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REMOTE CHILD AIR BAG-RELATED FATALITY INVESTIGATION

CASE NUMBER - IN-03-021
LOCATION - Georgia
VEHICLE - 1999 DODGE NEON
CRASH DATE - June 2001

Submitted:
October 29, 2004
revised:
June 16, 2005

Contract Number: DTNH22-01-C-07022

Prepared for:

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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

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15. *Supplementary Notes*
Remote investigation of an air bag deployment crash involving a 1999 Dodge Neon sedan, equipped with manual safety belts and dual redesigned air bags, that was impacted by a 2001 Ford Ranger pickup

16. *Abstract*
This report covers a remote investigation of an air bag deployment crash involving a 1999 Dodge Neon Sport sedan (case vehicle) and a 2001 Ford Ranger pickup truck (other vehicle). This crash is of special interest because the case vehicle's unrestrained, " on-lap" front right passenger (21-month-old male) sustained critical head injuries as a result of contacting and being redirected by the deploying front right passenger' s redesigned air bag module cover flap and air bag, resulting in his death. The case vehicle was traveling eastward in the eastbound lane of a two lane, undivided county road . The Ford was traveling westward in the westbound lane of the same roadway. The weather was clear and it was dusk with no artificial lighting. The asphalt road surface was dry and free of defects except there was an excavation along the north side of the roadway extending into the westbound lane, with a heavy steel plate across the hole and an orange traffic cone set nearby. The Ford' s driver veered to the left as he approached the excavation and traveled into the eastbound lane. There is no evidence that the case vehicle driver attempted any avoidance maneuver. The case vehicle' s left front corner was impacted by the Ford' s front left corner, with the two vehicles' left front wheels snagging and breaking, causing both vehicles' driver and front right passenger air bags to deploy. The case vehicle continued forward a short distance and came to rest along the south edge of the road. The Ford sustained disabling damage to the left front wheel and tire but the driver drove from the scene, leaving a trail of wheel rim gouge marks and crankcase oil. The case vehicle' s " on-lap" front right passenger was struck in the mouth by the deploying front right passenger air bag module cover flap, causing at least four teeth to be fractured/avulsed. He was redirected by the expanding air bag, his head impacted the front header and fell back into the lap of the front right adult passenger. He was transported to a hospital by private car, where he was pronounced dead approximately one hour post-crash. The case vehicle' s restrained driver and restrained front right adult passenger were both treated and released with very minor injuries.

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BACKGROUND

IN-03-021

This remote investigation was brought to the NHTSA's attention in June 2003 through a review of the 2001 Fatality Analysis Reporting System (FARS) data. This crash involved a 1999 Dodge Neon sedan (case vehicle) and a 2001 Ford Ranger pickup (other vehicle). The crash occurred in June 2001, at 9:30 p.m., in Georgia, and was investigated by the applicable state police. This crash is of special interest because the case vehicle was equipped with redesigned air bags and the case vehicle's unrestrained, "on-lap" front right passenger (21-month-old male, white, Hispanic) sustained critical head injuries as a result of contacting and being redirected by the deploying front right passenger's air bag module cover flap and air bag, resulting in his death. This report is based on the police crash report, including a special reconstructionist's report, police photographs, medical treatment data, occupant kinematic principles, and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The case vehicle was traveling eastward in the eastbound lane of a two lane, undivided county road and intended to continue straight ahead. The Ford was traveling westward in the westbound lane of the same roadway, intending to continue westward. The weather was clear and it was dusk with no artificial lighting. The asphalt road surface was dry and free of defects (except as noted below), with a double yellow painted centerline and no edgelines or shoulders on either side. The speed limit was 56 km.p.h. [35 m.p.h.] and there was a positive slope to the east. There was an excavation along the north side of the roadway extending into the westbound lane, with a heavy steel plate across the hole and an orange traffic cone set near the steel plate (**Figures 1** and **2**). The police report notes that there was adequate space for two vehicles to pass in the area of the excavation, but the Ford's driver was under the influence of alcohol (BAC = 0.19) and apparently made an exaggerated steering maneuver to the left and traveled into the eastbound lane. There is no evidence that the case vehicle driver attempted any avoidance maneuver. The crash occurred in the eastbound lane.

Figure 1: View westward, lookback along case vehicle's approach path (case photo #01)

Figure 2: View eastward, lookback along other vehicle's approach path (case photo #03)

The case vehicle's left front corner was impacted by the Ford's front left corner, with the two vehicles' left front wheels snagging and breaking, causing the case vehicle's driver and front right passenger air bags to deploy. The Ford's dual frontal air bags also deployed. The case vehicle continued forward approximately 9 meters [29 feet] and came to rest (the police report

indicates that the driver brought the case vehicle to a controlled stop) along the south edge of the road with its right side against a hedgerow. The Ford sustained heavy damage to the left front wheel and tire but the driver fled the scene, leaving a trail of wheel rim gouge marks and crankcase oil. The Ford' s left front wheel/tire assembly broke off the axle a short distance (estimated approximately 30 meters [100 feet]) west of the point of impact, but the Ford' s driver continued nearly two miles to his own residence, where the police found the damaged pickup and its driver.

CASE VEHICLE

The case vehicle was a 1999 Dodge Neon Sport front wheel drive, four-door, five- passenger sedan (VIN: 1B3ES47C2XD------), equipped with a 2.0 liter I-4 gasoline engine and an automatic transmission with a console mounted selector lever. Four wheel anti-lock brakes were an option on the case vehicle, but it is unknown if the case vehicle was so equipped. Its odometer reading was 74,602 kilometers [46,357 miles] and its wheel base was 267 centimeters [105.0 inches]. The case vehicle was towed due to disabling wheel/tire damage.

Figure 3: Case vehicle' s front, straight on view, at tow yard (case photo #11)

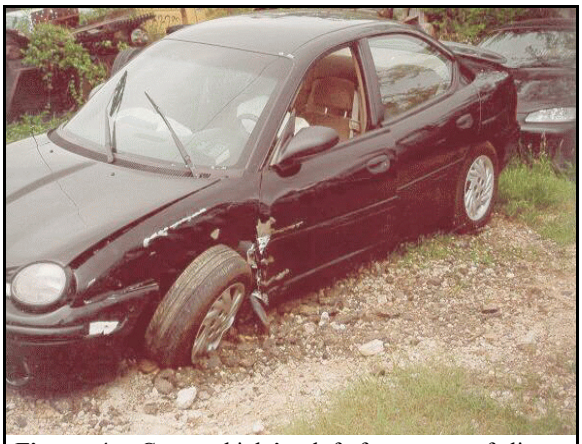


Figure 4: Case vehicle' s left front area of direct contact damage, at tow yard (case photo #12)

The case vehicle sustained direct contact on its left side, beginning just aft of the left front corner and extending along the wheel well to the left A-pillar and the leading edge of the driver' s door (**Figures 3** and **4**). The case vehicle' s left front wheel/tire assembly snagged against the other vehicle' s left front wheel/tire assembly, causing the case vehicle' s wheel to partially break from its suspension, but not break away completely (**Figures 4** and **5**). There was scraping and slight crush along the top of the wheel well and fender, continuing onto the left lower A-pillar and the forward portion of the left front door.

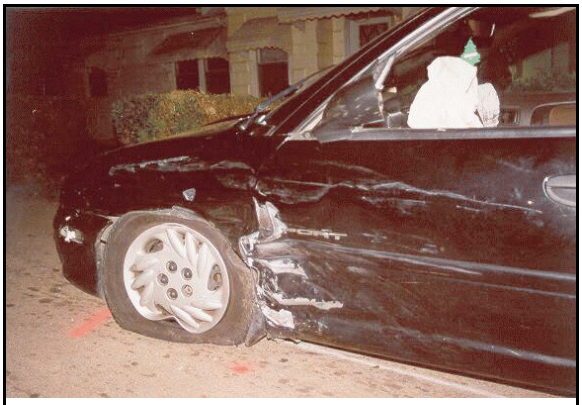


Figure 5: Case vehicle' s left front area at final rest; note wheel rim damage (case photo #09)

There is no other exterior damage visible in the available photographs. The left front tire was deflated, the wheel assembly was displaced rearward against the edge of the wheel well, and the rim was visibly dented. It appears that the left front suspension components were damaged, with the body sagging and compressing the tire (**Figure 5**). There was no other wheel/tire damage. The windshield had a small star-shaped crack on the right side directly above the front right passenger air bag module that probably resulted from the module cover flap striking the windshield. The driver' s door window glazing was shattered from the impact with the other vehicle, and the there was no other glazing damage.

The CDC for the case vehicle' s single impact was estimated from the available photographs as **12-LYEW-2 (350)**. This impact is out of scope for the WinSMASH reconstruction program. This contractor estimates that this was an impact of low severity (14-23 km.p.h. [9-14 m.p.h.]) for the case vehicle.

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with driver and front right passenger redesigned air bags. Both air bags deployed as a result of the collision events.

Figure 6: Case vehicle' s deployed air bags, viewed from back seat, at tow yard (case photo #15)

Figure 7: Deployed air bags, viewed through right front door, at tow yard (case photo #16)

The driver' s air bag was located in the steering wheel hub, with a single module cover flap (**Figures 6** and **7**). The available photos show no obvious damage to the cover flap or the air bag. The details about the size, shape and features of the air bag and its module cover flap are otherwise not known. There was blood smeared on the back of the driver' s air bag (**Figure 8**). These blood marks appear to be the result of handling/removing the child victim after the crash.

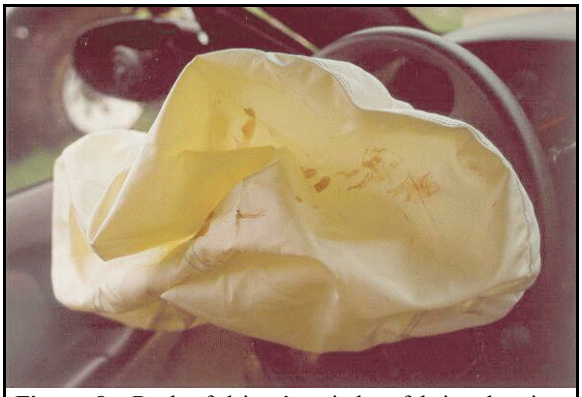


Figure 8: Back of driver' s air bag fabric, showing blood smears, at tow yard (case photo #17)

The front right passenger' s air bag was located in the top of the right instrument panel, with a single cover flap (**Figures 6** and **7**). The details about the size, shape and features of the air bag and its module cover flap are otherwise not known. There were teeth marks in the top surface of the air bag cover flap (**Figure 9**), and no other evidence of damage to the cover flap or air bag. There were a few droplets of blood on the front left area of the air bag' s fabric (**Figure 10**).

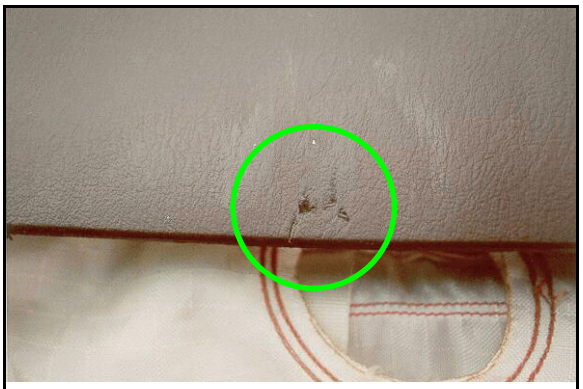


Figure 9: Teeth imprint on passenger' s air bag module cover flap, at tow yard (case photo #21)

Figure 10: Blood droplets on passenger' s air bag fabric, at tow yard (case photo #18)

CASE VEHICLE " ON-LAP" FRONT RIGHT PASSENGER' S KINEMATICS

The case vehicle' s " on-lap" front right passenger (21-month-old male, white, Hispanic, height and weight unknown) was being held in the lap of the front right adult passenger and was not restrained in any manner. The available photographs show that the front right bucket seat track was adjusted toward the rear and the seat back was slightly reclined. Further details about the child' s posture are not known, but the injury data suggest that he was probably facing forward.

Figure 11: Contact evidence on front header, at tow yard (case photo #24)

The case vehicle driver made no known avoidance maneuvers and the child' s posture probably did not change immediately prior to the crash. The case vehicle' s impact with the other vehicle caused the child to move forward and slightly leftward, toward the 12:00 o' clock direction of force, and caused the front right air bag to deploy. The front edge of the air bag module cover flap struck the child in the mouth, as evidenced by the imprint of his upper teeth in the top surface of the module' s cover flap (**Figure 9**), causing at least four teeth be knocked loose or broken (three whole loose teeth and a fourth fractured tooth were found during the police inspection of the case vehicle). The expanding air bag lifted the child and his head struck the front header as evidenced by an area of indentation with hair in the headliner (**Figure 11**). The child fell back and probably struck the adult front right passenger in the face. The child' s position at final rest is not known.

The child was removed from the case vehicle by the adult occupants and transported to a hospital via a private car. The child was pronounced dead approximately one hour after the crash. He was not autopsied.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Nonanatomic brain injury (i.e., arrived[1] in traumatic cardiopulmonary arrest), unresponsive, and pupils fixed and dilated; in addition, bladder control was lost and blood was noted in both nostrils, mouth, and a small amount in both ears	critical 160824.5,0	Front right module' s cover flap	Probable	Emergency room records
2	Fractured {broken} teeth, not further specified	minor 251404.1,8	Front right module' s cover flap	Certain	Emergency room records
3	Avulsed teeth, x 3, not further specified	minor 251406.1,8	Front right module' s cover flap	Certain	Other: Police Photographs[2]
4	Laceration, large, noted to right side of head, not further specified	minor 243400.1,8	Sun visor, front right passenger' s	Probable	Emergency room records
5	Contusions {bruising} noted to head, not further specified	minor 190402.1,9	Windshield roof header, front right passenger' s	Probable	Emergency room records
6	Contusions {bruising} noted to face, including ecchymosis right side of face, not further specified	minor 290402.1,0	Air bag, front right passenger' s	Probable	Emergency room records
7	Laceration tongue, not further specified	minor 243400.1,8	Front right module' s cover flap	Certain	Emergency room records
8	Abrasions noted to body (i.e., torso) and extremities, not further specified	minor 990200.1,0	Unknown contact mechanism	Unknown	Emergency room records
9	Contusions {bruises} noted to body (i.e., torso) and extremities, not further specified	minor 990400.1,0	Unknown contact mechanism	Unknown	Emergency room records

[1] This occupant was brought from the scene by his mother (i.e., the driver) in a private vehicle and was hand-carried into the emergency department.

[2] Three avulsed teeth and one broken tooth were visible on or near the front right seat in the police photographs.

The case vehicle' s front right adult passenger (24-year-old male, white, Hispanic, height and weight not known) was restrained by his available, active, three-point, lap-and-shoulder safety belt system. The available photographs show that the bucket seat track was adjusted toward the rear and the seat back was slightly reclined. The details of his posture are not known, but he was probably in a forward facing seated position, holding the 21-month-old child in his lap.

The case vehicle driver did not attempt any avoidance maneuvers and his posture did not change immediately prior to the crash. The case vehicle' s impact with the other vehicle caused the front right adult passenger to move forward and slightly leftward, but he was held in place by the safety belt system. The impact caused the front right air bag to deploy. The adult front right passenger probably did not contact the air bag because he had the child in his lap. The child' s kinematics were discussed previously. As the child rebounded after being redirected by the air bag, the child may have struck the adult in the face, causing contusions and lacerations on the adult' s lips. The adult also sustained an injury described as " irritation of the conjunctiva" in his right eye, from an unknown source.

FRONT RIGHT ADULT PASSENGER' S INJURIES

The front right adult passenger remained at the scene until emergency responders arrived while the driver and the child passenger were taken to a hospital in a private car. The front right passenger was transported via ambulance to a hospital, where he was treated and released in the emergency department.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Injury right conjunctiva (i.e., irritation, conjunctivitis), NFS	minor 240416.1,1	Unknown contact mechanism	Unknown	Emergency room records
2	Contusion to upper inner lip	minor 290402.1,8	Other passenger: " on-lap" occupant	Possible	Emergency room records
3	Lacerations, small, to both lips, not further specified	minor 290602.1,8	Other passenger: " on-lap" occupant	Possible	EMS treatment record

CASE VEHICLE DRIVER' S KINEMATICS

The case vehicle' s driver (24-year-old female, white, Hispanic, 150 centimeters, 50 kilograms [59 inches, 110 pounds], 13 weeks pregnant [first trimester]) was restrained by her available, active, three-point, lap-and-shoulder safety belt system. The available photos show that the driver' s bucket seat track was adjusted toward the front, the seat back was upright and the tilt steering wheel was adjusted at the middle position. The details of her posture are not known, but she was probably in a normal driving posture, with her back against the seat back, her feet on the floor or operating the foot controls and at least one hand on the steering wheel.

The driver did not attempt any avoidance actions and her posture did not change immediately prior to the crash. The case vehicle' s impact with the other vehicle caused the driver to move forward and slightly leftward, but she was held in place by the safety belt system. The impact caused the driver air bag to deploy. The driver sustained a contusion and sprain to her right thumb, probably due to contact with the deploying air bag. She also sustained an abrasion on her left elbow and a lumbar spine strain, both from unknown sources. Her post-impact position is not known, but she probably rebounded into her seat. The police report indicates that the case vehicle traveled approximately 9 meters [29 feet] and was brought to a controlled stop.

CASE VEHICLE DRIVER INJURIES

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Strain lumbar spine, not further specified	minor 640678.1,8	Unknown contact mechanism	Unknown	Emergency room records
2	Abrasion left elbow over olecranon	minor 790202.1,2	Unknown contact mechanism	Unknown	Emergency room records
3	Contusion right thumb, not further specified	minor 790402.1,1	Air bag, driver' s	Possible	Emergency room records
4	Sprain right thumb (i.e., metacarpal-phalangeal joint)	minor 750402.1,1	Air bag, driver' s	Possible	Emergency room records

OTHER VEHICLE

The other vehicle was a 2001 Ford Ranger rear wheel drive (4x2), two-door, super-cab compact pickup truck (VIN: 1FTYR14U91TA------), equipped with a 3.0 liter V6 gasoline engine and an automatic transmission with a column-mounted selector lever. The police noted its odometer reading as 665 kilometers [413 miles]. Its wheelbase was 319 centimeters [125.6 inches]. The Ford was driven from the scene of the crash despite disabling wheel/tire damage..

Figure 12: Ford' s front and left side after police apprehension two miles away from the scene of the crash (case photo #35)

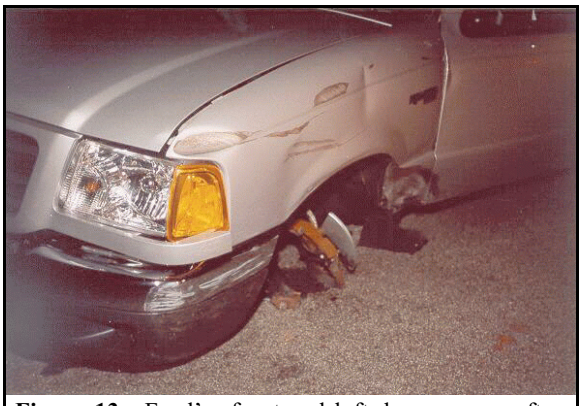


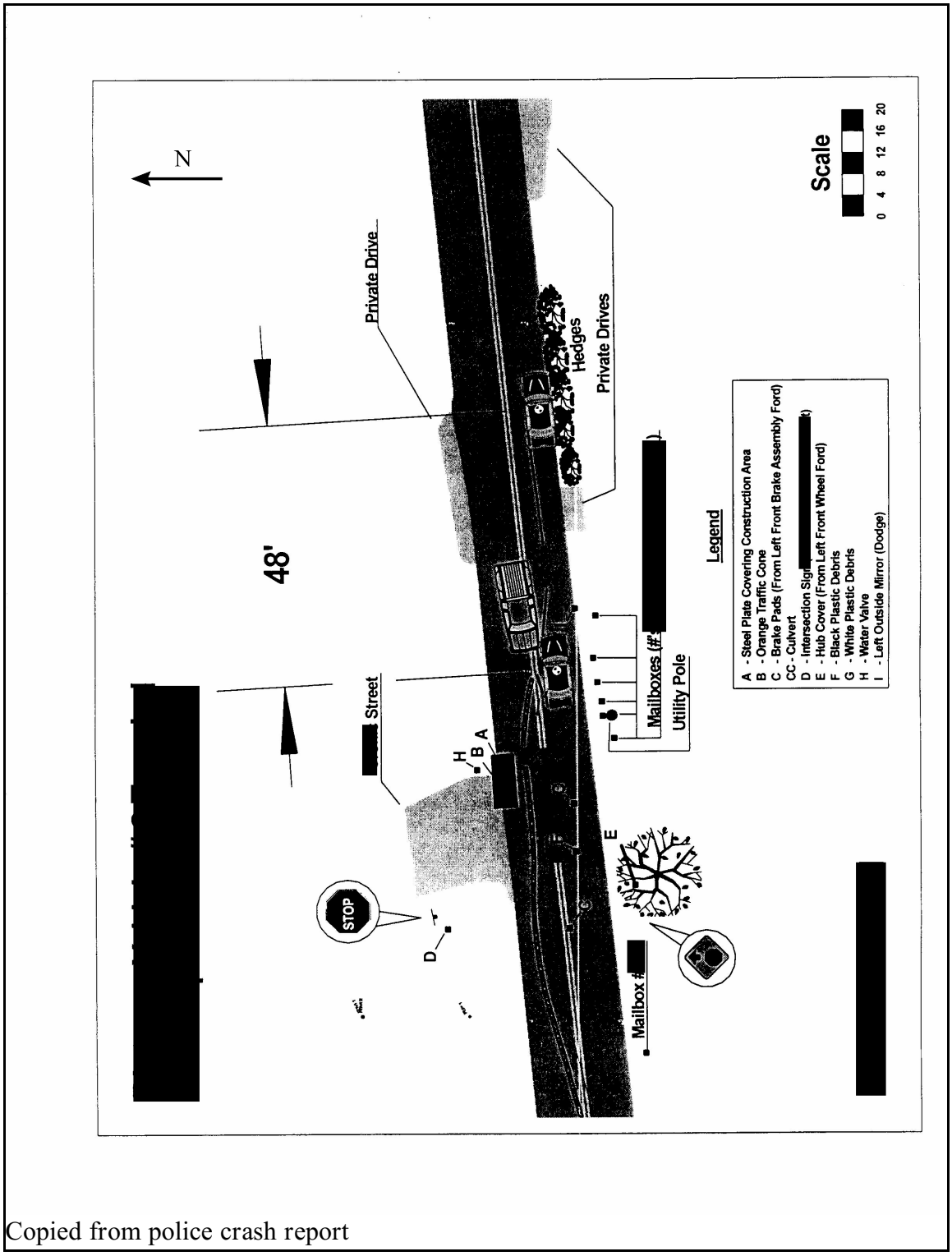
Figure 13: Ford' s front and left damage area after police apprehension two miles away from the scene of the crash (case photo #36)

Figure 14: Ford' s left front wheel, found at the scene the next day (case photo #44)

The Ford' s front left corner contacted the left side of the case vehicle in a swiping-type engagement, and the two vehicles' left front wheels snagged causing wheel and suspension damage (**Figures 13** and **14**). The Ford' s driver drove the pickup away from the scene without stopping and the left front wheel was torn off a short distance (approximately 30 meters [100 feet] from the point of impact), such that the exact nature of the impact damage to the wheel/tire assembly is not known. There was light denting and scraping on the front end of the fender and the bumper, and scraping along the top of the fender and around the wheel well, extending rearward to the left lower A-pillar. The Ford' s left front suspension was damaged, allowing the vehicle' s front end to fall such that the oil pan was damaged, causing the crankcase oil to leak, leaving a trail in the roadway as the driver fled (**Figures 1** and **2**). The front left tire had a large gash in the inside sidewall, but it is not known if this was from the impact or from driving on the damaged wheel/tire (**Figure 15**). There was no other damage visible in the available photos.

The CDC for the Ford' s impact with the case vehicle was estimated from police photos as **12-FLEE-5 (0)**. This impact is out of scope for the WinSMASH reconstruction program. This contractor estimates that this was an impact of low severity (14-23 km.p.h. [9-14 m.p.h.]) for the Ford.

According to the police crash report, the Ford's driver (21-year-old male, white, Hispanic, height and weight not known) was restrained by his available, active, three-point, lap-and-shoulder safety belt system. The driver fled the scene by driving his disabled vehicle approximately two miles to his home, where the police apprehended him. He sustained police-reported " C" (possible) injuries as a result of this crash. His treatment status and specific injuries, if any, are not known.



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