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DEPOWERED AIR BAG REPORT

CASE NUMBER - IN98-011
LOCATION - Texas
VEHICLE - 1998 CHEVROLET CAVALIER
CRASH DATE - December, 1997

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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.

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15. <i>Supplementary Notes</i> On-site depowered/second generation air bag deployment investigation involving a 1998 Chevrolet Cavalier and a 1995 Oldsmobile 88 Royale.			
16. <i>Abstract</i> <p>This report covers an on-site investigation of an air bag deployment crash. This crash is of special interest because the case vehicle (1998 Chevrolet Cavalier) was equipped with depowered/second generation air bags that deployed as a result of the crash events. The case vehicle was traveling east in the eastbound lane of a residential street, approaching an intersection and intending to continue east. Vehicle #2 was traveling south in the center southbound through lane of a four-lane divided local road, approaching an intersection and intending to continue south. The crash occurred within the intersection of the two roadways. The front of the case vehicle impacted the right side of vehicle #2, causing the case vehicle's driver and front right passenger air bags to deploy. Vehicle #2 was also equipped with air bags, but they did not deploy. This was a crash of low severity for both vehicles. There were a total of five persons in the two vehicles. Three did not sustain any police-reported injury and two sustained police-reported "C" (possible) injuries but declined treatment. No ambulance came to the scene. Both vehicles were towed due to disabling damage.</p>			
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Background

This on-site report was brought to the NHTSA's attention on January 20, 1998 by NASS/CDS sampling activities. The crash involved a 1998 Chevrolet Cavalier (case vehicle) and a 1995 Oldsmobile 88 Royale (vehicle #2). This crash is of special interest because the case vehicle was equipped with depowered/second generation air bags that deployed as a result of the crash events. There were two occupants in the case vehicle. The driver was not injured and the passenger declined treatment at the scene. The investigating police agency was contacted on January 21, with scene and case vehicle inspections conducted in early February. The driver and passenger in the case vehicle declined to cooperate with the investigation and no interview data are available. Vehicle #2 had been repaired and was not available to be inspected.

Crash Circumstances

The crash occurred in December 1997, in Texas, at 10:24 a.m., and was investigated by the applicable municipal police agency. The case vehicle was traveling east in the eastbound lane of a one-lane divided residential street (one lane in each direction with a curbed, landscaped median), speed limit 48 km.p.h. (30 m.p.h.), approaching an intersection and intending to continue east. Vehicle #2 was traveling south in the center southbound through lane of a four-lane divided local road (three southbound through lanes and a southbound left turn lane with a grass median), speed limit 80 km.p.h. (50 m.p.h.), approaching an intersection and intending to continue south. The crash occurred within the intersection of the two roadways. It is not known if either driver attempted any avoidance actions. The front of the case vehicle impacted the right side of vehicle #2, causing the case vehicle's driver and front right passenger air bags to deploy. Vehicle #2 was also equipped with air bags, but they did not deploy. The case vehicle rotated approximately 90 degrees clockwise and came to rest headed approximately south. Vehicle #2 rotated approximately 20 degrees counter-clockwise and came to rest headed southeast. This was a crash of low severity for both vehicles. There were a total of five persons in the two vehicles. Three did not sustain any police-reported injury and two sustained police-reported "C" (possible) injuries but declined treatment. No ambulance came to the scene. Both vehicles were towed due to disabling damage.

Case Vehicle

The case vehicle was a front-wheel-drive 1998 Chevrolet Cavalier four-door sedan equipped with four-wheel anti-lock brakes (VIN: 1G1JF52T5W7-----). Direct damage was confined to the left half of the front of the case vehicle. The entire front bumper and grille assembly was torn away, with damage to the radiator support brackets and displacement of the radiator. In addition, there was minor buckling and displacement of the engine hood and a small stress crack in the windshield, at the lower edge near the center. All doors remained closed and operational, and

there was no glazing damage except to the windshield. The wheelbase was shortened by four centimeters on both sides. The CDC for the case vehicle was determined to be 10-FYEW-1. The ROLDMIS reconstruction algorithm was used to calculate delta v because vehicle #2 was repaired and no crush measurements were obtained. The computations indicated total delta v 13 km.p.h. (8 m.p.h.), with longitudinal component -9 km.p.h. (-5 m.p.h.) and lateral component +10 km.p.h. (+6 m.p.h.).

The case vehicle was fitted with bucket seats in the front row. The driver's seat track was adjusted between the middle and forward most positions, with the seat back slightly reclined. The front right passenger's seat track was adjusted at the middle position, with the seat back slightly reclined. There was no evidence of seat or track failure for either of the front seats. The vehicle was equipped with manual three-point lap-and-shoulder safety belts at the four outboard positions, with a lap-only safety belt in the center position of the second row. The tilt steering wheel was adjusted in the center position. The steering wheel was not deformed and there was no evidence that the steering column had moved. The driver's air bag was located in the hub of the steering wheel with cover flaps in the I-configuration. The deployed driver's air bag was round, with diameter 60 centimeters (24 inches) and two vent ports at the 3 and 9 o'clock positions. The driver's air bag flaps opened along the seams and there was no evidence of damage to the flaps or the air bag. There was no evidence of contact on the driver's air bag. The front right passenger's air bag was located in the top of the instrument panel. The passenger air bag's single flap opened along the seams with no evidence of damage to the flap or the air bag. The flap impacted the windshield, causing a small area of spiderweb cracking directly above the flap, low on the windshield. The deployed passenger's air bag was a rectangle 46 centimeters (18 inches) tall and 50 centimeters (20 inches) wide with no vent ports. There was a small blood stain on the front of the air bag, near the upper left corner. The source of this stain is not known but presumably reflects the front right passenger's police-reported "C" (possible) injury. There was no other evidence of occupant contact anywhere in the case vehicle.

Case Vehicle Occupants

The case vehicle's driver was female, 31 years, unknown height, 86 kilograms (190 pounds) and was restrained by the available manual three-point lap-and-shoulder safety belt system with the upper anchorage adjusted in the middle position. The front right passenger was female, 66 years, unknown height, 100 kilograms (220 pounds). It is not known if the front right passenger was wearing her safety belt. The driver did not sustain any police-reported injuries. The front right passenger sustained police-reported "C" (possible) injuries and declined treatment at the scene. Because there is no interview data, the occupants' pre-crash posture is not known. It is not known if the case vehicle driver attempted any avoidance actions. Based on the principles of occupant kinematics, both occupants would have moved forward and to the left as a result of the impact. The driver's motion would have been restricted by her safety belt and she would have encountered the deployed driver's air bag in an upright but off-center alignment. The passenger

would have moved toward the center of the instrument panel. Because it is not known if the passenger was restrained, the passenger's movements are not known. Presumably, she encountered the deployed passenger air bag leaning somewhat forward and leftward of upright. There was a small blood stain in the upper left area of the front of the passenger's air bag, with no other evidence of contact anywhere in the vehicle. The location of the blood stain is consistent with the presumed location of the front right passenger's face. It is speculated that the police-reported "C" injury for the passenger may indicate a small laceration on her face, perhaps a split lip.

Vehicle #2

Vehicle #2 was a front-wheel-drive 1995 Oldsmobile 88 Royale LS four-door sedan (VIN: 1G3HY52K2SH-----). Vehicle #2 was equipped with driver and front right passenger air bags that did not deploy. This vehicle had been repaired and was not available to be inspected. There were three occupants in vehicle #2. The driver and the occupant in the leftmost position in the second seat row did not sustain any police reported injuries. The front right passenger sustained police-reported "C" (possible) injuries and declined treatment. The ROLDMIS reconstruction indicated total, longitudinal and lateral delta v, respectively, 10 km.p.h. (6 m.p.h.), -8 km.p.h. (-5 m.p.h.) and -6 km.p.h. (-4 m.p.h.).

Selected Photographs



Figure 1: Looking back along case vehicle's approach; note: impact occurred in middle foreground of this view (case photo #3)

Selected Photographs (continued)



Figure 2: Front and left side of case vehicle; note: bumper and grille assembly torn off by impact (case photo #9)



Figure 3: Front and right side of case vehicle (case photo #14)

Selected Photographs (continued)



Figure 4: Case vehicle's steering wheel and driver air bag cover flaps (case photo #15)



Figure 5: Front surface of driver's air bag (case photo #18)

Selected Photographs (continued)



Figure 5: Entire instrument panel; note: front right air bag cover flap (case photo #19)



Figure 7: Front surface of front right air bag (case photo #22)