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REMOTE REDESIGNED AIR BAG REPORT

CASE NUMBER - IN97-055
LOCATION - MISSOURI
VEHICLE - 1998 OLDSMOBILE 88 LS
CRASH DATE - December, 1997

Submitted:

September 4, 2001

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Contract Number: DTNH22-94-D-17058

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590-0003

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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. *Supplementary Notes* Remote redesigned air bag deployment investigation involving a 1998 Oldsmobile 88 LS, four-door sedan, with manual safety belts and dual front air bags, and a 1990 Geo Storm, two-door hatchback			
16. *Abstract* This report covers an remote investigation of an air bag deployment crash that involved a 1998 Oldsmobile eighty-eight LS (case vehicle) and a 1990 Geo Storm (other vehicle). This crash is of special interest because the case vehicle was equipped with redesigned air bags and the case vehicle's restrained driver [74-year-old, White (Hispanic) male] and restrained, front right passenger (74-year-old female) sustained only minor injuries and no injuries, respectively, from their deploying air bags. The case vehicle had been traveling primarily eastward in the eastbound lane of a three-lane, undivided, county roadway and was approaching a "Tee" intersection intending to make a left-hand turn and travel northward (i.e., there was one eastbound and one westbound through lane and one westbound, right-hand, turn lane). The case vehicle's driver had started to make his left-hand turn when he observed the Geo traveling westbound and stopped in the "Tee" intersection, attempting to avoid the crash. The Geo was traveling primarily westward in the westbound through lane of the same roadway. The crash occurred in the westbound lane, within the "Tee" intersection of the two roadways. The front left corner of the case vehicle was most likely impacted by the front left corner of the Geo, causing the case vehicle's driver and front right supplemental restraints (air bags) to deploy. The case vehicle's driver was seated with his seat track located between its middle and forward-most positions, and the tilt steering wheel was located in its middle position. He was restrained by his available, active, three-point, lap-and-shoulder, safety belt system and sustained, according to his interview, minor injuries which included: a lacerated {split} and swollen lip and a contused right hand. The driver attributed both of his injuries to his deploying air bag. The front right passenger was seated with her seat track located in its rearmost position and was restrained by her available, active, three-point, lap-and-shoulder, safety belt system. According to the interview with the case vehicle's driver (i.e., husband), she did not sustain any injuries as a result of this crash.			
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BACKGROUND

IN97-055

This remote report was brought to NHTSA's attention on December 15, 1997 through GES sampling activities. This crash involved a 1998 Oldsmobile Eighty-Eight LS (case vehicle) and a 1990 Geo Storm (other vehicle). The crash occurred in December, 1997, at 10:35 a.m., in Missouri and was investigated by the applicable county sheriff department. This crash is of special interest because the case vehicle was equipped with redesigned air bags and the case vehicle's restrained driver [74-year-old, White (Hispanic) male] and restrained, front right passenger [74-year-old, White (Hispanic) female] sustained only minor injuries and no injuries, respectively, from their deploying air bags. This contractor interviewed the driver for the case vehicle on December 19, 1997. This report is based on the Police Crash Report, an interview with the case vehicle's driver, insurance photographs, occupant kinematic principles, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The case vehicle had been traveling primarily eastward in the eastbound lane of a three-lane, undivided, county roadway and was approaching a "Tee" intersection intending to make a left-hand turn and travel northward (i.e., there was one eastbound and one westbound through lane and one westbound, right-hand, turn lane). The case vehicle's driver had started to make his left-hand turn when he observed the Geo traveling westbound and stopped in the "Tee" intersection, attempting to avoid the crash. The Geo was traveling primarily westward in the westbound through lane of the same three-lane, undivided, county roadway and intended to continue traveling westbound. The driver of the Geo braked, attempting to avoid the crash but, according to the Police Crash Report, slid on the wet surface. The crash occurred in the westbound lane, within the "Tee" intersection of the two roadways.

The east-west county roadway was straight and level at the area of impact. The pavement was bituminous, and the width of the travel lanes for both vehicles is unknown. It is unknown if there were any shoulders and/or curbs in the area. Pavement markings consisted of a single solid white centerline for both the east and westbound directions of travel, augmented by a single solid yellow "no passing" line for westbound traffic. It is unknown if there were any edge lines present. There were no traffic controls reported on the Police Crash Report. The legal speed limit was 56 km.p.h. (35 m.p.h.) for both of the intersecting county roadways. At the time of the crash the light condition was daylight and, according to the Police Crash Report, the atmospheric condition was raining and the road pavement was wet. According to the case vehicle's driver, it was cloudy without precipitation, and the road surface was dry. According to the case vehicle's driver, the traffic density was moderate and the site of the crash was rural residential.

The front left corner (**Figure 1** below) of the case vehicle was most likely impacted by the front left corner of the Geo, causing the case vehicle's driver and front right supplemental restraints (air bags) to deploy. The case vehicle most likely rotated slightly counterclockwise and came to rest within the "Tee" intersection heading in a northeasterly direction. According to the available evidence, the Geo came to rest within the "Tee" intersection heading essentially westward.

The 1998 Oldsmobile Eighty-Eight LS was a front wheel drive, six-passenger, four-door sedan (VIN: 1G3HN52K8W4------) equipped with a 3.8L, V-6 engine and a four-speed automatic transmission. Four wheel, anti-lock brakes are standard equipment for this model. The case vehicle's wheelbase was 281 centimeters (110.8 inches) and, according to the available insurance photographs, the electronic odometer reading was 1,889 kilometers (1,174 miles).

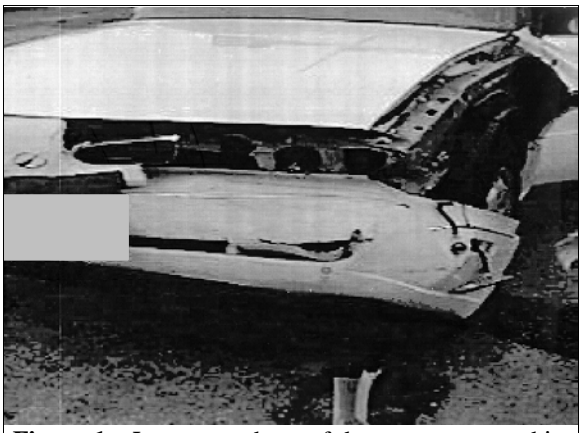

Figure 1: Insurance photo of damage to case vehicle's front left bumper; Note: left fender was pulled outwards from impact (case photo #01)

The case vehicle's interior had an adjustable front bench seat (i.e., most likely a 60/40 split bench); a non-adjustable back bench seat; continuous loop, three-point, lap-and-shoulder, safety belt systems at the front and back outboard positions; and two-point, lap belt systems at the front and back center positions. It is unknown if the front seat belt systems were equipped with manually operated height adjusters for the "D"-rings. The vehicle was equipped with knee bolsters for both the driver and front right passenger. Automatic restraint was provided by a Supplemental Restraint System (SRS) that consisted of redesigned frontal air bags for the driver and front right passenger seating positions. Both frontal air bags deployed as a result of the case vehicle's frontal impact with the Geo.

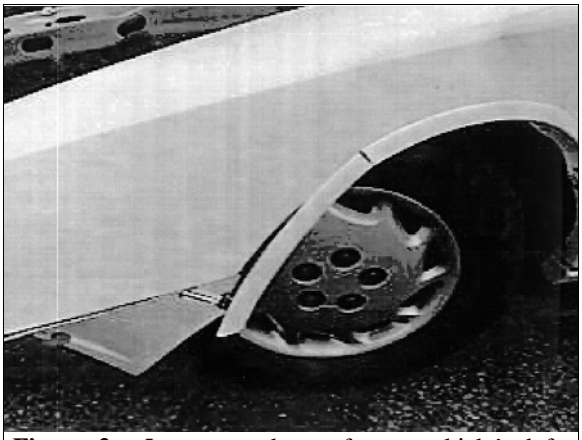

Figure 2: Insurance photo of case vehicle's left fender which was pulled outwards as a result of frontal impact (case photo #02)

The case vehicle's initial contact with the Geo involved the front left bumper corner. The corner was most likely impacted by the front left bumper corner of the Geo. The angled impact peeled the left fender away from the case vehicle's body (**Figure 2**). Maximum crush was estimated as 10 centimeters (3.9 inches) at C_1 (**Figure 1**). The case vehicle's front bumper, bumper fascia, grille, left headlight and turn signal assemblies, and left fender were directly damaged and crushed rearward.

Based on the available poor quality insurance photographs, the CDC for the case vehicle was estimated to be: **01-FYEW-1 (30)**. No reconstruction program was used on this crash because the NASS, CDS, SMASH protocol requires that actual vehicular crush measurements be obtained; however, this contractor's visually estimated Delta V is between 13 km.p.h. (8 m.p.h.) and 19 km.p.h. (12 m.p.h.). The case vehicle was towed from the scene but not due to damage.

The case vehicle's driver air bag was located in the steering wheel hub. Because this case is a remote investigation, the existence, number, and size of tethers or vent ports could not be

assessed nor could the shape or size of the driver's air bag be described. The investigating police officer made no mention of any evidence of contact or damage to the air bag's fabric.

The front right passenger's air bag was located in the top of the instrument panel (**Figure 3**). Because this case is a remote investigation, the existence, number, and size of tethers or vent ports could not be assessed nor could the shape or size of the front right passenger's air bag be described. The investigating police officer made no mention of any evidence of contact or damage to the air bag's fabric.

Figure 3: Insurance photo of case vehicle's front seating area showing deployed driver's and front right passenger's air bags (case photo #04)

Based on the available photographs, the case vehicle's interior revealed a crack to the right windshield's glazing (**Figure 4**) that most likely resulted from contact by the front right air bag module's cover flap. The available evidence is inadequate to ascertain the existence or non-existence of any other evidence of occupant contact on the interior surfaces of the case vehicle.

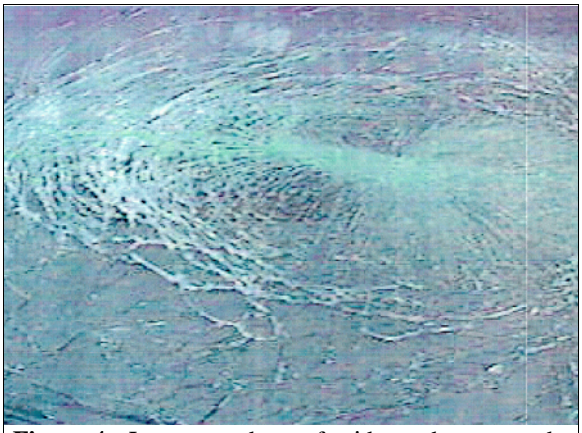

Figure 4: Insurance photo of spider web type crack to case vehicle's right windshield; Note: windshield's glazing was broken by front right air bag module's cover flap (case photo #03)

CASE VEHICLE OCCUPANTS

Immediately prior to the crash the case vehicle's driver [74-year-old, White (Hispanic) male; 168 centimeters and 70 kilograms (66 inches, 155 pounds)] was seated upright with his back against the seat back, his left foot on the floor, his right foot on the brake, and both hands on the steering wheel. His seat track was located between its middle and forward-most positions, the seat back was upright, and the tilt steering wheel was located in its middle position.

Both the Police Crash Report and the interview with the case vehicle's driver indicated that he was restrained by his available, active, three-point, lap-and-shoulder, safety belt system.

According to the case vehicle's driver he braked and brought his vehicle to a stop just prior to impact, in an attempt to avoid the crash. As a result of this attempted avoidance maneuver, he most likely was leaning slightly forward just prior to impact. The case vehicle's impact with the Geo enabled the case vehicle's driver to move forward and slightly rightward toward the 30 degree Direction of Principal Force as the case vehicle decelerated. The frontal impact caused the driver's safety belt system to "lock-up", restraining the driver and most likely preventing him from going too far forward toward the deploying air bag. However, because of the position of the driver's seat track, the driver was certainly within the air bag's excursion area. The case

vehicle rotated slightly counterclockwise post-crash and, as a result, the driver most likely moved further to his right across the front surface of the air bag and further loaded his safety belt system. The excursion of the air bag knocked the glasses off the driver's face and most likely pushed him backwards into his seat back. At final rest the case vehicle's driver remained in his seat because of his seat belt usage.

Immediately prior to the crash the case vehicle's front right passenger [74-year-old, White (Hispanic) female; 160 centimeters and 68 kilograms (63 inches, 150 pounds)] was seated upright with her back against the seat back, her feet on the floor, and both of her hands on her lap. Her seat track was located in its rearmost position, and the seat back was upright.

According to both the Police Crash Report and the case vehicle's driver, the front right passenger was restrained by her available, active, three-point, lap-and-shoulder, safety belt system.

As a result of the driver's braking and stopping maneuver, just prior to impact, the front right passenger most likely leaned slightly forward just prior to impact. The case vehicle's impact with the Geo enabled the case vehicle's front right passenger to move forward and slightly rightward toward the 30 degree Direction of Principal Force as the case vehicle decelerated. The frontal impact caused the front right passenger's safety belt system to "lock-up", restraining the front right passenger and most likely preventing her from going too far forward toward her deploying air bag. The passenger's safety belt use combined with her seat track position most likely kept her outside of her air bag's excursion area and allowed her to impact the deploying air bag in its fully expanded stage of deployment. The case vehicle rotated slightly counterclockwise post-crash and, as a result, the front right passenger most likely moved further to her right across the front surface of the air bag, further loading her safety belt system. The passenger's glasses were knocked off her face by the impact force, and the air bag most likely pushed her backwards into her seat back. At final rest the front right passenger remained in her seat because of her seat belt usage.

DRIVER INJURIES

The driver was not transported from the scene but was taken to his residence in a police vehicle. He went to his private physician later in the day. He sustained minor injuries and was examined and treated by his physician. The injuries sustained by the case vehicle's driver included: a lacerated {split} and swollen lip and a contused right hand. The driver attributed both of his injuries to his deploying air bag.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Laceration {split} lip, not further specified	290600.1 minor	Air bag, driver's	Probable	Interviewee (same person)

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
2	Contusion right hand, not further specified	790402.1 minor	Air bag, driver's	Probable	Interviewee (same person)

FRONT RIGHT PASSENGER INJURIES

The front right passenger was also not transported from the scene and, based on the available evidence, did not seek any follow-up medical treatment. According to the case vehicle's driver, she did not sustain any injuries as a result of this crash.

OTHER VEHICLE

The 1990 Geo Storm was a front wheel drive, four-passenger, two-door hatchback coupe (VIN: J81RF2365L7------) equipped with a 1.6L, L-4 engine and either the standard five-speed manual ***or*** an unknown-speed automatic transmission. Anti-lock brakes are not an option for this model. The case vehicle's wheelbase was 245 centimeters (96.5 inches), and the odometer reading is unknown because the Geo was not inspected. Based on the Geo's Vehicle Identification Number, the Geo was equipped with active, three-point, lap-and-shoulder, safety belt systems for the front outboard seating positions and a supplemental restraint system (air bag) for the driver. According to the Police Crash Report, the Geo's driver air bag did not deploy during this crash. With no available vehicle photographs, the CDC for the Geo is not estimable. The Geo was driven from the scene.