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REMOTE AIR BAG REPORT

CASE NUMBER - IN97045
LOCATION - TEXAS
VEHICLE - 1995 CROWN VICTORIA
CRASH DATE - April, 1996

Submitted:

July 24, 1998

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

1. <i>Report No.</i> IN97-045		2. <i>Government Accession No.</i>		3. <i>Recipient's Catalog No.</i>	
4. <i>Title and Subtitle</i> Remote Air Bag Fatality Investigation Vehicle - 1995 Ford Crown Victoria LX Location - Texas			5. <i>Report Date:</i> July 24, 1998		
			6. <i>Performing Organization Code</i>		
7. <i>Author(s)</i> Special Crash Investigations Team #2			8. <i>Performing Organization Report No.</i> Task # 0126		
9. <i>Performing Organization Name and Address</i> Transportation Research Center Indiana University 222 West Second Street Bloomington, Indiana 47403-1599			10. <i>Work Unit No. (TRAIS)</i>		
			11. <i>Contract or Grant No.</i> DTNH22-94-D-17058		
12. <i>Sponsoring Agency Name and Address</i> U.S. Department of Transportation (NRD-32) National Highway Traffic Safety Administration National Center for Statistics and Analysis Washington, D.C. 20590-0003			13. <i>Type of Report and Period Covered</i> Technical Report Crash Date: April, 1996		
			14. <i>Sponsoring Agency Code</i>		
15. <i>Supplementary Notes</i> Remote air bag deployment investigation involving a 1995 Ford Crown Victoria LX, 4-door sedan, with dual air bags, and a 1992 Chevrolet incomplete vehicle fitted with a Boulder Fleetwood motor home					
16. <i>Abstract</i> This report covers an remote investigation of an air bag deployment crash that involved a 1995 Ford Crown Victoria, four-door sedan (case vehicle) and a 1992 Chevrolet incomplete vehicle fitted with a Boulder Fleetwood motor home (vehicle #2). This crash is of special interest because the case vehicle's, restrained, right front passenger, (64-year-old female) sustained fatal brain injuries as a result of impacting her front right passenger air bag. The case vehicle was traveling west in a trailer park, parking lot driveway approaching a STOP sign. The driver intended to exit the parking lot, cross a north/south frontage road, and turn onto a north/south city street that was west of the frontage road. Vehicle #2 was stopped heading westbound at the STOP sign for the city street and was waiting to exit onto the city street. Due to vehicle #2's length, the back end stuck out into the southbound lane of the frontage road. While stopped at the STOP sign for the frontage road, the case vehicle's driver bent forward towards the lower floor pan to secure a washcloth. While leaning forward, the case vehicle's driver inadvertently released the brake pedal and, admittedly, may have depressed the accelerator while reaching for the brake. The case vehicle rolled forward onto the frontage road. The crash occurred in the intersection of the frontage road and the westbound lane of the parking lot driveway. The front of the case vehicle impacted the back of vehicle #2, causing the case vehicle's driver and front right passenger supplemental restraints (air bags) to deploy. The right front passenger in the case vehicle was restrained by her available, active, three-point, lap and shoulder belt, and her feet were resting up against the toe pan. The right front seat track was located in it's forward-most position. She sustained, according to her medical records, fatal brain injuries which included: a nonanatomic brain injury, a large subdural hematoma to her left parietal area, edema and subarachnoid hemorrhage in her left hemisphere, an infarction to her right front lobe, and bilateral intraventricular hemorrhages. In addition, she sustained facial contusions, particularly to her right orbit, and a left posterior parietal scalp laceration. The case vehicle's driver (63-year-old male) was also restrained by his available, active, three-point, lap and shoulder belt. He sustained, according to his medical records, minor injuries which included: abrasions and contusions to his face, trunk contusions, and a laceration to his right upper arm.					
17. <i>Key Words</i> Air Bag Deployment Motor Vehicle Traffic Crash Injury Severity			18. <i>Distribution Statement</i> General Public		
19. <i>Security Classif. (of this report)</i> Unclassified		20. <i>Security Classif. (of this page)</i> Unclassified		21. <i>No. of Pages</i> 6	22. <i>Price</i> \$6,500

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BACKGROUND

This remote report was brought to NHTSA's attention on November 17, 1997 by the relative of the deceased right front passenger involved in this crash. The crash occurred in April, 1996, at 8:18 a.m., in Texas and was investigated by the applicable city police department. This crash involved a 1995 Ford Crown Victoria (case vehicle), and a 1992 Bounder Fleetwood motor home (vehicle #2). This crash is of special interest because the case vehicle's right front passenger (64-year-old female) sustained fatal brain injuries from her deploying front right passenger air bag. This contractor interviewed the daughter of the case vehicle's driver on March 19, 1998. This summary is based on the Police Crash Report, an interview with the daughter of the case vehicle driver's, occupant kinematic principles, occupant medical records, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The case vehicle was traveling west in the westbound lane of a two-lane, undivided, private drive--that was part of the parking lot of a trailer park, and was approaching a STOP sign. The case vehicle came to a stop for the STOP sign just prior to a frontage road. The driver intended to exit the parking lot, cross a north/south frontage road, and turn onto a north/south city street that was west of the frontage road. Vehicle #2 was stopped heading westbound at the STOP sign for the city street, which is west of the frontage road, and was waiting to exit onto the city street. Due to vehicle #2's length, the back end stuck out into the southbound lane of the frontage road. While stopped at the STOP sign for the frontage road, the case vehicle's driver bent forward towards the lower floor pan to put a damp washcloth back into a zip-lock baggie (the case vehicle's driver and right front occupant were departing on a 3,500 mile trip). While temporarily distracted, the case vehicle's driver inadvertently released his foot off the brake pedal while leaning forward and, admittedly, may have depressed the accelerator while reaching back for the brake. The case vehicle subsequently rolled forward onto the frontage road. The case vehicle's driver was unaware of his vehicles forward movement until he impacted the back of the motor home. The crash occurred in the intersection of the frontage road and the westbound lane of the parking lot driveway.

The front of the case vehicle impacted the back of vehicle #2, causing the case vehicle's driver and front right passenger supplemental restraints (air bags) to deploy (see **Figures #1-4**). The crash severity to the case vehicle was low (9-14 m.p.h.).



Figure #1: Case vehicle's frontal damage viewed from left;
Note: front end being repaired

CASE VEHICLE

The case vehicle was a rear wheel drive 1995 Ford Crown Victoria LX, four-door sedan (VIN: 2FALP74W55X-----), and was equipped with anti-lock brakes. The case vehicle was towed due to damage. The case vehicle was almost totally disassembled for repair, but the damaged components were photographed (see **Figures #2-4**). The damage to the case vehicle was primarily above the bumper (underride type) indicating the case vehicle's air bag sensor, located in the center radiator support, was directly contacted resulting in not only the air bags deployment but an elongated delta T. The bumper fascia does show some direct contact (see **Figure #2**). Based on the one interior photo, there was no passenger compartment integrity loss, nor any intrusion. All the doors remained closed and operational. Based on the available photographs of the case vehicle, the CDC was determined to be: **12-FDEW-1** [maximum crush was estimated at 7 centimeters (2.75 inches)]. No reconstruction program was used on this crash because the NASS, CDS, WinSmash 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 equipped with a split bench in the front row. Presumably the back seat was equipped with a nonadjustable bench seat. The front and rear outboard seats were equipped with active, three-point lap and shoulder belts with a two-point manual lap belt in the front and rear center seat positions. The vehicle was equipped with driver and front right passenger supplemental restraints (air bags). The driver's air bag was located in the steering wheel hub with the front right passenger air bag located in the front of the right dash. The driver's cover flap configuration is unknown while the front right air bag module's cover flap was a single flap configuration hinged at the top/forward part of the module. Based on the one interior photograph (see **Figure 5**), it is unknown whether either bag was vented or tethered or if either cover flap was contacted; although, there does appear to be something on the front right air bag module's cover flap (possibly air bag exhaust).

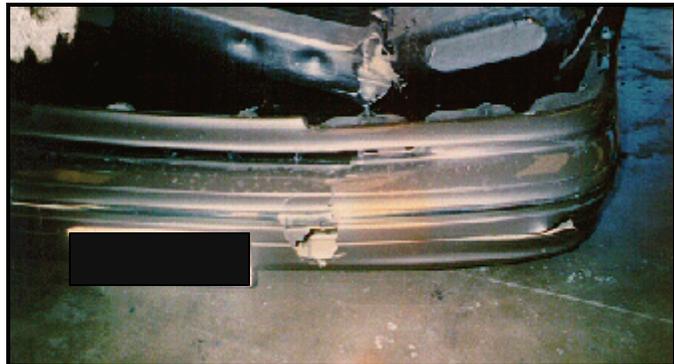


Figure #2: Direct damage to case vehicle's bumper fascia



Figure #3: Remainder of case vehicle's grille



Figure #4: Direct damage to case vehicle's hood

CASE VEHICLE'S RIGHT FRONT PASSENGER

The case vehicle's right front passenger [163 centimeters and 61 kilograms (64 inches, 135 pounds)] was restrained by her available, active, three-point, lap and shoulder belt. The front right passenger air bag was located in the front of the right dash. As previously mentioned, there appeared to be possible evidence of contact on the front right air bag module's cover flap (see **Figure #5**). This was later discounted since the passenger did not sustain any injuries that could be related to the cover flap. There was no mention in this occupant's medical records of belt pattern bruising and/or abrasions to the right front passenger's body.

Immediately prior to the crash the case vehicle's right front passenger was seated slightly reclined with her back against the seat back, both legs were outstretched so that her feet were braced against the fire wall (toe pan), her left hand was on her lap, and her right hand was on the door's armrest. Her seat track was located in its forward-most position, in order for her short legs to reach the firewall and be slightly elevated.

The case vehicle's driver made no pre-crash avoidance maneuvers. As a result of this, the right front passenger most likely remained in her pre-crash position just prior to impact. The case vehicle's impact with vehicle #2, not only deployed the front right air bag, but thrust the right front passenger forward. Due to the passenger's close proximity to the deploying air bag (seat track at the full forward position), her head absorbed a large portion of the air bags deployment forces. The passenger's use of her three-point lap and shoulder belt had little affect on her forward movement due to her close proximity to deploying air bag. The deploying air bag thrust the passenger upwards toward the roof and backwards into her seat back. At some point during this passenger's backwards thrust her left wrist, which was previously broken and outfitted with a fixator splint, was thrown to the left and back into the driver's right shoulder leaving two puncture wounds. The passenger rebounded back forward but was held back by her three-point seat belt. At final rest the right front passenger was seated upright with her head tilted downward. This contractor suspects that the right front passenger may have attempted to assist the driver. As a result she had her head turned downward and to the left, and subsequently, she was closer to the air bag module prior to impact. This scenario would explain why the right front passenger did not observe the back of the motor home and warn the driver.



Figure #5: Interior of case vehicle's showing deployed air bags; Note: broken piece of dash trim on seat and unknown mark on front right air bag module's cover flap.

The right front passenger was transported by ambulance to the hospital. She sustained fatal head injuries and was pronounced brain dead eight days post-crash. According to her medical records, the right front passenger sustained: a nonanatomic brain injury, a large subdural hematoma to her left parietal area, edema and subarachnoid hemorrhage to her left hemisphere, an infarction to her right front lobe, and bilateral intraventricular hemorrhages. In addition she sustained facial contusions, particularly to her right orbit (i.e., her head was turned slightly to the left), and a left posterior parietal scalp laceration.

RIGHT FRONT PASSENGER INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Nonanatomic brain injury with coma and unresponsive to painful stimuli, decorticate and decerebrate posturing	160214.5 critical	Air bag, front right passenger's	Probable	Hospitalization records
2	Hematoma, large (3 centimeters--11 grams), subdural--to left parietal skull	140656.5 critical	Roof ¹	Possible	Hospitalization records
3	Edema throughout left parietal lobe with 1 centimeter midline shift to right	140668.3 serious	Roof ²	Possible	Hospitalization records
4	Infarction right frontal lobe and in basal ganglia	140676.3 serious	Air bag, front right passenger's	Possible	Hospitalization records
5 6	Hemorrhage, intraventricular in bilateral occipital horns	140678.4 140678.4 severe	Air bag, front right passenger's	Probable	Hospitalization records
7	Hemorrhage, subarachnoid left parietal area	140684.3 serious	Air bag, front right passenger's	Probable	Hospitalization records
8	Contusion { <i>ecchymosis</i> }, generalized, face	290402.1 minor	Air bag, front right passenger's	Certain	Hospitalization records

¹ This occupant had no *cited* cervical or thoracic cavity injuries. In this contractor's opinion, the lesion that caused her death was the cerebral edema. The Death Summary indicated that "the pressure { in her brain } started to increase and not even barbiturates could control the intracranial pressure"; this occupant was pronounced "brain dead" eight days post-crash. The cerebral edema is likely a direct byproduct of the large left parietal subdural hematoma which was caused by an impact to her posterior scalp. Even though her subdural was evacuated, the edema process took over and could not be reverse. Although, it is very difficult to determine which brain lesions resulted from the air bag per se and which resulted from an impact with an interior vehicular surface, if you apply the "**but for**" test (i.e., but for the deployment of the air bag), this occupant "died" because of the deploying air bag.

² The following material is taken from the book: FORENSIC PATHOLOGY by Dominick J. DiMaio and Vincent J.M. DiMaio, CRC Press, Ann Arbor, 1993; Chapter Six: Trauma to the Skull and Brain: Craniocerebral Injuries, ***Traumatic Brain Swelling and Edema***, page 165.

Following significant head injury, whether clinically mild or severe, swelling of the brain may occur. Brain swelling may be focal, adjacent to an area of brain injury; be diffuse, involving both cerebral hemispheres; or involved only a single hemisphere. This latter condition is seen most commonly following evacuation of an acute subdural hematoma and involves the ipsilateral hemisphere. The secondary swelling may, in fact, cause a more serious mass effect than the original hematoma.

BRAIN SWELLING can be due to either **an increase in intravascular cerebral blood volume secondary to vasodilation or an absolute increase in the water content of the brain tissue**. This latter condition is called **CEREBRAL EDEMA** and is often incorrectly considered synonymously with brain swelling. If continued long enough, brain swelling due to an increase in the intravascular cerebral blood volume progresses to cerebral edema, presumably due to increased vascular permeability. The magnitude of the brain swelling does not necessarily correspond to the severity of the injury.

The following term is defined in DORLAND'S ILLUSTRATED MEDICAL DICTIONARY as follows:

ipsilateral (*ip''sī-lat''lār-al*): situated on, pertaining to, or affecting the same side, as opposed to contralateral.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
9	Contusion { <i>ecchymosis</i> } right orbital area	297402.1 minor	Air bag, front right passenger's	Certain	Hospitalization records
10	Laceration, "L"-shaped left posterior parietal scalp	190600.1 minor	Roof	Possible	Hospitalization records

CASE VEHICLE DRIVER

The case vehicle's driver [63-year-old male, 178 centimeters and 100 kilograms (70 inches, 220 pounds)] was restrained by his available, active, three-point, lap and shoulder belt.

Immediately prior to the crash, the case vehicle's driver was leaning fully forward towards the center dash, near the drive train hump. His left foot was in the air; his right foot was either on the accelerator or in the air, his left hand on the steering wheel (unknown location), and his right hand was reaching down having just finished putting a washcloth in a zip-lock baggie. His seat track was located between its middle and rearmost positions, the seat back was slightly reclined, and the tilt steering wheel was located between its middle and down-most positions.

The case vehicle's driver was transported by ambulance to the hospital. He sustained minor injuries and was treated and released. The injuries sustained by the case vehicle's driver included: abrasions and contusions to his face, trunk contusions, and a laceration to his right upper arm.

DRIVER INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Contusion over sternal area of chest	490402.1 minor	Air bag, driver's side	Probable	Emergency room records
2	Contusion over left upper quadrant of abdomen	590402.1 minor	Air bag, driver's side	Probable	Emergency room records
3	Abrasion neck, location not specified	390202.1 minor	Air bag, driver's side	Probable	Interviewee (relative)
4	Contusion neck, location not specified	390402.1 minor	Air bag, driver's side	Probable	Interviewee (relative)
5	Abrasion left shoulder	790202.1 minor	Air bag, driver's side	Probable	Interviewee (relative)
6	Contusion left shoulder	790402.1 minor	Air bag, driver's side	Probable	Interviewee (relative)
7	Laceration {puncture x 2} right upper arm	790600.1 minor	Other occupant (i.e., fixator on left wrist of right front occupant)	Probable	Interviewee (relative)

VEHICLE #2

Vehicle #2 is a 1992 Chevrolet incomplete vehicle fitted with a Bounder Fleetwood motor home (VIN³: 1GBKP37N8N3-----). Vehicle #2 was driven from the scene. No other information is available on this vehicle.

³ The Police Crash Report indicated that the VIN was: 1GBKP37N8N2-----; however, according to NICB this VIN failed because the Assembly Plant was not possible for this type of vehicle. In addition, the Check Digit did not compute correctly and the Sequence Number was out of range. Following the NICB Help utility, the only valid digit for the Assembly Plant was a "3". After making this change and changing the first digit of the Sequence Number, the VIN passed the edit checks. This contractor considers the listed VIN to be correct and the police reported VIN to be in error.