
# REMOTE REDESIGNED AIR BAG REPORT

CASE NUMBER - IN97-048
LOCATION - MISSOURI
VEHICLE - 1998 FORD RANGER XL PICKUP TRUCK
CRASH DATE - November, 1997

Submitted:

January 22, 1999

Contract Number: DTNH22-94-D-17058

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National Center for Statistics and Analysis
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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 Ford Ranger XL pickup, with manual safety belts and dual front air bags, which ran-off-road and impacted two roadside objects

16. *Abstract*

This report covers a remote investigation of an air bag deployment crash that involved a 1998 Ford Ranger XL, pickup truck (case vehicle), which ran-off-road and impacted two roadside objects. This crash is of special interest because the case vehicle was equipped with redesigned air bags and the unrestrained driver (18-year-old male) allegedly sustained an eye injury from his deploying driver air bag. The case vehicle was traveling south in the southbound lane of a two-lane, undivided, county roadway. In this contractor's opinion, as the case vehicle entered a left-hand curve it went off the west side of the roadway, enabling its right-side wheels to drop off the west pavement edge. The case vehicle struck an orange construction barrel. As a result, the case vehicle's driver steered left, causing the case vehicle to rotate counterclockwise. The front right corner and undercarriage of the case vehicle impacted a tree stump, causing the case vehicle's driver and front right passenger supplemental restraints (air bags) to deploy. The case vehicle's driver was seated with his seat track located in its rearmost position, and the location of the tilt steering wheel is unknown. He was not wearing his available, active, three-point, lap and shoulder belt and sustained, according to his interview, minor injuries which included: blunt head trauma and periorbital contusions to his eyes (i.e., black eyes).

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## BACKGROUND

IN97-048

This remote report was brought to NHTSA's attention on December 2, 1997, by GES sampling activities. The crash involved a 1998 Ford Ranger XL pickup (case vehicle) which ran-off-road and impacted two roadside objects. The crash occurred in November, 1997, at 3:00 a.m., in Missouri and was investigated by the applicable city police department. This crash is of special interest because the case vehicle was equipped with redesigned air bags and the unrestrained driver (18-year-old male) allegedly sustained an eye injury from his deploying driver air bag. This contractor contacted the investigating law enforcement agency in mid-December, 1997, and conversed with the investigating police officer on April 6, 1998. After numerous attempts and a certified letter, the case vehicle's driver was interviewed on October 16, 1998. Insurance company photographs of the case vehicle were obtained in March, 1998. This report is based on the Police Crash Report, a conversation with the investigating police officer, an interview with the case vehicle's driver, insurance company photographs, self-reported injury information, and this contractor's evaluation of the evidence.

## CRASH CIRCUMSTANCES

**Figure 1:** Case vehicle's frontal damage; Note: position of right front tire and right fender damage (case photo #01)

The case vehicle was traveling south in the southbound lane of a two-lane, undivided, county roadway and intended to continue its southerly travel path. It was raining at the time of the crash, and the asphalt pavement was wet. The level roadway had a left curve of unknown radius. It was dark, with no lights. There was a warning sign (construction ahead) and no vision obstructions. Traffic density was light. There are two descriptions of this crash that cannot be completely reconciled. The Police Crash Report indicated that, as the case vehicle entered a left-hand curve, the driver downshifted gears, causing the vehicle to begin sliding sideways on the wet pavement and travel off the road. According to the case vehicle's driver, as the case vehicle entered a left-hand curve, its right-side wheels dropped off the west pavement edge. In either scenario, the crash occurred off the west (right) side of the road.

In this contractor's opinion, the case vehicle struck an orange construction barrel[1] (interviewee) located on the west roadside. As a result, the driver steered left in an attempt to reenter the roadway, but instead, the case vehicle slid on the wet road/roadside, rotated counterclockwise, and traveled off the west side of the road. The front right corner and undercarriage (**Figure 1** above) of the case vehicle

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[1] According to the case vehicle's driver, he was very intoxicated. It is entirely possible, in this contractor's opinion, that the case vehicle's driver fell asleep. Most likely he was awakened when either the right-side tires dropped off the pavement edge or he struck an orange construction barrel. The crash did occur in an area where road construction was on-going, but because of the vehicle fire, any paint markings associated with the barrel impact were destroyed.

impacted a tree stump[2] (Police Crash Report), causing the case vehicle's driver and front right passenger supplemental restraint systems (air bags) to deploy. The available evidence suggests that the case vehicle's deployment impact resulted from striking the tree stump because the right front axle was snagged and displaced rearwards toward the lower "A" pillar (**Figure 2**). After its impact with the tree stump, the case vehicle rotated counterclockwise and slid down into a dry creek bed. Unfortunately, there is no information as to the severity of the elevation change from the roadway surface to the creek bed. The case vehicle caught fire (**Figure 3**), for unknown reasons (a Response Report by the fire department did not identify the fire's cause), and destroyed the vehicle's engine compartment (**Figure 4**) and passenger interior, including any air bag or contact evidence (**Figure 5** below). Unknown as well is the case vehicle's pre-impact travel speed. The posted speed limit for this roadway was 56 km.p.h. (35 m.p.h.).

**Figure 2:** Case vehicle's front right damage; Note: direct damage to right front wheel rim and minimal fire damage to right front door (case photo #05)

**Figure 3:** Case vehicle's fire damage; Note: paint on truck bed has only minor damage (case photo #02)

**Figure 4:** Fire damage to case vehicle's engine com-partment, viewed from right side (case photo #06)

## CASE VEHICLE

The case vehicle was a rear wheel drive, 1998 Ford Ranger XL, 4x2, two-passenger, regular cab pickup truck (VIN: 1FTYR10C3WU------) equipped with a 2.5L, EFI-SOHC, I-4 engine, a five-speed manual transmission, and two-wheel, anti-lock brakes. The case vehicle's wheel base was 283

[2] A conversation with the investigating police officer did not improve information concerning the height of the tree stump or the slope to, and depth of, the creek bed.

centimeters (111.6 inches), and odometer information was unavailable. The case vehicle was towed due to disabling damage. Available insurance company photographs indicate that the case vehicle had been partially disassembled in the salvage yard; the hood and right front fender were missing (**Figure 1** above). Damage to the case vehicle included: the front bumper, the front grille, the front right headlamp assembly, the radiator frame, the right fender and frame, and the right front wheel (**Figure 2**). The case vehicle's fire began, most likely, under the hood, destroying the engine compartment (**Figure 4**), damaging both front tires (**Figure 2** and **Figure 5**), and gutting the interior: including greenhouse, steering wheel, instrument panel (**Figure 6**), and seating area (**Figure 7**). Those same insurance photographs provided no detectable evidence of passenger compartment integrity loss, nor any intrusion. Both doors remained closed and operational. Most likely all window glass disintegrated because of the fire (**Figure 8** below).

**Figure 5:** Fire damage to case vehicle's left front tire (case photo #03)

The insurance company photographs enabled the CDC for the case vehicle's primary impact to be estimated as: **02-FREN-2.** No reconstruction program was used on this crash because the WinSMASH protocol requires that actual vehicular crush measurements be obtained; however, this contractor's visually estimated Delta V is between 14 km.p.h. (9 m.p.h.) and 23 km.p.h. (14 m.p.h.).

The case vehicle was equipped with front bucket seats and folding backs. The front outboard seat positions were equipped with active, three-point, lap and shoulder belts (**Figure 7**). The case vehicle was equipped with driver and front right passenger supplemental restraints (air bags). From a Ford Motor Company brochure, the driver's air bag was located in the steering wheel hub and the front right passenger air bag was located in the middle of the instrument panel. It was determined from the brochure that the driver module's cover flap is a symmetrical "H" configuration, while the front right passenger air bag module's cover flap is of the single, large variety (unknown if it is hinged or tethered). Because of the fire, it is unknown whether either air bag was vented or tethered, or whether the driver cover flap or air bag fabric contained contact evidence.

**Figure 6:** Fire damage to case vehicle's driver seating area, including steering wheel, dash, and instru-ment panel (case photo #07)

**Figure 8:** Case vehicle's back and right side; Note: backlite glazing gone and undamaged truck bed (case photo #04)

## CASE VEHICLE'S DRIVER

The case vehicle's driver [180 centimeters and 77 kilograms (71 inches, 170 pounds)] was not wearing his available, active, three-point, lap and shoulder belt. In addition, the driver made no mention of any belt pattern bruising and/or abrasions to his torso. Immediately prior to the crash, the case vehicle's driver indicated he was seated in an upright posture 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. He also said that his seat was adjusted to its rearmost track position, and his seat back was slightly reclined. He could not recall the position of his tilt steering wheel.

The case vehicle's driver made no avoidance maneuvers just prior to the crash. The impact with the orange construction barrel most likely had a negligible effect on the driver's posture. After the initial impact, the driver steered leftward. As a result of the left steering maneuver and the nonuse of his available safety belts, he most likely moved slightly toward his right just prior to the primary impact. The case vehicle's impact with the tree stump, not only deployed the driver and front right passenger air bags, but thrust the driver forward and rightward. The deploying driver air bag reportedly struck the case vehicle's driver in the face and rendered him unconscious for an unspecified period of time. The driver's movements inside the vehicle between the primary impact and final rest are unknown. The driver remembers waking up and seeing smoke coming out of the front hood. He does not remember his body position, but he does recall exiting through the left front door under his own power. The driver's recollection was, in this contractor's opinion, most likely tempered by the involvement of alcohol in this crash.

**Figure 7:** Fire damage to case vehicle's front seats; Note: integral head restraint frames and adjustable shoulder belt anchorage (case photo #08)

## CASE VEHICLE DRIVER INJURIES

Available information indicates that the driver was neither transported by ambulance to a hospital nor later sought medical attention from another source, yet the Police Crash Report indicated that he sustained "evident-not disabling" injuries. The Police Crash Report indicated "that the air bags in his vehicle struck him in his eyes causing a mild injury." The case vehicle's driver reported contused eyes ("black eyes") as his only crash-related injury and, as indicated above, he alleged that he was knocked unconscious.

| Injury Number | Injury Description (including Aspect) | NASS Injury Code & AIS 90 | Injury Source (Mechanism) | Source Confidence | Source of Injury Data |
|---|---|---|---|---|---|
| 1 | Blunt head trauma (nonanatomic brain injury alleged) | 115099.7 unknown | Unknown contact mechanism | Unknown | Interviewee (same person) |
| 2 | Contusions, bilateral, periorbital | 297402.1 minor | Air bag, driver's | Possible | Interviewee (same person) |