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REMOTE AIR BAG DEPLOYMENT REPORT

CASE NUMBER - IN99-096

LOCATION - TEXAS

VEHICLE - 1998 DODGE RAM 1500 PICKUP TRUCK

CRASH DATE - June 1998

Submitted:

December 12, 2000

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June 5, 2001



Contract Number: DTNH22-94-D-17058

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator's expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

Technical Report Documentation Page

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15. <i>Supplementary Notes</i> Remote air bag deployment report involving a 1998 Dodge Ram 1500 Club Cab pickup truck equipped with manual safety belts and dual redesigned front air bags, and a 1991 Oldsmobile Cutlass Ciera S.					
16. <i>Abstract</i> This report covers a remote investigation of an air bag deployment crash that involved a 1998 Dodge Ram 1500 Club Cab pickup truck (case vehicle) and a 1991 Oldsmobile Cutlass Ciera S. This crash is of special interest because the Dodge was equipped with redesigned air bags that deployed as a result of the collision events. The Dodge's restrained front right passenger (45-year-old male) was fatally injured and the restrained driver (39-year-old male) sustained police-reported "C" (possible) injuries. The Dodge was traveling north in the northbound lane of a two-lane, undivided state highway, approaching an off-set cross intersection and apparently intended to continue north. The Oldsmobile was traveling west in the westbound lane of a two-lane, undivided county roadway, approaching the same intersection and apparently intended to continue west. The crash occurred in the northbound lane within the intersection. The right side of the Dodge was impacted by the front of the Oldsmobile, causing the Dodge's driver and front right passenger air bags to deploy. Both vehicles rotated clockwise, sustained separate secondary impacts with roadside objects, and came to rest off the pavement on the intersection's northwest quadrant, heading southeast. The Oldsmobile's unrestrained driver was ejected through the driver's door. The Dodge's front right passenger likely contacted the interior right front door panel, the right upper A-pillar, and his air bag, sustaining fractures of the right and left lower extremities and the left humerus, with multiple contusions and abrasions to his right side. His cause of death was given as "complications of multiple injuries." His complications consisted of: clinical history of hepatic failure, hepatitis, GI bleed, disseminated intravascular coagulopathy, and alcohol abuse. He died 7 days and approximately 21 hours post-crash. The Oldsmobile's driver was pronounced dead at the scene. Both vehicles were towed from the scene due to disabling damage.					
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Additional photographs are available in SCI EDCS case IN99-096

This case was brought to the NHTSA's attention by a review of the 1998 Fatality Analysis Reporting System (FARS) in June 1999. The crash involved a 1998 Dodge Ram 1500 Club Cab pickup truck (case vehicle) and a 1991 Oldsmobile Cutlass Ciera S. The crash occurred in June 1998, at 4:20 p.m., in Texas, and was investigated by the applicable state highway patrol agency. This case is of special interest because the Dodge was equipped with redesigned air bags that deployed as a result of collision events. The Dodge's restrained front right passenger (45-year-old male) was fatally injured and the restrained driver (39-year-old male) sustained police-reported "C" (possible) injuries. The Police Crash Report was received in December 1999 and police photographs in March 2000. The medical examiner's report of a non-invasive death examination of the Dodge's front right passenger was received in February 2000. This report is based on the Police Crash Report, the death investigation report, police on-scene photographs, occupant kinematic principles, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The Dodge was traveling north in the northbound lane of a two-lane, undivided state highway, approaching an off-set cross intersection, apparently intending to continue north. The Oldsmobile was traveling west in the westbound lane of a two-lane, undivided local road, approaching the same intersection, apparently intending to continue west. It was daylight, clear weather, and no vision obstructions noted. Both roadways were bituminous, dry and straight. The Police Crash Report did not indicate the presence of a roadway grade and police photographs were not sufficient to estimate the existence of a grade. The intersection was controlled by stop signs for the local road. The local road had channelized right turn lanes on both the east and west legs of the intersection. The posted speed limit for the state highway was 113 km.p.h. [70 m.p.h.] and for the local roadway 89 km.p.h. [55 m.p.h.]. The Police Crash Report diagram indicates a left (west) steering maneuver by the Dodge. It is not known if the Dodge's driver attempted any other avoidance maneuvers.

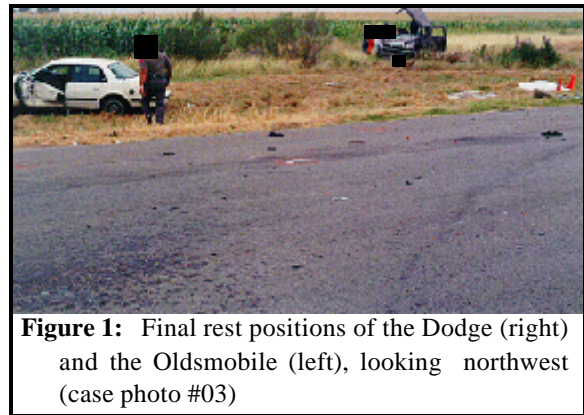


Figure 1: Final rest positions of the Dodge (right) and the Oldsmobile (left), looking northwest (case photo #03)

The crash occurred in the state highway's northbound lane, within the intersection. The right side fender and door area of the Dodge was impacted by the front of the Oldsmobile, causing the Dodge's driver and front right passenger air bags to deploy. The Dodge rotated clockwise approximately 140 degrees. While rotating, the Dodge struck a metal sign pole with its left front door. It came to rest off the pavement on the intersection's northwest quadrant, heading southeast (**Figure 1**). The Oldsmobile rotated approximately 330 degrees clockwise and struck at least one wooden fencepost. During this post-impact rotation, the Oldsmobile's unrestrained driver was ejected. The Oldsmobile also came to rest off the pavement on the intersection's northwest quadrant, heading southwest.

The case vehicle was a rear wheel drive Dodge Ram 1500, 4x2, club cab, two-door, pickup truck (VIN: 3B7HC12Z3WM-----) equipped with a 5.9 liter, V-8 gasoline engine and a four-speed automatic transmission with the shift lever location unknown. It was equipped with, at least, two-wheel anti-lock brakes; four-wheel anti-lock brakes were an option for this vehicle but it is unknown if the Dodge vehicle was so equipped. The Dodge's wheelbase was 352 centimeters (138.7 inches). No odometer reading was reported. The Dodge was towed from the scene due to disabling damage.

From the impact with the Oldsmobile, the Dodge sustained direct contact damage to its right side. Incomplete photographic coverage and extensive cutting during extrication precludes a definitive description of the Dodge's crash damage (**Figures 2 and 3**). The right front tire was deflated and the wheel rim damaged. The lower right A-pillar was crushed inward, as were the right rocker panel, the right front door, the lower right B-pillar, the right extended cab panel, the lower right C-pillar, and the right front corner of the cargo bed (**Figure 3**). Rescue workers snipped the upper A, B, and C pillars and raised the roof to remove the front right passenger. The right front door, right extended cab, and back light glazing are missing (some may be from extrication efforts). An impact with a metal sign pole resulted in a vertical impression on the left front door panel that likely shattered the glazing (**Figure 4**). Induced damage included the right hood edge, the front right bumper fascia corner, the front right air dam corner, the front right black rubber corner, left front fender buckling, buckling of the left front door panel's forward third, and the deflation of the left rear tire. A CDC for the Dodge's impact with the Oldsmobile was estimated from police photographs as: **01-RDEW-3 (040)**. The WinSMASH reconstruction program, with CDC-only estimated crush profile, provided a borderline reconstruction, and the results appear reasonable. The Dodge's estimated Total, Longitudinal, and Lateral Delta Vs are, respectively: 16.3 km.p.h. [10.1 m.p.h.], -12.5 km.p.h. [-7.8 m.p.h.], and -10.4 km.p.h. [-6.5 m.p.h.].



Figure 2: Induced damage to Dodge's front right corner (case photo #06)

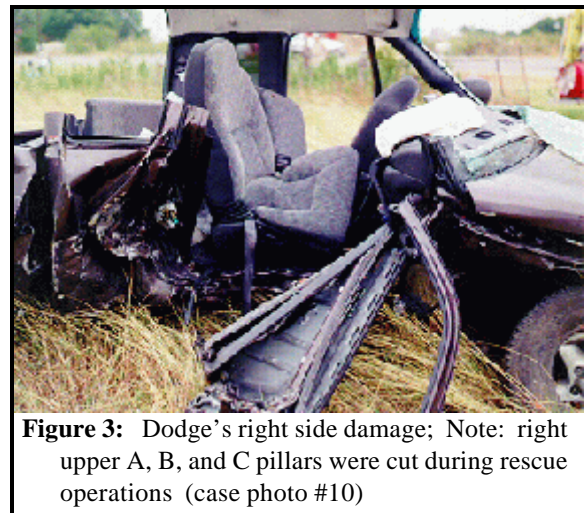


Figure 3: Dodge's right side damage; Note: right upper A, B, and C pillars were cut during rescue operations (case photo #10)



Figure 4: Road sign post impact to Dodge's left front door; Note: damage extended to top of door window frame (case photo #07)

Intrusion to the Dodge's front right passenger seating area was severe (**Figure 3**). The lower right A-pillar was displaced inward, buckling the toe pan and floorboard areas of the front right seat position. Although the right front door panel was removed during rescue operations post-crash, the inward movement of the right rocker panel and the right front door also reduced available space in the front right seat position. Those intruding components resulted in the front right passenger's seat being deformed and displaced.

CASE VEHICLE FRONT RIGHT PASSENGER

The Dodge's front right passenger (45-year-old male, white, unknown if Hispanic, 178 centimeters and 127 kilograms [70 inches, 281 pounds]) was wearing his available, manual, three-point, lap-and-shoulder safety belt system. His pre-crash seat adjustments and posture are not known. He was airlifted from the crash site and flown to a trauma center. He was admitted to the hospital and was declared dead 7 days, 21 hours, and 19 minutes post-crash. A non-invasive death examination was conducted by a medical examiner and the cause of death was given as "complications of multiple injuries." The complications were listed as: clinical history of hepatic failure, clinical history of hepatitis, clinical history of gastro-intestinal bleeding, clinical history of disseminated intravascular coagulopathy, and clinical history of alcohol abuse. The following discussion of the Dodge's front right passenger is based on the death examination report, on-scene police photographs, and occupant kinematic principles.

The Dodge's front right passenger was likely seated in a normal passenger posture with his back against the seat back and his feet on the floor. A left (west) pre-impact steering maneuver by the Dodge's driver was depicted on the Police Crash Report's diagram. This steering maneuver would have resulted in the restrained front right passenger moving slightly forward and rightward, toward the right A-pillar. Although the Dodge was struck on its right side, there was sufficient longitudinal deceleration to cause the driver and front right passenger air bags to deploy. At impact, the passenger moved further forward and rightward, toward the right A-pillar, loading his safety belt. As the right side and floor components intruded, the passenger sustained unspecified fractures of the right and left lower extremities; contusions to the right chest, right flank, and right lateral hip; an abrasion to the right arm posteriorly; and bilateral contusions extending from the ankles to the soles of the feet. The extensive crushing and buckling of the floor caused the front right seat to become displaced and his flailing left arm struck the instrument panel, causing a fracture of the humerus.

CASE VEHICLE FRONT RIGHT PASSENGER INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1.	Fracture, left humerus, NFS	752600.2 moderate	Center instrument panel	Possible	External death exam.
2.	Fracture, right leg, NFS	852002.2 moderate	Right instrument panel	Possible	External death exam.
3.	Fracture, left leg, NFS	852002.2 moderate	Right instrument panel	Possible	External death exam.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
4.	Contusion, right chest	490402.1 minor	Right side interior surface	Probable	External death exam.
5.	Contusion, right abdomen	590402.1 minor	Right side interior surface	Probable	External death exam.
6.	Contusion, right hip	890402.1 minor	Right side interior surface	Probable	External death exam.
7.	Contusion, right arm, NFS	790402.1 minor	Right side interior surface	Probable	External death exam.
8.	Contusions, ankles and soles of feet, bilateral	890402.1 minor	Floor/toe pan	Possible	External death exam.

CASE VEHICLE DRIVER

The Dodge's driver (39-year-old male, White, unknown if Hispanic, height and weight unknown) was reportedly wearing his available, manual, three-point, lap-and-shoulder safety belt system. His pre-crash seat adjustments, steering wheel position, and posture are not known. He was transported from the crash scene by ambulance to a medical facility. Police assessed his injuries as "C" (possible). His treatment status and specific injuries are not known.

OTHER VEHICLE

The other vehicle was a front wheel drive, 1991 Oldsmobile Cutlass Ciera S, six passenger, four-door sedan (VIN: 1G3AJ54N1M6-----) equipped with a 3.3 liter, V-6 gasoline engine and an automatic transmission with the shift lever at an unknown location. It was not equipped with anti-lock brakes. Its wheelbase was 266 centimeters (104.9 inches). No odometer reading was recorded. The Oldsmobile was towed from the scene due to disabling damage.



From the collision with the Dodge, direct contact damage to the Oldsmobile included: the front bumper fascia and the front reinforcement bar were displaced rearward; the grille and headlamp assemblies shattered and missing; the engine compartment's forward top radiator bracket was pushed rearward and downward; the top hood panel torn off and missing; the metal hood frame was shifted right and buckled; and both front fenders pushed rearward and buckled (**Figure 5**). A second impact, with at least one wooden fencepost, resulted in a vertical line of crush from the bottom of the left front door panel to the upper A-pillar (**Figure 6**). Induced damage to the Oldsmobile included: the left front tire and wheel, the forward seam of the left front door, the right front tire and wheel, the forward seam of the right front door panel, and the splintering of the windshield. A combination of the fencepost impact, a violent clockwise

rotation from the vehicle-to-vehicle collision, and the unrestrained driver contacting the interior panel of the left front door resulted in the top of the door frame pulling away from the left roof rail a sufficient distance to allow the driver's body to be completely ejected through that opening. Based on police photographs, a CDC for the Oldsmobile was estimated as: **11-FDEW-1 (320)**. The WinSMASH reconstruction program, with CDC-only estimated crush profile, provided a borderline reconstruction, and the results appear reasonable. The Oldsmobile's estimated Total, Longitudinal, and Lateral Delta Vs are, respectively: 25.2 km.p.h. [15.7 m.p.h.], -19.3 km.p.h. [-12.0 m.p.h.], and 16.2 km.p.h. [10.1 m.p.h.].

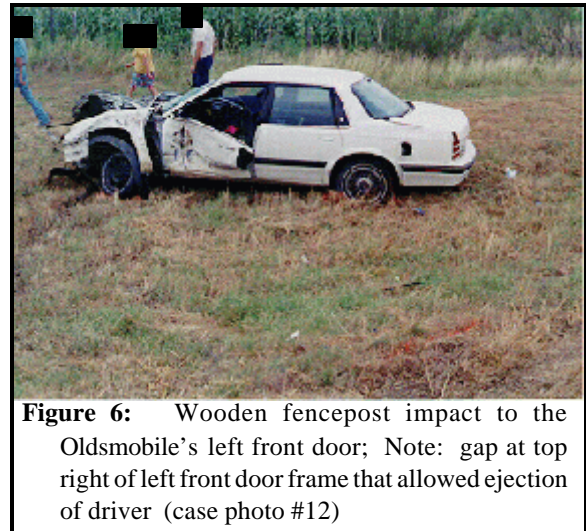


Figure 6: Wooden fencepost impact to the Oldsmobile's left front door; Note: gap at top right of left front door frame that allowed ejection of driver (case photo #12)

The Oldsmobile's driver (75-year-old, male, White, unknown if Hispanic, height and weight unknown) was reportedly unrestrained. His pre-crash seat adjustments, steering wheel position, and posture are unknown. He was pronounced dead at the crash scene and was transported directly to a funeral home.