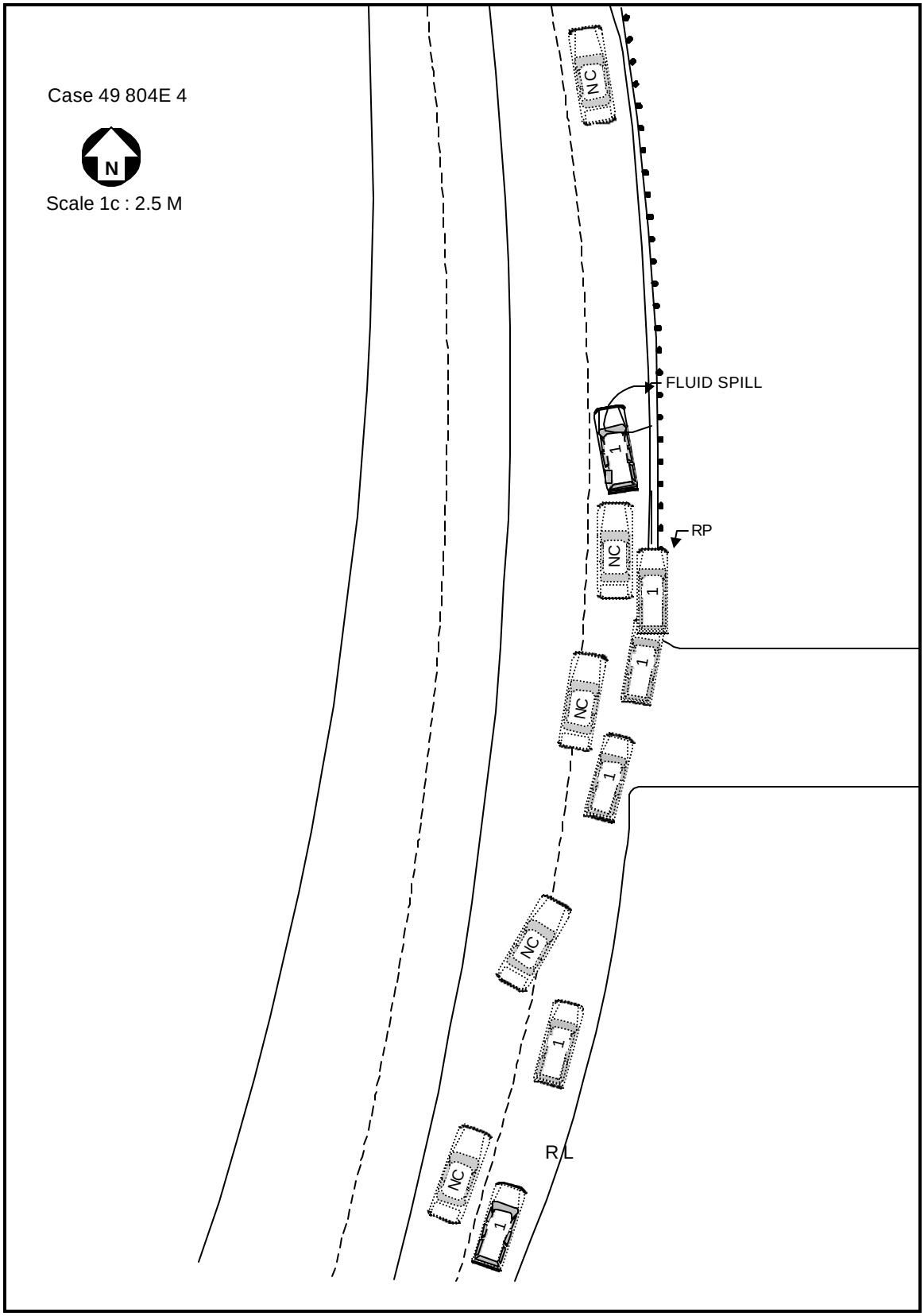

Figure 10. Scene diagram