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SCI/NASS COMBINATION 208-COMPLIANT INVESTIGATION

CASE NUMBER - NASS-2004-49-253A

LOCATION - Texas

VEHICLE - 2004 FORD TAURUS

CRASH DATE - October 2004

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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> SCI/NASS combination investigation of an air bag deployment crash involving a 2004 Ford Taurus that was a Certified Advanced 208-Compliant (CAC) vehicle					
16. <i>Abstract</i> This report covers a SCI/NASS combination investigation of an air bag deployment crash involving a 2004 Ford Taurus (case vehicle) that impacted a timber utility pole. This crash is of special interest because the case vehicle's manufacturer has certified that it meets the advanced air bag requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. The unrestrained case vehicle driver (51-year-old female) sustained heart and lung injuries resulting in her death. There was no other occupant in the case vehicle. The case vehicle was traveling southward in an unknown lane of an undivided four-lane city street. It was dark but lighted, the weather was clear and the asphalt road surface was dry and free of defects. For some unknown reason, the case vehicle veered to the right (west). The autopsy toxicology testing revealed that the driver's blood alcohol concentration (BAC) was 0.18 mg/dl. The case vehicle departed the roadway to the right (west) and its front center-right area impacted a timber utility pole, causing the driver's air bag to deploy. The unrestrained driver rode down the air bag and her chest and abdomen impacted the steering assembly, causing measurable deformation of the steering wheel rim. She sustained a laceration and contusions of the heart, bilateral contusions of the lungs, fractures of the sternum and multiple ribs on the left, lacerations of the liver and spleen, and other injuries. She was declared dead approximately two hours post-crash. The case vehicle was towed due to disabling damage.					
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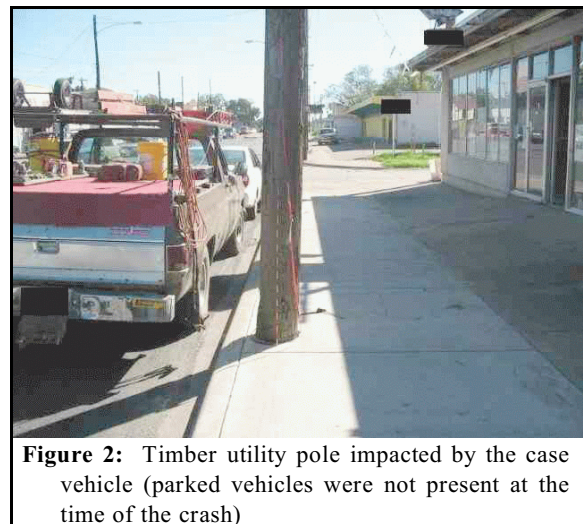
This SCI/NASS combination investigation was brought to the NHTSA's attention in October 2004 by NASS-CDS sampling activities and was designated for SCI on January 24, 2005. This crash involved a 2004 Ford Taurus sedan (case vehicle) and a timber utility pole. The crash occurred in October 2004, at 12:24 a.m., in Texas, and was investigated by the applicable municipal police department. This crash is of special interest because the case vehicle's manufacturer vehicle has certified that it meets the advanced air bag requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. The case vehicle's driver (51-year-old female, black, non-Hispanic) was declared dead approximately two hours post-crash. There was no other occupant in the case vehicle. This report is based on the coded NASS case, occupant kinematic principles and this contractor's evaluation of the available evidence.

CRASH CIRCUMSTANCES

The case vehicle was traveling southward in an unknown lane of an undivided four-lane city street. It was dark but lighted, the weather was clear, the speed limit was 56 km.p.h. [35 m.p.h.] and the asphalt road surface was dry and free of defects (**Figure 1**). For some unknown reason, the case vehicle veered to the right (west). The autopsy toxicology testing revealed that the driver's blood alcohol concentration (BAC) was 0.18 mg/dl. It should be noted that there was fresh, swiping-type damage on the case vehicle's left side. The case vehicle's owner (husband of the deceased driver) indicated that there was no damage on the case vehicle prior to the crash. It is not known if this damage was related to the crash or, perhaps, occurred during post-crash handling of the case vehicle. The case vehicle departed the roadway to the right (west) and the right front wheel mounted the curb onto the sidewalk. The police report indicates that there were no skid marks and no witnesses.



The crash occurred off the right (west) road edge. The case vehicle's front impacted a timber utility pole (**Figure 2**), causing the case vehicle driver's frontal air bag to deploy. The police crash report scene diagram indicates that, at final rest, the case vehicle was heading southwest with its front against the pole and its back wheels in the roadway. The police crash report indicates that electric service to an entire city block was disrupted, but this must have been a result of the wires and/or wire-bearing structures being damaged by vibrations because the pole had only surface damage.



The case vehicle was a 2004 Ford Taurus SES front wheel drive, four-door, five-passenger sedan (VIN: 1FAFP55U14G-----), equipped with a 3.0 liter V6 gasoline engine and an automatic transmission with a console-mounted selector lever. Four-wheel anti-lock brakes were an option for this model, but it is not known if the case vehicle was so equipped. The case vehicle was fitted with dual-stage frontal air bags, safety belt buckle sensors, safety belt pretensioners, seat track sensors and a front right passenger sensor. Seat back-mounted side impact air bags were an option for this model, but the case vehicle was not so equipped. Its odometer reading is not known. Its wheelbase was 276 centimeters [108.5 inches]. The case vehicle was towed due to disabling damage.

The case vehicle's front center-right area impacted a timber utility pole that had a diameter of approximately 35 centimeters [14 inches] and which was set in the concrete sidewalk. The pole sustained minor surface scraping, with no fracture and no movement of its foundation (**Figure 2**).

The case vehicle sustained narrow direct contact on the bumper, grille and hood, beginning just right of center (**Figure 3**) and penetrating rearward and slightly rightward, creating a pocket behind the right headlamp/turn signal assembly (**Figure 4**). The hood was crushed rearward, folded upward and displaced to the right (**Figure 5**). Maximum crush was measured as 55 centimeters [21.7 inches] just inboard of the right headlamp/turn signal assembly. The right fender sustained induced damage and the right front tire was restricted due to its being pressed against the trailing edge of the wheel well. There was no other wheel/tire damage. The wheelbase was shortened by 12 centimeters [4.7 inches] on the right and lengthened by 2 centimeters [0.8 inches] on the left. The windshield was cracked across its entire width along the bottom edge with an area of spider web cracking directly above the steering wheel, and there was no other glazing damage.



Figure 3: Case vehicle's entire front

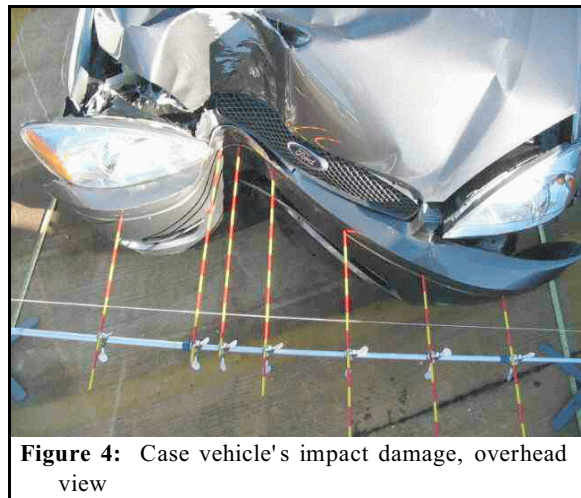


Figure 4: Case vehicle's impact damage, overhead view



Figure 5: Case vehicle's front and right side

The case vehicle's CDC for the pole impact was determined to be **12-FZEN-3 (0)**. The WinSMASH reconstruction program, damage-only algorithm based on the case vehicle's measured crush profile, was used on the case vehicle's impact with the utility pole. The total, longitudinal and lateral delta Vs are, respectively: 37 km.p.h. [23 m.p.h.], -37 km.p.h. [-23 m.p.h.] and 0 km.p.h. [0 m.p.h.]. The pole impact was the most severe and this was a crash of moderate severity (24-40 km.p.h. [15-25 m.p.h.]) for the case vehicle.

Because the case vehicle had fresh swiping-type damage on the left side, the NASS investigator included an event coded as "unknown event or object" in the case structure. The CDC for this event was determined to be **06-LZES-1 (190)**. If this unknown event was part of the collision sequence, it was of very minor severity (**Figure 6**).

Inspection of the case vehicle's interior revealed several points of occupant contact, including a spider-web crack in the windshield directly above the steering wheel (attributed to the driver's head) and to the knee bolster just left of the steering column. The left half of the steering wheel rim was bent forward, measured as 2 centimeters [0.8 inches]. In addition, the mid-portion of the instrument panel was displaced and the center console/transmission selector assembly was measured as having moved 5 centimeters [2.0 inches] leftward.

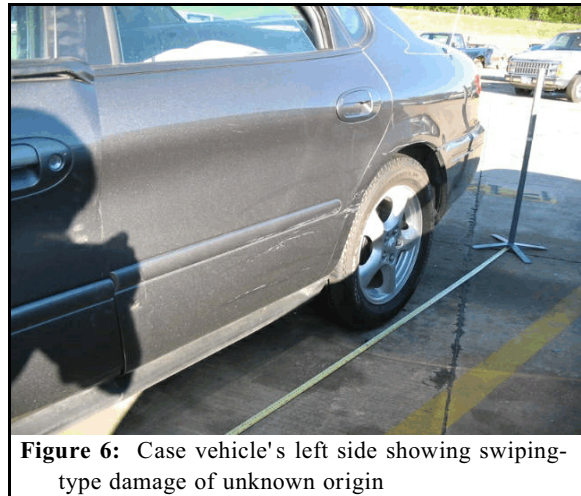


Figure 6: Case vehicle's left side showing swiping-type damage of unknown origin

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with Certified Advanced 208 Compliant (CAC) driver and front right passenger frontal air bags. The driver's air bag deployed as a result of the collision events. There was no passenger in the front right position and the front right air bag, which was mounted in the top of the instrument panel, did not deploy.

The driver's air bag module was mounted in the steering wheel hub, with the flaps arranged in the "H" configuration. The seam across the middle measured 22 centimeters [8.7 inches] horizontally. The upper flap measured 8 centimeters [3.1 inches] vertically and the lower flap measured 10 centimeters [3.9 inches] vertically. The module cover flaps opened at the designated tear points and there was no evidence of damage to the cover flaps or adjacent structures. The driver's air bag was round with a diameter of 55 centimeters [21.7 inches]. There

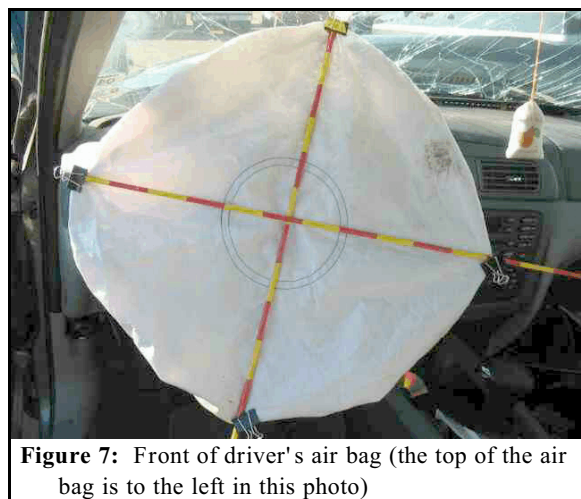


Figure 7: Front of driver's air bag (the top of the air bag is to the left in this photo)

was a small smudge of dirt on the front of the air bag fabric, at approximately the 5:00 position, and the driver's air bag was otherwise not damaged (**Figure 7**). There was no evidence of occupant contact on the driver's air bag.

CASE VEHICLE DRIVER'S KINEMATICS

The case vehicle's driver (51-year-old female, black, non-Hispanic, 168 centimeters, 95 kilograms [66 inches, 210 pounds]) was not restrained by the available, manual, three-point lap-and-shoulder safety belt system. There was no evidence on the safety belt system of use during this crash, the driver did not sustain any safety belt-related injuries and the buckle pretensioner did not actuate. At the time of the vehicle inspection, the driver's bucket seat was found with the seat track adjusted at the full-rearward position and with the seat back adjusted at the full upright position. The autopsy toxicology testing revealed that the driver's blood alcohol concentration (BAC) was 0.18 mg/dl. The driver's pre-crash posture is not known (there were no other occupants in the case vehicle and there were no witnesses to the crash) and she may have fallen asleep and may have been slumped against the steering wheel.

The driver's pre-crash actions are not known. It appears that the case vehicle simply drifted to the right and this gradual motion probably did not affect the driver's posture. The right front wheel mounted the barrier curb while the left front wheel remained in the roadway and the driver probably leaned slightly to the left. The case vehicle's front impacted the timber utility pole, slightly off center to the right, causing the driver's steering wheel-mounted air bag to deploy. The driver moved forward in response to the impact deceleration. Because she was not restrained by the safety belt system, she loaded and then rode down the air bag and her chest impacted the steering assembly. She sustained a fracture of the sternum, a laceration and contusion of the heart, contusions of the lungs bilaterally, fractures of four ribs on the left, a laceration of the spleen, a laceration of the liver, plus contusions and abrasions on her chest and left breast. As she moved forward, her knees impacted the knee bolster and she sustained lacerations on both knees. She also sustained an open fracture of the right ankle, with further details not specified, probably from her foot impacting and flexing against the floor. Her posture at final rest is not known.



Figure 8: Driver's footwell and lower instrument panel

CASE VEHICLE DRIVER'S INJURIES

The driver was transported via ground ambulance to a hospital, where she was declared dead approximately two hours after the crash. Her body was autopsied.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1.	Laceration, heart (myocardium) - full thickness perforation, left ventricle	maximum 441014.6,4	Steering assembly	Certain	Autopsy
2.	Contusion, heart (myocardium)	minor 441002.1,4	Steering assembly	Certain	Autopsy
3.	Bilateral lung contusions	severe 441410.4,3	Steering assembly	Certain	Autopsy
4.	Fracture, left ribs 2 - 4 and 6	serious 450230.3,2	Steering assembly	Certain	Autopsy
5.	Laceration, spleen	moderate 544222.2,2	Steering assembly	Certain	Autopsy
6.	Laceration, liver	moderate 541822.2,1	Steering assembly	Certain	Autopsy
7.	Open fracture, right ankle, not further specified	moderate 852002.2,1	Floor	Certain	Autopsy
8.	Fracture, sternum	moderate 450804.2,4	Steering assembly	Certain	Autopsy
9.	Contusion, central chest	minor 490402.1,4	Steering assembly	Certain	Autopsy
10.	Abrasion, left lower chest/breast	minor 490202.1,2	Steering assembly	Certain	Autopsy
11.	Lacerations, knees bilateral	minor 890602.1,3	Knee bolster	Certain	Autopsy

