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REMOTE AIR BAG DEPLOYMENT REPORT

CASE NUMBER - IN99-033

LOCATION - Texas

VEHICLE - 1998 PONTIAC SUNFIRE

CRASH DATE - March 1998

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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 investigation involving a 1998 Pontiac Sunfire equipped with manual safety belts and dual redesigned front air bags, and a fixed object (large tree)					
16. <i>Abstract</i> This report covers a remote investigation of an air bag deployment crash that involved a 1998 Pontiac Sunfire that impacted a large tree. This crash is of special interest because the case vehicle was equipped with redesigned air bags that deployed as a result of the collision events. There were two unrestrained passengers sitting side-by-side in the front right bucket seat (16-year-old female and 12-year-old male). The 16-year-old sustained fatal injuries resulting from blunt force compression of her chest and abdomen, probably due to contact with the instrument panel. The 12-year-old sustained fatal skull and brain injuries, probably due to contact with the right A-pillar. The case vehicle was traveling east at high speed in the eastbound lane of an undivided two-lane local street (posted speed limit 48 km.p.h. [30 m.p.h.]). The case vehicle drifted off the right (south) road edge and the front right corner impacted a large tree, causing the case vehicle's driver and front right passenger air bags to deploy. There is no mention in the Police Crash Report that the driver attempted any specific avoidance actions and there is no other evidence. The case vehicle rotated approximately 30 degrees clockwise and came to rest with the front right wheel on the shoulder and the front left and both back wheels in the roadway. The crash severity for the case vehicle was high (greater than 40 km.p.h. [25 m.p.h.]). The pre-crash posture of the two front right passengers is not known except that neither was in a normal passenger posture due to their seating arrangement and neither was restrained by the available manual three-point lap-and-shoulder safety belt system. The 16-year-old sustained lacerations of the myocardium and pericardium, multiple rib fractures, multiple lacerations of the liver and spleen, and other injuries. She was declared dead at the scene and did not receive any medical treatment. The 12-year-old sustained a basilar skull fracture, uncal herniation of the hippocampus, diffuse edema of the brain, and other injuries. He was declared dead seven days post-crash. The driver and three back seat passengers survived.					
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There are no photographs included in this report because of the very poor quality of the original photographs. The three original on-scene police photographs are available in SCI EDCS case IN99-033.

BACKGROUND

IN99-033

This case was brought to the NHTSA's attention by a review of the 1998 Fatality Analysis Reporting System (FARS) in February 1999. The crash involved a 1998 Pontiac Sunfire (case vehicle) and a large tree. The crash occurred in March 1998, at 1:04 p.m., in Texas, and was investigated by the applicable county police. This case is of special interest because the case vehicle was equipped with redesigned air bags that deployed as a result of the collision events. Two unrestrained passengers who were sharing the front right passenger seat (16-year-old female and 12-year-old male) were both killed. The Police Crash Report was received in March 1999. Coroner's reports of complete autopsies for the two victims were received in April. Police photographs were also received in April, but they were underexposed, showing only dim, vague images. Inquiries to the insurance company revealed that no other photographs are available. This report is based on the Police Crash Report, limited information from the poor-quality photographs, the autopsy reports, occupant kinematic principles, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The case vehicle was traveling east at high speed in the eastbound lane of an undivided two-lane local street. It was daylight, the weather was clear and the bituminous road surface was dry and without defects. There were no traffic controls other than painted white edge lines and a single, solid yellow centerline. The posted speed limit was 48 km.p.h. (30 m.p.h.). According to the Police Crash Report, the case vehicle drifted off the right (south) road edge and did not recover in time to avoid the crash. There is no mention in the Police Crash Report that the driver attempted any specific avoidance actions and there is no other evidence.

The crash occurred on the right (south) shoulder. The front right corner of the case vehicle impacted a large tree that was approximately 1.2 meters (4 feet) south of the south pavement edge (i.e., in the shoulder), causing the driver and front right passenger air bags to deploy. The case vehicle rotated approximately 30 degrees clockwise and came to rest with the front right wheel on the shoulder and the front left and both back wheels in the roadway.

CASE VEHICLE

The case vehicle was a front-wheel-drive 1998 Pontiac Sunfire five-passenger two-door coupe (VIN: 1G2JB1241W7-----), equipped with a 2.2 liter L4 engine and with the transmission selector lever mounted as part of a center console (unknown if automatic or manual). Four wheel anti-lock brakes are standard for this model vehicle. The case vehicle's wheelbase was 264 centimeters (104.1 inches). The odometer reading is not known.

The available photographs do not enable a thorough appreciation of the scene or the case vehicle's damage. It appears that there was a drop-off from the bituminous road surface to the gravel shoulder such that, with the left wheels on the pavement and the right wheels on the shoulder, the case vehicle was tilted to the right at the moment of impact. The front right corner impacted the tree in the manner of a narrow end engagement (i.e., direct contact included the corner and was less than 41 centimeters [16 inches] wide) and probably pitched forward. The right front wheel was pushed rearward against the right lower A-pillar;

the A-pillar was pushed rearward; the windshield header, right roof rail and roof were buckled; the right door opening was distorted and the door came open; and the windshield was shattered across its entire width. There was induced damage across the entire front, with the right side of the hood crushed against the windshield. The available photographs do not provide sufficient evidence to estimate a CDC (a “best guess” might be 12-FRAE-6). There is not sufficient evidence to permit a Delta V reconstruction. The crash severity for the case vehicle was high (greater than 40 km.p.h. (25 m.p.h.)).

The interior of the case vehicle is not visible, except that the front right seat appears to be out of position, as might be seen if the floor pan had buckled. In addition, the deployed front right air bag can be seen.

CASE VEHICLE DRIVER

The case vehicle driver (18-year-old male, race, height and weight unknown) was not restrained by the available manual three-point lap-and-shoulder safety belt system. His pre-crash posture and seat adjustments are not known. He sustained police-reported “A” (incapacitating) injuries and was transported via ambulance to a hospital. He survived the crash, but his treatment status and injuries are unknown.

CASE VEHICLE FRONT RIGHT PASSENGERS

There were two passengers sharing the front right bucket seat. The Police Crash Report designates these two as “front right left” (occupant #2) and “front right right” (occupant #3). The pre-crash seat adjustments and postures are not known, except to note that they were sitting side-by-side in the front right bucket seat.

OCCUPANT #2

Occupant #2 (16-year-old female, White (unknown if Hispanic), 156 centimeters, 49 kilograms [61 inches, 107 pounds]) was not restrained by the available manual three-point lap-and-shoulder safety belt system. According to the Police Crash Report, she was the inboard passenger in the shared bucket seat. She was declared dead at the scene and was transported directly to the morgue.

Because this out-of-position occupant’s posture is not known (i.e., on the console? turned to the right? etc.) and because there is no information regarding the interior of the case vehicle, a fully-developed kinematic reconstruction will not be attempted. She sustained: lacerations of the myocardium and pericardium; fractures of ribs 1 through 10 on the left with 500 ml. left hemothorax; multiple lacerations of the spleen and of the liver; fractures of the left tibia and fibula; and abrasions on her nose, around her mouth, on her left shoulder and on both legs. The presence of injuries on the left side is suggestive that she may have been turned to her right in the shared seat. The force of the impact probably caused her to move forward and upward. She probably encountered the left side of the deploying front right passenger air bag. Her injuries are consistent with blunt force compression of her chest and abdomen, suggesting that she was thrown against front components of the passenger compartment, possibly the center of the instrument panel, and perhaps including interactions with the center console.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Lacerations of the myocardium: left atrium, right atrium and right ventricle	441016.6 untreatable	Center instrument panel	Possible	Autopsy
2	Fractures of left ribs 1 through 10 with 500 ml left hemothorax	450232.4 severe	Center instrument panel	Possible	Autopsy
3	Multiple lacerations of the liver capsule and parenchyma	541824.3 serious	Center instrument panel	Possible	Autopsy
4	Multiple lacerations of the spleen capsule and parenchyma	544224.3 serious	Center instrument panel	Possible	Autopsy
5	Laceration of the pericardium	441602.2 moderate	Center instrument panel	Possible	Autopsy
6	fracture left fibula NFS	851605.2 moderate	Right instrument panel and below	Possible	Autopsy
7	fracture left tibia NFS	853404.2 moderate	Right instrument panel and below	Possible	Autopsy
8	abrasions, nose and around the mouth on the left	290202.1 minor	Passenger's air bag	Possible	Autopsy
9	abrasions, left shoulder	790202.1 minor	Passenger's air bag	Possible	Autopsy
10	abrasions, right lower leg and left knee	890202.1 minor	unknown	unknown	Autopsy

OCCUPANT #3

Occupant #3 (12-year-old male, White (unknown if Hispanic), 163 centimeters, 45 kilograms [64 inches, 99 pounds]) was not restrained by the available manual three-point lap-and-shoulder safety belt system. According to the Police Crash Report, he was the outboard passenger in the shared bucket seat. He was transported to a hospital via helicopter. He survived for seven days, was declared dead and his usable organs were harvested.

Because this out-of-position occupant's posture is not known (i.e., turned to the left? turned to right? etc.) and because there is no information regarding the interior of the case vehicle, a fully-developed kinematic reconstruction will not be attempted. The coroner's death report indicates that he was partially ejected, with his "upper torso out of the right front," but the Police Crash Report indicates that he was not ejected, neither fully nor partially. He sustained: a basilar skull fracture through the left and right middle cranial fossae; uncal herniation of the hippocampus on the left; diffuse edema of the brain with the entire

brain substance soft and necrotic; subarachnoid hemorrhage in the left occipital lobe; subscapular hemorrhage in the left frontal and left occipital regions; fractures of the right tibia and fibula; and a contusion on his right knee. The force of the impact probably caused him to move forward and upward. He probably encountered the right side of the deploying front right passenger air bag. His head probably impacted front structures in the passenger compartment, possibly the intruding right upper A-pillar or windshield header, causing the skull and brain injuries.

CASE VEHICLE OCCUPANT #3'S INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Diffuse edema of the brain (entire brain substance necrotic)	140674.5 critical	Right A-pillar	Possible	Autopsy
2	Uncal herniation of the hippocampus	140202.5 critical	Right A-pillar	Possible	Autopsy
3	Basilar skull fracture involving left lateral sphenoid, midportion of the sphenoid near the sella turcica and the right lateral sphenoid, NFS	150200.3 serious	Right A-pillar	Possible	Autopsy
4	Subarachnoid hemorrhage, left occipital region	140684.3 serious	Right A-pillar	Possible	Autopsy
5	Subscapular hemorrhage, left frontal and left occipital	190402.1 minor	Right A-pillar	Possible	Autopsy
6	Pulmonary contusions, NFS	441402.3 serious	Right instrument panel	Possible	Autopsy
7	Fracture, right fibula, midshaft	851606.2 moderate	Right instrument panel and below	Possible	Autopsy
8	Fracture, right tibia, midshaft	853420.2 moderate	Right instrument panel and below	Possible	Autopsy
9	Contusion, right knee	890402.1 minor	Right instrument panel and below	Possible	Autopsy

OTHER OCCUPANTS

There were three other occupants, all in the second seat row. From left to right they were: a 15-year-old male, a 14-year-old female and a 16-year-old male. The two males sustained police-reported "A" (incapacitating) and the female sustained "B" (evident but non-incapacitating) injuries. All three were transported to a hospital. Their treatment status and injuries are unknown.

OBJECT CONTACTED

IN99-033

The case vehicle impacted a large tree with diameter approximately 60 centimeters (24 inches) at the point of impact. The tree was in the shoulder, close to the roadway pavement. There is no evidence that the tree moved or fractured.