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# ON-SITE ALLEGED INADVERTENT AIR BAG DEPLOYMENT INVESTIGATION

CASE NUMBER - IN97-010
LOCATION - TEXAS
VEHICLE - 1995 DODGE NEON
CRASH DATE - February, 1997

Submitted:

December 3, 2002


Contract Number: DTNH22-94-D-17058

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
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*
On-site investigation of an alleged inadvertent air bag deployment involving a 1995 Dodge Neon, four-door sedan, with manual safety belts and dual front air bags.

16. *Abstract*
This report covers an on-site investigation of an alleged inadvertent air bag deployment that involved a 1995 Dodge Neon (case vehicle). This crash is of special interest because the case vehicle's driver and front right passenger air bags are alleged to have deployed inadvertently. This contractor's assessment indicates that the alleged inadvertent air bag deployment was an impact-related deployment. According to the Police Crash Report and the driver (27-year-old female), the case vehicle was traveling south in the southbound lane of a city street, negotiating a left curve and approaching a Tee intersection. The driver intended to turn left at the intersection. It was snowing and there was no other traffic present. As the driver was executing the left turn maneuver, the driver and front right passenger air bags deployed for no apparent reason. The driver lost control of the vehicle following the deployment of his air bag and impacted the curb on the north side of the east-west street. The Police Crash Report depicts the case vehicle as headed east at final rest with its left front wheel against the curb.

The available evidence is not consistent with the foregoing crash scenario. The case vehicle did sustain an undercarriage impact in the area of the right front wheel and steering mechanism that was, in this contractor's opinion, sufficient to deploy the air bags. The investigation indicates that as the case vehicle's driver attempted to negotiate the left curve in the snow, the case vehicle skidded straight through the curve and impacted the west curb with the right front wheel/undercarriage, causing the air bags to deploy. The case vehicle's driver most likely over steered the case vehicle back onto the roadway, causing the case vehicle to rotate counterclockwise. The case vehicle skidded through the intersection, entered the east-west roadway, and slid across the east-west roadway–while rotating counterclockwise. The case vehicle's left front wheel scraped along the north curb before the case vehicle came to rest heading east.

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This on-site investigation was brought to the NHTSA's attention on March 6, 1997 by NASS/GES sampling activities. This incident involved a 1995 Dodge Neon, four-door sedan (case vehicle). The crash occurred in February, 1997, at 5.43 p.m., in Texas and was investigated by the applicable city police department. This incident is of special interest because the case vehicle's driver and front right passenger air bags are alleged to have deployed inadvertently. The case vehicle's driver (27-year-old female) was interviewed on March 10, 1997 and the Police Crash Report was received on March 12, 1997. An abbreviated on-site investigation was conducted on March 20, 1997. Because the driver/owner would not sign an authorization for a vehicle inspection, the dealership where the case vehicle was stored would not permit a complete inspection. It was learned that the Chrysler Motor Corporation had sent an investigator to inspect the case vehicle and evaluate the claim of an inadvertent air bag deployment. A supervisor at Chrysler's Special Investigations division was interviewed on April 28, 1997. The case vehicle's driver would not sign an authorization to release the medical information and no official medical data have been received. The investigating police officer declined to discuss the crash. The available evidence is not consistent with the crash scenario described on the Police Crash Report and by the case vehicle's driver. In this contractor's opinion, based on previous Special Crash Investigations that involved undercarriage damage patterns that resulted in air bag deployment, the case vehicle did sustain an undercarriage impact that was sufficient to deploy the air bags. This contractor's assessment is that the alleged inadvertent deployment was an impact-related, air bag deployment.

## CRASH CIRCUMSTANCES

According to the Police Crash Report and the driver's interview, the case vehicle was traveling south in the southbound lane of a two-lane city street, negotiating a left curve and approaching a Tee intersection with another city street (**Figure 1**). The driver intended to turn left at the intersection and travel east. It was snowing and there was no other traffic present. As the driver was executing the left turn maneuver, the driver and right front passenger air bags deployed for no apparent reason. The driver claims that she lost control of the vehicle following the inadvertent air bag deployment and impacted the curb on the north side of the east-west street. The diagram on the Police Crash Report depicts the case vehicle at rest, headed east with its left front wheel against the curb (**Figure 2**).

**Figure 1:** Case vehicle's southerly travel path prior to first impact with west curb (case photo #01)

**Figure 2:** Case vehicle's approximate final rest position along northern curb of east-west roadway (case photo #06)

The available evidence is not consistent with the foregoing crash scenario. The case vehicle did sustain an undercarriage impact in the area of the

right front wheel and steering mechanism that was, in this contractor's opinion, sufficient to deploy the air bags. In addition, there were fresh scrub marks on the right front, left front, and right rear tires (**Figure 3**), and the right rear tire was deflated.

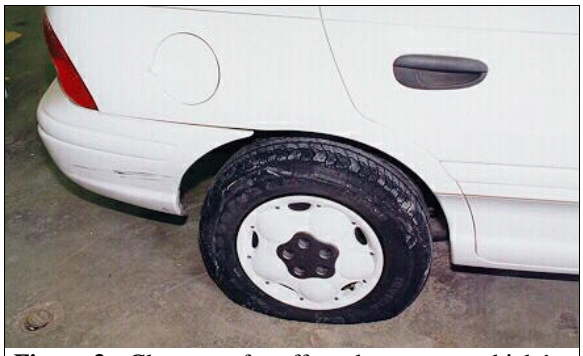

**Figure 3:** Close-up of scuff marks on case vehicle's deflated right rear tire and scuff mark on right rear portion of back bumper (case photo #12)

Our investigation indicates that as the case vehicle's driver attempted to negotiate the left curve in the snow, the case vehicle skidded essentially straight through the curve, with the wheels turned slightly to the left because the driver was attempting to steer leftward, and impacted the west curb with the right front wheel/undercarriage (**Figure 1** above). The sliding trajectory in combination with the leftward orientation of the front wheels and the slight negative crown of the roadway combined for added loading on the right front wheel assembly that enabled the right front undercarriage area to impact the curb, causing the air bags to deploy. The case vehicle's driver most likely over steered the case vehicle back onto the roadway, causing the case vehicle's right rear tire to scuff the curb (**Figure 3**) and the case vehicle to rotate counterclockwise. The case vehicle skidded through the intersection, entered the east-west roadway, and slid across the east-west roadway–while rotating counterclockwise. The case vehicle's left front wheel (**Figure 2** above) scraped along the north curb before the case vehicle came to rest heading east.

## CASE VEHICLE

The 1995 Dodge Neon was a front wheel drive, five-passenger, four-door sedan (VIN: 1B3ES47C1SD------). Anti-lock brakes were an option for this model, but it is not known if the case vehicle was so equipped. The driver stated that she had owned the Neon for two years and during this time she had the car serviced eleven times for minor electrical problems (e.g., dome light, radio, air conditioner not working, instrument panel engine warning lights come on and go off for no apparent reason). The driver further stated that, approximately two weeks before the alleged spontaneous deployment, the air bag indicator light came on as usual upon starting the car, but then did not go out after ten seconds as it normally does. She drove the car on a short errand with the air bag indicator light on and the light went out when she turned the car off. The air bag indicator light performed normally when she next started the car. She contacted the service shop but was told that this was not a problem and no action was taken.

The case vehicle had numerous areas of minor damage, including hailstone damage on the trunk deck, roof, and engine cover, and scratching on the right front door that appeared to be vandalism. There was an area of buckling (with no evidence of an impact) on the left front fender, along the top of the wheel well. There was another area of buckling (with no evidence of an impact) in the middle of the back door on the right. There was a small, swiping-type black scrub on the right rear, in the area where the back bumper's plastic cover wraps around to the right side rear overhang. The driver stated that the vehicle had been involved in a minor, swiping-type, hit-

and-run incident approximately one year prior to the present incident, but she did not indicate where this prior damage was located.

The dealership where the case vehicle was being stored had agreed to permit a detailed inspection and to provide copies of the vehicle's service record, contingent upon the driver signing a letter of authorization. On the advice of her attorney, the driver would not sign. The dealership permitted photographs of the vehicle, but would not permit any measurements, and did not supply the service records.

The dealership indicated that the Chrysler Motor Corporation had sent an investigator to inspect the vehicle and evaluate the alleged inadvertent air bag deployment. A supervisor at the Chrysler Motor Corporation Special Investigations division was contacted. He stated that their investigator interviewed the driver/owner and learned of the alleged electrical problems and the alleged malfunction of the air bag indicator light. Their investigator found impact damage on the case vehicle that was sufficient to cause the air bags to deploy. The warranty-claim service record for this vehicle did not reveal any particular problems.

**Figure 4:** Case vehicle's front and left side showing no obvious contact damage and inward rotation of left front tire (case photo #08)

**Figure 5:** Case vehicle's front and right side showing no obvious contact damage inward rotation of right front tire (case photo #11)

The right rear tire was deflated and had fresh abrasions on the sidewall (**Figure 3** above). Both front wheels were angled inward, approximately +10 degrees for the left front tire (**Figure 4**) and -20 degrees for the right front tire (**Figure 5**). The steering components on the right were embedded with soil and grass and the right tie rod was broken (**Figure 6**). There were light

**Figure 6:** Case vehicle's right front wheel and steering assembly showing embedded grass and broken right tie rod (case photo #15)

scuffs and soil on both front tires (**Figures 7** and **8**) and light scratches along the rim of the left front wheel cover (**Figure 8**). There were numerous light scratches on the underside of the front bumper cover, extending across the right two-thirds of the bumper. The left front door window glazing was broken out.

**Figure 7:** Close-up of scuff marks on case vehicle's inward rotated right front tire (case photo #14)

**Figure 8:** Close-up of scuffs and scrapes on case vehicle's inward rotated left front wheel from north curb impact (case photo #16)

The CDC for the first curb impact that deployed the air bags and caused the damage to the right front steering assembly is estimated as **00-UFRW-2**. This was an impact of low severity, approximately 14 - 22 km.p.h. (9 - 14 m.p.h.). The CDC for the second curb impact, with the right rear tire, is estimated as **03-RBWN-1**. The third curb impact, with the left front tire and wheel cover, is estimated as **11-LFWS-1**. The second and third impacts were very minor, leaving only scuffs and minor abrasions with impact three being a swiping-type impact as the vehicle came to rest against the north curb of the east-west roadway.

The case vehicle was equipped with a Supplemental Restraint System (SRS) that contained frontal air bags at the driver and front right passenger positions. Both frontal air bags deployed as a result of the front right undercarriage impact with the south curb. The driver's air bag was in the hub of the steering wheel and the front right air bag was in the mid-instrument panel location. For both air bags, the cover flaps opened at the designated tear points, and there was no evidence of damage to the air bags or the cover flaps. Both air bags were designed with two tethers. The driver air bag had one vent port, approximately 3 centimeters (1.2 inches) in diameter, located at the 12 o'clock position. The front right air bag also had one vent port, approximately 6 centimeters (2.4 inches) in diameter, located at the 12 o'clock position. There was no contact evidence readily apparent on the driver's air bag (**Figure 9**). There was an area of oil/skin transfer on the front right air bag, just above the top seam at the middle of the bag (**Figure 10** below). There was no other evidence of occupant contact on the interior surfaces of the

**Figure 9:** Case vehicle's deployed driver air bag showing no obvious evidence of occupant contact (case photo #19)

case vehicle. Two of the louvered air conditioner ventilation ports, immediately on either side of the front right air bag, were partially displaced from their sockets.

**Figure 10:** Case vehicle's deployed front right passenger air bag (case photo #22)

## CASE VEHICLE OCCUPANTS

According to the case vehicle's driver [27-year-old, Black (non-Hispanic) female; 175 centimeters and 76 kilograms (69 inches, 168 pounds), immediately prior to the crash, she was seated in a slightly reclined posture, but leaning to the left as she negotiated the left turn (i.e., most likely the left curve), with her back against the seat back, her left foot on the floor, and both hands on the steering wheel. The exact position of her right foot is unknown. Her seat track was located in its middle position, the seat back was sightly reclined, and the tilt steering wheel was located between its middle and upmost positions.

The case vehicle's driver stated that she was restrained by her available, active, three-point, lap-and-shoulder, safety belt system. She stated that the air bags deployed for no apparent reason while she was negotiating the left turn. She stated that the driver's air bag stuck her on the right side of her face and head, forcing her head further to the left and causing her head to break out the driver's door glazing. She stated that she was wearing a wig at the time and her head was not injured. According to the driver, she lost control of the vehicle, and it ran into the north curb. She stated she was dazed and confused after the air bag deployed. She did not attempt to move after the vehicle came to rest, but stayed in her seated position and was removed from the vehicle by ambulance personnel, with a neck collar in place.

According to the case vehicle's driver, the right front passenger [22-year-old male, 180 centimeters and 100 kilograms (71 inches, 220 pounds)] was seated in a slightly reclined posture with his back against the seat back, his feet on the floor, and both hands in his lap. His seat track was located between its middle and rearmost positions and the seat back was sightly reclined.

The right front passenger was, according to the driver, restrained by his available, active, three-point, lap-and-shoulder, safety belt system. The driver was not able to describe the passenger's pre-crash posture nor his movements during the turning maneuver or as the air bags deployed. According to the driver, the passenger got out of the vehicle as soon as it came to rest, but was unsteady and fell down in the street. He subsequently sat down in the case vehicle and awaited the ambulance.

## CASE VEHICLE DRIVER INJURIES

Official injury data are not available. According to the driver, both occupants were taken to a hospital in one ambulance, where they were both checked and released with treatment consisting of a soft-collar neck brace for the driver and pain medication for both. The driver's

self-reported injuries consisted of an abrasion on the left forearm, which she attributed to the driver's air bag, and contusions on both thighs, which she attributed to the bottom edge of the instrument panel. In this contractor's opinion, however, these contusions were most likely caused by the lower portion of the steering wheel rim. She was stiff and sore for several days and suffered persistent numbness in her neck. As described by the driver, the right front passenger did not sustain any specific lesions. He was stiff and sore for several days, especially in his back.

| Injury Number | Injury Description (including Aspect) | NASS Injury Code & AIS 90 | Injury Source (Mechanism) | Source Confidence | Source of Injury Data |
|---|---|---|---|---|---|
| 1 | Abrasion left forearm, not further specified | 790202.1 minor | Air bag, driver's | Probable | Interviewee (same person) |
| 2 | Contusions bilateral thighs, location not further specified | 890402.1 minor | Steering wheel rim, lower | Probable | Interviewee (same person) |

**OBJECT CONTACTED**

The case vehicle struck two different but identical Portland cement concrete barrier-type curbs (i.e., not mountable curbs), one on the west side of the north-south roadway and the other on the north side of the east-west roadway. There were no sidewalks and the curbs were not tall enough to qualify as true barrier curbs.