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SCI/NASS COMBINATION CASE REPORT

CASE NUMBER - NASS-1999-75-176G

LOCATION - Colorado

VEHICLE - 1999 VOLKSWAGEN JETTA

CRASH DATE - December 1999

Submitted:

March 23, 2001

revised:

October 26, 2001



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> NASS-1999-75-176G		2. <i>Government Accession No.</i>		3. <i>Recipient's Catalog No.</i>	
4. <i>Title and Subtitle</i> SCI/NASS Combination Case Report Vehicle - 1999 Volkswagen Jetta Location - Colorado			5. <i>Report Date:</i> March 23, 2001		
			6. <i>Performing Organization Code</i>		
7. <i>Author(s)</i> Special Crash Investigations Team #2			8. <i>Performing Organization Report No.</i> Task # 0233		
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: December 1999		
			14. <i>Sponsoring Agency Code</i>		
15. <i>Supplementary Notes</i> Combination SCI/NASS side air bag deployment investigation involving a 1999 Volkswagen Jetta with manual safety belts and dual front and side air bags that impacted an embankment and a fence.					
16. <i>Abstract</i> This report covers a SCI/NASS combination investigation of a side air bag deployment crash that involved a 1999 Volkswagen Jetta GLS sedan (case vehicle) that impacted an earthen embankment and a fence. This crash is of special interest because the Jetta was equipped with seat back-mounted side air bags and the driver's side air bag deployed as a result of the left side impact with an embankment. The Jetta's restrained driver (19-year-old male) was not injured in the crash. The Jetta was traveling east in the eastbound lane of a three-lane, undivided state highway, negotiating a right curve. The Jetta encountered some loose dirt/gravel in the roadway and lost control, traveled over the centerline and departed the left (north) road edge. The Jetta's front left corner and left side swiped along an earthen embankment, causing the Jetta's driver seat back-mounted side air bag to deploy. The Jetta was redirected back onto the roadway and, continuing its clockwise rotation, departed the right (south) road edge. The Jetta traveled approximately 14 meters [46 feet] southeast diagonally down a steep grassy slope and impacted a barbed wire fence with its left side. The Jetta continued an additional 17 meters [55 feet] southeast, coming to rest heading in an westerly direction, having rotated approximately 180 degrees. The Jetta's driver was seated with his seat track adjusted in its rear most position, his seat back slightly reclined, and with the steering wheel adjusted in its full-up position. He was restrained by his available, active, three-point, lap-and-shoulder safety belt system and did not sustain any injuries as a result of the crash. The Jetta was towed from the scene due to damage.					
17. <i>Key Words</i> Side 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> 5	22. <i>Price</i> \$2,500	

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This combination SCI/NASS crash investigation involves a 1999 Volkswagen Jetta GLS (case vehicle) that impacted an earthen embankment and a fence. The crash occurred in December 1999, at 10:30 p.m., in Colorado and was investigated by the applicable state police department. This crash is of special interest because the Jetta was equipped with seat back-mounted side air bags and the driver's side air bag deployed as a result of a left side impact. The restrained case vehicle driver (19-year-old male, sole occupant) was not injured as a result of the crash. The NASS researcher inspected the scene and the Jetta in January 2000. This report is based on the Police Crash Report, the NASS investigator's coded forms and photographs, scene and vehicle inspections, occupant kinematic principles, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The Jetta was traveling east in the eastbound lane of a three-lane, undivided state roadway (one lane eastbound and two lanes westbound) and was negotiating a curve right. It was dark and the weather was clear. The bituminous roadway was dry with an uphill grade of over 2% for eastbound traffic. The posted speed limit was 72 km.p.h. [45 m.p.h.]. There were no traffic controls other than painted lane and edge lines. According to the driver's statement to the investigating officer, the Jetta encountered a patch of loose dirt/gravel and the driver lost control, crossing into the westbound lanes. The driver overcorrected by steering sharply to the right, causing the Jetta to go into a clockwise yaw and depart the left (north) edge of the roadway (**Figure 1**). The crash occurred off the left (north) side of the roadway.

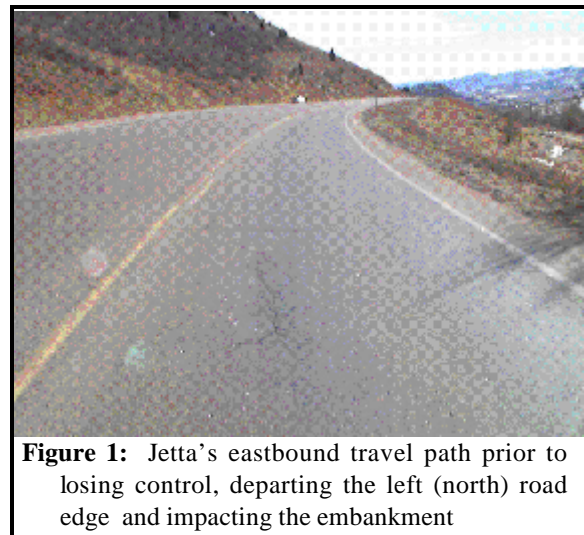


Figure 1: Jetta's eastbound travel path prior to losing control, departing the left (north) road edge and impacting the embankment

The Jetta's front left corner and left side impacted an embankment in a swiping-type engagement, causing the driver's seat back-mounted side air bag to deploy. The Jetta was redirected to the right and, continuing its clockwise rotation, traveled across the westbound and eastbound lanes and departed the right (south) side of the roadway. From the point where the Jetta lost control to its departure off the south edge of the roadway, it traveled approximately 49 meters [162 feet]. The Jetta continued in a southeasterly direction approximately 14 meters [46 feet] diagonally down a grassy slope, with its left side leading, and impacted a barbed wire fence (**Figure 2**) with its left and back planes. The Jetta

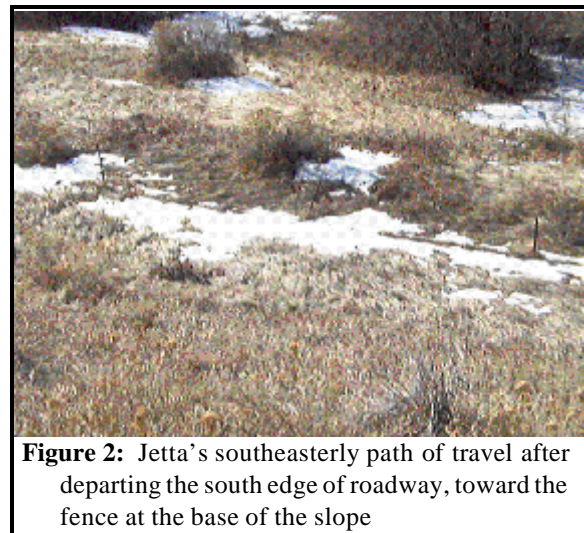


Figure 2: Jetta's southeasterly path of travel after departing the south edge of roadway, toward the fence at the base of the slope

passed through the fence and continued an additional 17 meters [55 feet] southeast, coming to rest heading in a westerly direction. The Jetta was towed from the scene due to damage.

CASE VEHICLE

The case vehicle was a front wheel drive 1999 Volkswagen Jetta GLS, five-passenger, four-door sedan (VIN: 3VWRA29M8XM-----) equipped with a 2.0 liter I-4 engine and an automatic transmission with a console-mounted selector lever. Anti-lock brakes were an option for this model; it is not known if the case vehicle was so equipped. The Jetta's wheelbase was 251 centimeters [98.9 inches]. The odometer reading is unknown due to the non-functional electronic instrument panel.



Figure 3: Front left view of damage to Jetta's front left corner from impact with embankment, which extended down left side

CASE VEHICLE DAMAGE

The Jetta's initial contact with the embankment involved the front left bumper corner and extended down the left side (**Figures 3 and 4**). The bumper cover was torn off, the front left corner of the fender was pushed inward and slightly rearward and there was abrading along the entire left side. The Jetta's impact with the fence involved a penetrating-type impact with scraping and minor deformation to the entire left side, the top and across the entire back plane. The wheelbase on the left side was shortened 6 centimeters [2.4 inches]. Both left side tires were deflated. There were no areas of integrity loss to the Jetta, although the windshield was cracked from the embankment impact.



Figure 4: Jetta's left side damage from impacting embankment, with overlapping fence damage

For the first harmful event (impact with embankment), the CDC was determined to be **12-FLEE-9 (350)**. For the second event (penetrating impact with barbed wire fence), three CDCs were assigned, following the penetrating impact protocol. These were determined to be: **09-LDAW-2 (270)**¹ (left side impact with fence), **09-LDGS-9 (270)** (topswipe as the case vehicle passed through/under the fence) and **09-BDES-1 (270)** (end swipe on the back). Because of the Jetta's multiple impacts and overlapping damage, crush profile data were not recorded and the WinSMASH reconstruction program was not used

¹The NASS case coding reads 09-LDAW-1, but when direct contact is above the belt line, extent zone is greater than 1 by definition.

due to insufficient data. The researcher's estimate of damage severity was recorded as moderate for this first impact.

An examination of the Jetta's interior showed no visible evidence of occupant contact. The energy absorbing steering column was not measured for compression. The Jetta driver's knee bolster showed no evidence of scuffing or deformation. There was no evidence of intrusion into the Jetta's passenger compartment.

AUTOMATIC RESTRAINT SYSTEM

The Jetta was equipped with front air bags and seat back-mounted side air bags at the driver and front right passenger seat positions. The driver's side air bag deployed as a result of the Jetta's left side impact with an earthen embankment (first harmful event) and none of the other air bags deployed. The NASS researcher indicated that the Jetta was equipped with safety belt pretensioners and indicated that it is not known whether the pretensioners actuated (given that the front air bags did not deploy, the pretensioners probably did not actuate).

The Jetta driver's frontal air bag was mounted in the steering wheel hub. The Jetta's front right passenger air bag was mounted in the mid-instrument panel just above the glove compartment.

The Jetta's driver side air bag deployed from along the outside seam of the driver's bucket seat back. The side air bag's dimensions were estimated to be 20 centimeters [7.9 inches] horizontally and 48 centimeters [18.9 inches] vertically and it was not tethered or vented (**Figures 5 and 6**). There was no visible evidence of contact or damage on the air bag.

CASE VEHICLE DRIVER

The Jetta's driver (19-year-old male, unknown race/ethnicity, height and weight unknown) was



Figure 5: Deployed driver's seat back-mounted side air bag, looking rearward



Figure 6: Looking down on deployed driver's seat back-mounted side air bag

restrained by his available, active, three-point, lap-and-shoulder safety belt system. The driver was not interviewed and there is no knowledge of his pre-crash posture nor of any self-reported injuries². According to the Police Crash Report, he did not sustain any injuries as a result of the crash.

The Jetta's driver was probably seated in a normal driving 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. His seat track was located in its rear most position, the seat back was slightly reclined, and the tilt steering wheel was in the full-up position.

As the Jetta went out of control and began its clockwise rotation, the driver probably moved slightly forward and leftward. The Jetta's impact with the embankment caused the driver's seat back-mounted side air bag to deploy and caused the driver to move further leftward and slightly forward. He probably contacted the air bag, but did not sustain any injuries (recall that the crash occurred in December, in Colorado, and the driver was probably wearing heavy clothes). As the Jetta was redirected, continued rotating and slid down the grassy embankment, the driver's use of the manual safety belt system prevented him from moving out of his seat. The Jetta's impact with the fence was of minor severity and probably had little effect on the driver's position.

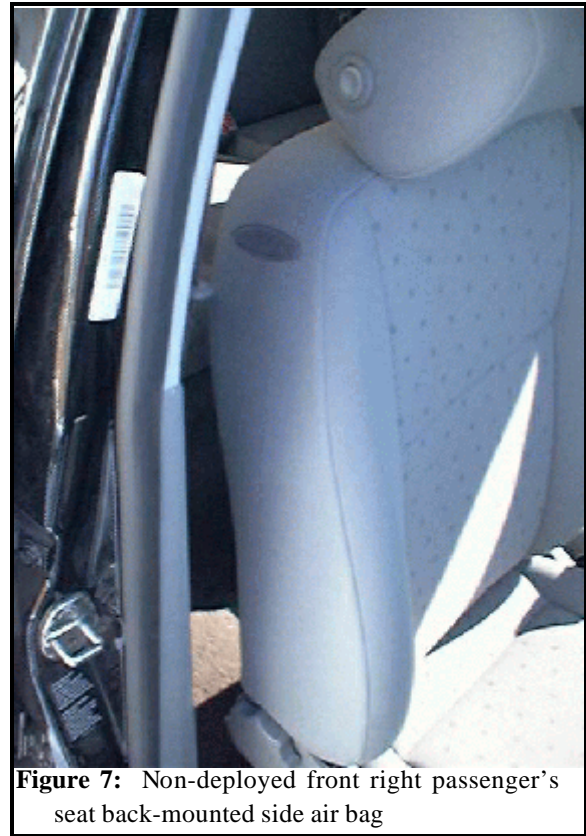


Figure 7: Non-deployed front right passenger's seat back-mounted side air bag

²The NASS case coding indicates that the driver was 190 centimeters tall and weighed 61 kilograms [75 inches and 134 pounds]. A 19-year-old male who was 6 feet 3 inches and weighed less than 140 pounds is highly unlikely and some aspect of these data may represent a coding error. There is no indication as to how this information was acquired for the NASS case (i.e., it is not on the Police Crash Report, there was no interview and there are no medical records).

SCENE DIAGRAM

NASS-1999-75-176G

