On-Site Side Air Bag Investigation
Dynamic Science, Inc. (DSI), Case Number DS09030
2009 Ford Focus
Washington
August 2009

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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.

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16. Abstract

This on-site investigation focused on the air bag deployments in a 2009 Ford Focus involved in a single-vehicle crash and subsequent rollover. The crash occurred in August 2009 in the state of Washington. The subject vehicle was being driven by a 17-year-old male and a 16-year-old female occupied the front right seat. The crash site was an undivided two-lane, north/south roadway. The Ford was traveling northbound and as the driver negotiated a left curve the vehicle departed the roadway on the right side. The right side of the vehicle impacted a fire hydrant and four small trees, and the front end impacted a telephone utility marker. During those impacts the vehicle initiated a clockwise rotation, then it initiated a left side leading trip rollover. The vehicle came to rest on its roof in a private driveway.

The Ford was equipped with advanced dual-stage frontal air bags, front row seat-mounted side air bags, combination rollover/side impact inflatable curtain (IC) air bags, and front row safety belt buckle pretensioners. During the crash, all six of the vehicle's air bags deployed, and both front row safety belt pretensioners actuated. The driver and front right occupant each sustained a minor injury. The Ford was towed from the scene due to damage and was later declared a total loss by the insurance company.

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Background

This on-site investigation focused on the deployed air bags in a 2009 Ford Focus involved in a single-vehicle crash and subsequent rollover. The crash occurred in August 2009 in the state of Washington. The subject vehicle (**Figure 1**) was being driven by a 17-year-old male and a 16-year-old female occupied the front right seat. The crash site was an undivided two-lane, north/south roadway. The Ford was traveling northbound and as the driver negotiated a left curve the vehicle departed the roadway on the right side. The right side of the vehicle impacted a fire hydrant and four small trees, and the front end impacted a telephone utility marker. During those impacts the vehicle initiated a clockwise rotation, then it initiated a left side leading trip rollover. The vehicle came to rest on its roof in a private driveway.

Figure 1. Subject vehicle, 2009 Ford Focus

The Ford was equipped with advanced dual-stage frontal air bags, front row seat-mounted side air bags, combination rollover/side impact inflatable curtain (IC) air bags, and front row safety belt pretensioners. During the crash, all six of the vehicle's air bags deployed, and both front row safety belt pretensioners actuated. The driver and front right occupant each sustained a minor injury. The Ford was towed from the scene due to damage and was later declared a total loss by the insurance company.

This on-site side air bag investigation was initiated by the National Highway Traffic Safety Administration (NHTSA) during a review of National Automotive Sampling System (NASS) General Estimates System (GES) police reports. On October 9, 2009 DSI was forwarded the police report with instructions to obtain cooperation. DSI obtained permission to inspect the subject vehicle and the case was assigned on October 19, 2009. The vehicle was located at an insurance auction facility and the vehicle was inspected on October 20, 2009. The vehicle's Event Data Recorder (EDR) was supported by the Bosch Crash Data Retrieval (CDR) system and the data was imaged during the vehicle inspection. The report is included at the end of this report as Attachment 2.

Summary

Crash Site

The crash site consisted of an undivided two-lane north/south roadway that curved left (**Figure 2**). The roadway was configured with paved shoulders; outboard of the paved shoulder were gravel shoulders followed by unpaved ground. Outboard of the east shoulder was a gravel shoulder and driveway, followed by grass, trees and shrubbery. The north- and southbound lanes measured 3.2 m (10.5 ft) in width; the east and west shoulder measured 1.4 m (4.5 ft) and 0.9 m (3.0 ft) in width,

respectively. The roadway and shoulders maintained the same widths throughout the curve. The composition for the lanes and paved shoulders was asphalt.

Figure 2. Crash site

The travel lanes were delineated by double yellow stripes and the outboard roadway edges were marked by solid white fog lines. Raised yellow reflective markers were aligned on the yellow stripes and raised white reflective markers were aligned on the fog lines. An additional row of white reflective markers were aligned parallel to, and 0.3 m (1 ft) outboard of, the east edge of the roadway. At the time of the crash the weather was clear-to-partly cloudy, conditions were dark without illumination, and the roadway was dry.

The northbound roadway alignment was straight and the profile had a positive grade. At the beginning of the left curve the roadway profile had an uphill grade of positive 1.7 percent; at 61.0 m (200.0 ft) into the curve the uphill grade reached a maximum slope of positive 4.3 percent; at 76.0 m (250.0 ft) into the curve the uphill grade measured positive 2.9 percent. At the beginning of the curve the super-elevation of the northbound lane measured positive 0.4 percent; at 46.0 m (150.0 ft) into the curve the northbound lane achieved a maximum super-elevation of positive 4.6 percent; and at 76.0 m (250.0 ft) into the curve the super-elevation decreased to positive 1.5 percent. The location of the impacted objects relative to the roadway and the damage flow indicating direction of force suggested that the vehicle departed the roadway at approximately 76.0 m (250.0 ft) into the curve, at a point where the slope and super-elevation were decreasing.

A black and yellow arrow directional sign indicating the roadway curved left was posted north of the curve at 11.3 m (37.0 ft) north of the east roadway edge. When traveling south, the sign was visible from 91.0 m (300.0 ft) north of the of the curve. The posted speed limit for the roadway was 40 km/h (25 mph).

Pre-Crash

The Ford was traveling northbound at an EDR-reported speed of 95.5 km/h (59.3 mph) four seconds prior to Algorithm Enable (AE). The vehicle entered the left curve and at approximately 76.0 m (250.0 ft) into the curve the Ford departed the roadway on the right side. The driver was actively steering the vehicle to the left with both hands, and prior to impact was braking with his right foot. While rotating slightly counterclockwise and skidding laterally in a right side leading yaw, the vehicle crossed the paved shoulder and traveled across gravel for a distance of 3.5 m (11.5 ft). The EDR-reported speed at AE was 76.4 km/h (47.5 mph).

Crash

The crash sequence included seven events. The right side of the Ford impacted the fire hydrant (Events 1) (**Figure 3**). The fire hydrant was made of cast iron, measured 38.0 cm (15.0 in) at its

maximum width and 91.0 cm (36.0 in) in height, and was bolted to a steel base. The impact to the fire hydrant displaced it from its base. According to the local water district's office, a new fire hydrant was installed in place of the damaged one, and a concrete post was installed between the roadway and the fire hydrant to act as a protective barrier. There was no post installed prior to the crash. The EDR reported the vehicle's frontal and side air bags deployed between 51.5 milliseconds (msec) and 89.0 msec after AE. Based on the EDR, it was determined that all the air bags deployed at impact with the fire hydrant.

Figure 3. Impacted objects including fire hydrant, trees, and utility marker

Following the impact with the fire hydrant, the vehicle traveled in a forward trajectory and the right side of the vehicle impacted a group of four small-diameter trees (Event 2-5). The trees measured less than 10.0 cm (3.9 in) in diameter and were aligned in a row measuring 1.1 m (3.6 ft) in length. All four trees sustained damage resulting from the impacts. The damage to the trees began 32.0 cm (12.6 in) above grade at the lower aspect and ended 100.0 cm (39.4 in) above grade at the upper aspect.

The Ford initiated a clockwise rotation and the vehicle's front end impacted a telephone utility marker (Event 6). The utility marker measured 10.0 x 15.0 cm (4.0 x 6.0 in) in width and 91.0 cm (36.0 in) in height. It yielded upon impact and the vehicle continued to rotate clockwise and travel forward.

At the point where the Ford had rotated 90 degrees clockwise from its post-impact orientation, it was again heading north and was traveling in a left-leading yaw across a gravel-covered driveway. The driveway's profile had an uphill grade of positive 8.2 percent. The vehicle's left side tires and rims dug into the gravel and engaged the ground with sufficient opposing lateral force to initiate a left side leading trip rollover (Event 7). The vehicle rolled two quarter-turns and came to rest on its roof in the driveway and heading northeast.

For the fire hydrant impact in Event 1, the Barrier algorithm of the WinSMASH program calculated a Total Delta-V of 15.0 km/h (9.3 mph); the longitudinal and lateral components were -11.5 km/h (-7.1 mph) and -9.6 km/h (-6.0 mph), respectively. Based on the yielding nature of the impacted fire hydrant, the reconstruction should be considered borderline.

Post-Crash

The driver of the Ford stated during the interview that the vehicle's front doors would not open post-crash. The driver and front right occupant unbuckled their respective safety belts. The driver assisted the front right occupant to the second row, then moved to the second row himself. The second row right side door remained operational after the crash, and the occupants opened the door and exited the vehicle under their own power. The driver and front right occupant each sustained a minor injury. They were mobile at the scene; neither were treated at the scene and they were not transported to a

medical facility. The vehicle was towed due to damage and was later declared a total loss by the insurance company.

Vehicle Data

The Ford was identified by the Vehicle Identification Number (VIN): 1FAHP36N49Wxxxxxx and the vehicle's date of manufacture was April 2009. The odometer reading was 669.0 km (415.0 mi). The vehicle was equipped with a 2.0-liter, 4-cylinder engine, manual 5-speed transmission, front wheel drive, front disc and rear drum brakes, standard Assisted Braking System (ABS), 4-wheel anti-lock brakes, power steering with tilt column functionality, and a tire pressure monitoring system. Standard suspension features included independent front strut suspension with anti-roll bar, front and rear coil springs, rear shocks, and independent rear suspension.

The vehicle manufacturer's recommended tire size was P205/50R16 and the recommended cold tire pressure was 235 kPa (34 psi) for the front and rear. The vehicle was equipped with Kumho KH16 P205/50R16 tires for the front and rear. The specific tire information was as follows:

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	207 kPa (30 psi)	8 mm (10/32 in)	No	None
LR	Tire flat	8 mm (10/32 in)	No	De-beaded
RR	90 kPa (13 psi)	8 mm (10/32 in)	No	Bulge in sidewall
RF	Tire flat	8 mm (10/32 in)	No	Sidewall cut/torn

The Ford's interior was configured with seating for five occupants. The front row seating consisted of outboard bucket seats with adjustable head restraints. The second row seating consisted of a 60/40 split bench seat with adjustable head restraints and folding backs.

Vehicle Damage

Exterior Damage

The Ford sustained direct and induced damage to the front end and right side resulting from the horizontal impacts, and direct and induced damage to the left side and top resulting from the rollover. Damage to the right side of the vehicle sustained during the Events 1-5 resulted in overlapping crush. Direct damage from the fire hydrant impact (Event 1) began 30.0 cm (11.8 in) forward of the right rear axle, extended 257.0 cm (101.2 in) forward, and ended 27.0 cm (10.6 in) forward of the right front axle. The Field L for Event 1 began 30.0 cm (11.8 in) forward of the right rear axle, extended 292.0 cm (115.0 in) forward, and ended at the right front bumper corner (**Figure 4**). Six crush measurements were taken at mid-door level as follows: C_1 = 0 cm, C_2 = 2.0 cm (0.8 in), C_3 = 3.0 cm (1.2 in), C_4 = 7.0 cm (2.8 in), C_5 = 5.0 cm (2.0 in), C_6 = 1.0 cm (0.4 in). Maximum crush was located 77.0 cm (30.3.0 in) aft of the right front axle between C_3 and C_4 and measured 8.0 cm (3.2 in). The Collision Deformation Classification (CDC) for Event 1 was 01RYEW1.

The impacts with the four trees (Events 2-5) resulted in overlapping the damage and the impacts could not be separated. The direct damage began 75.0 cm (29.5) aft of the front right axle, extended 102.0 cm (40.2 in) forward, and ended 27.0 cm (10.6 in) forward of the right front axle. The direct damage extended 30.0 cm (11.8 in) above the belt line and included the window frame of the front right door panel. The Field L began 75.0 cm (29.5) aft of the front right axle, extended 137.0 cm (53.9 in) forward, and ended at the right front bumper corner. In addition to the sheet metal crush, the tree impacts fractured and displaced the right side-view mirror. The estimated crush measurements for the tree impacts at upper door level was as follows: C_1 = 0 cm, C_2 = 3.0 cm (1.2 in), C_3 = 4.0 cm (1.6 in), C_4 = 5.0 cm (2.0 in), C_5 = 2.0 cm (0.8 in), C_6 = 1.0 cm (0.4 in). Maximum crush was located at C_4. The CDC for the tree impacts was 01RYHW2.

Figure 4. Right side crush measurement

Figure 5. Front end crush measurement

Following the tree impacts, the front end of the Ford impacted a telephone utility marker (Event 6). The direct damage to the front bumper began 17.0 cm (6.7 in) to the left of the front right bumper corner, extended 30.0 cm (11.8 in) left, and ended 47.0 cm (18.5 in) left of the front right bumper corner. The Field L extended from bumper corner to bumper corner and measured 146.0 cm (57.5 in) (**Figure 5**). Vertically, the direct damage extended from the bumper to the hood. Six crush measurements were taken at bumper level as follows: C_1 = 0 cm, C_2 = 0 cm, C_3 = 0 cm, C_4 = 3.0 cm (1.2 in), C_5 = 6.0 cm (2.4 in), C_6 = 5.0 cm (2.0 in). Maximum crush to the front bumper was located 29.0 cm (11.4 in) right of the front right bumper corner at C_5. The CDC for Event 6 was 12FREN1.

Following the frontal impact, the vehicle's left side tires and rims engaged the ground inducing a left side leading trip rollover (Event 5). The vehicle rolled two quarter-turns and sustained damage to the left side and top planes. The direct damage to the left side began 33.0 cm (13.0 in) aft of the left rear axle, extended forward 345.0 cm (135.8 in), and ended 52.0 cm (20.5 in) forward of the left front axle. Vertically, the direct damage began at the lower door panel, extended upward 116.0 cm (45.7 in), and ended at the roof side rail. Maximum lateral crush to the greenhouse was located 125.0 cm (49.2 in) forward of the left rear axle at the window frame of the front left door panel, and measured 4.0 cm (1.6 in).

The direct damage to the top plane began forward of the sunroof at 135.0 cm (53.1 in) forward of the left rear axle, extended 200.0 cm (78.7 in) forward, and ended 335.0 cm (132.0 in) forward of

the left rear axle at the leading edge of the hood. Laterally, the direct damage was distributed from roof side rail to roof side rail and measured 116.0 cm (45.7 in). Maximum vertical crush to the greenhouse was located at the 58.0 cm (22.8 in) right of the left roof side rail at the right windshield header and measured 6.0 cm (2.4 in). The CDC for the rollover was 00TYDO2.

Interior Damage

The Ford sustained minor interior damage as a result of intrusions, occupant loading, contacts, and post-crash salvage activity. The front row left side glass disintegrated resulting in integrity loss, the windshield was cracked as a result of impact damage, and the remaining glazing was intact. The front left door was at first jammed shut, then was sprung and would not latch; the front right door was jammed shut, and the second row doors remained closed and operational. The passenger compartment sustained lateral intrusion of the front right door panel at the lower rear quadrant, and vertical intrusion of the left, center, and right windshield header, and the roof. Evidence of occupant loading was present on the following front row components: left and right safety belt webbing and latch plates, left and right frontal air bags, left and right seat-mounted side air bags, and left and right IC air bags. Evidence of occupant contacts was documented to the following front row components: left door panel, left and right IP, and the center console. The left IC air bag was cut during post-crash salvage activities.

Manual Restraints

The vehicle's front row seating positions were equipped with 3-point manual lap and shoulder safety belts with sliding latch plates, adjustable D-rings, and buckle pretensioners. The driver's safety belt had an Emergency Locking Retractor (ELR) and the front right passenger's safety belt had a switchable ELR/Automatic Locking Retractor (ALR).

The driver's safety belt D-ring anchorage was in the full-up position and the latch plate was scratched indicating historical usage. The safety belt buckle pretensioner had actuated during the crash and the buckle stalk measured 17.0 cm (6.7 in) in length resulting in a retraction distance of 4.0 cm (1.6 in) from its original length of 21.0 cm (8.3 in). The safety belt latch plate was abraded where the webbing was routed through the latch plate indicating occupant loading. The abraded area was 4.0 cm (1.6 in) in width, which was equal to the width of the webbing. The safety belt webbing exhibited two scuffs that measured 3.0 cm (1.2 in) and 9.0 cm (3.5 in) in length that were located 40.0 cm (15.7 in) above the stop button. The scuffs resulted from occupant loading and were in contact with the latch plate during the crash. Based on evidence of occupant loading to the safety belt webbing and latch plate, it was determined to have been used to restrain the driver during the crash.

The front row right passenger's safety belt D-ring was set to the full-up position and the latch plate was scratched indicating historical usage. The safety belt buckle pretensioner had actuated during the crash and the buckle stalk measured 17.0 cm (6.7 in) in length resulting in a retraction distance of 4.0 cm (1.6 in) from its original length of 21.0 cm (8.3 in). The safety belt latch plate was abraded where the webbing was routed indicating occupant loading. The abraded area was 4.0 cm (1.6 in) in width which was equal to the width of the webbing. The safety belt webbing exhibited stretch marks measuring 20.0 cm (7.9 in) in length that began 80.0 cm (31.5 in) above the stop button. The

location of the stretch marks was located at the occupant's chest when the belt was in the buckled position. Based on evidence of occupant loading to the safety belt webbing and latch plate, it was determined to have been used to restrain the front right occupant during the crash.

The second row seats were equipped with 3-point manual lap and shoulder belts for all three positions. The safety belts were equipped with integrated ELR/ALR anchorages that were located aft of the seat backs. The safety belts and latch plates did not show evidence indicating historical usage.

Supplemental Restraint System

The vehicle's Supplemental Restraint System (SRS) included an air bag control module (ACM), driver and passenger frontal air bags, seat-mounted side air bags for the front row, inflatable curtain (IC) air bags, and safety belt buckle pretensioners for the front row. The IC air bags were combination Rollover/Side Impact types. The SRS in this vehicle keeps the IC air bags inflated longer during rollover deployments. At impact with the fire hydrant, all the air bags in the vehicle deployed and the safety belt pretensioners actuated.

The Ford was a Certified Advanced 208-Compliant (CAC) vehicle. A CAC vehicle is certified by the manufacturer to be compliant with the Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS) No. 208.

The Ford's advanced dual-stage frontal air bags were designed to deploy based on impact severity. The two frontal air bags deployed due to sufficient longitudinal deceleration during the impact with the fire hydrant. The driver's air bag deployed from the steering wheel hub through an I-configured cover flap. The cover flap opened at the tear points and was not damaged. The front panel of the air bag revealed vinyl striations along its vertical centerline that were deposited by the cover flap during the air bag deployment. The air bag was configured with two internal tethers that were attached near the center of the front panel. Two vent ports were located on the upper aspect of the back panel. The air bag was circular in shape and measured 50.0 cm (19.7 in) in diameter.

The front panel of the frontal air bag revealed load marks in three locations. A group of gray-colored fabric transfers in the upper left quadrant in an area measuring 1.0 x 7.0 cm (0.4 x 2.8 in) in size and located near the perimeter of the air bag near the seam. The largest of the transfers measured 1.0 cm (0.4 in) in length. These marks were probably deposited by the driver's clothing and the driver's left forearm was the probable mechanism. His left hand was gripping the steering wheel rim at the 10 o'clock position.

An skin oil transfer on the upper right quadrant of the front panel measure 1.0 x 5.0 cm (0.4 x 2.0 in) and was located 2.0 cm (0.8 in) from the perimeter seam. The location of the transfer and the driver's kinematics suggested it was probably deposited by the driver's right arm. The driver stated in the interview that his right hand was at the 2 o'clock position on the steering wheel rim.

A group of scuff marks in the lower right quadrant of the front panel were located within an area measuring 4.0 x 5.0 cm (1.6 x 2.0 in) ending near the perimeter seam. Their location and orientation were consistent with the driver's kinematics relative to the direction of force during the frontal air

bag deployment. The scuffs were likely deposited by the driver's right forearm. Based on the driver interview, occupant loading of the frontal air bag did not result in injury.

Figure 6. Left seat-mounted side air bag

The front right occupant's frontal air bag deployed from the top right IP through a rectangular cover flap. The front panel of the air bag measured 40.0 cm (15.7 in) in width by 34.0 cm (13.4 in) in height. The cover flap fractured the right windshield at deployment and a combination of occupant loading and air bag contact displaced a panel in the middle IP and the air vent in the right IP. The air bag revealed three areas of possible occupant loading. A group of transfers located adjacent to the upper left quadrant on the left side panel were grey in color and covered an area measuring 4.0 x 5.0 cm (1.6 x 2.0 in). The location and color of these transfers indicated the air bag was loaded by the front right occupant and in turn contacted the center IP column.

A group of three transfers located in the upper right quadrant of the front panel were consistent with the occupant's kinematics during the right side impacts and their color and shape indicated they were probably make-up transfers deposited when the occupant's face loaded the air bag.

A transfer located in the lower left quadrant of the air bag was light grey in color, measured 2.0 x 3.0 cm (0.8 x 1.2 in) in size, and was probably deposited by the occupant's clothing when her chest loaded the air bag.

The left seat-mounted side air bag deployed from the left seat-back. The air bag was triangular in shape and round at the leading edge. It measured 28.0 x 28.0 cm (11.0 x 11.0 in) in size and covered most of the upper rear quadrant of the left door panel (**Figure 6**). Vertically, the air bag covered the area of the left door panel from the bottom of the side glass to the upper aspect of the arm rest. The air bag was configured without tethers or vent ports.

The outboard panel of the air bag exhibited two scuffs measuring 2.0 cm (0.8 in) and 7.0 cm (2.8 in) indicating contact from the left door panel. The scuffs were in the upper aspect of the air bag and their color was consistent with the padded grey vinyl covering just below the bottom of the side glass. The air bag was probably loaded by the driver during the first quarter-turn of the rollover, and in turn the air bag loaded the door panel resulting in the transfers. At the lower aspect of the outboard panel was a dirt deposit measuring 5.0 cm (2.0 in) that occurred during post-crash salvage activities. The inboard panel of the left seat-mounted side air bag revealed no damage or evidence of occupant loading.

The right seat-mounted side air bag exhibited two scuffs measuring 2.0 cm (0.8 in) and 3.0 cm (1.2 in) on the outboard panel. The color and location of the transfers were consistent with contact from the door's rear upper quadrant. The occupant's kinematics and the transfers to the air bag indicated the front right occupant probably loaded the air bag during the right side impacts. The air bag

exhibited no further damage and was otherwise unremarkable.

Figure 7. Left IC air bag

The left IC air bag deployed from the left roof side rail over the front and second rows. The IC air bag measured 170.0 cm (66.9 in) in length and 32.0 cm (12.6 in) in height. It was configured with a triangular sail at the forward aspect and 10.0 cm (3.9 in) tethers at the forward and rearward aspects. The forward aspect of the inboard panel revealed striations from the roof cladding, dirt deposits, and scuffs (**Figure 7**). The dirt deposits were located within an area measuring 9.0 x 25.0 cm (3.5 x 9.8 in) that began at the forward lower corner and extended upward and rearward. The front left window glazing pre-crash status was closed but then disintegrated during the rollover event. The dirt was deposited either during the rollover or post-crash salvage activities. Within the area of dirt deposit was a group of three scuffs measuring 1.0 cm (0.4 in) each that suggested the IC air bag contacted the ground during the rollover. The left side window was closed prior to the crash and disintegrated during the rollover, exposing the left IC air bag to the ground. The vehicle initiated a left side leading rollover and while it is probable the driver contacted the left IC air bag, during the interview he did not recall contacting the air bag and did not sustain air bag related injuries. The outboard panel of the IC air bag revealed several areas of contact with the ground resulting in dirt deposits and scuffs. During post-impact salvage activities, the left IC air bag was cut in order to allow easier access to the front row.

The right IC air bag revealed a large area of vinyl striations at the forward aspect of the inboard panel. A group of black scuff marks was located in the area near the upper right B-pillar near the roof side rail. The scuff marks were 8.0 cm (3.2 in) in length and their location and vertical orientation suggested they were deposited during deployment rather than from occupant loading. A fabric or skin oil transfer measuring 3.0 x 5.0 cm (1.2 x 2.0 in) was located 12.0 cm (4.7 in) from the bottom edge of the air bag resulted when the front right occupant's right upper arm loaded the IC air bag. The occupant sustained a contusion to the right upper arm and the injury and her kinematics indicated that the IC air bag was the injury mechanism. The right IC air bag was otherwise unremarkable.

Rollover

The Ford had a Static Stability Factor (SSF) rating of 1.33. The SSF of a vehicle is an at-rest calculation of its rollover resistance, which is based on its track width and center of gravity. The vehicle had a rollover resistance rating of 4 out of 5 stars, and had a 13 percent chance of rollover[1]. The vehicle was not equipped with stability or traction control technology.

[1] www.safercar.gov

After the impact with the four trees the vehicle rotated clockwise 90 degrees, at which point the vehicle was traveling west and facing north on a gravel driveway that sloped upward 8.2 percent. The vehicle's left side tires and rims then plowed into the gravel and ground with sufficient opposing lateral force to induce a left side leading trip rollover. The left front and rear tires held gravel between the bead and rim and the rims revealed significant areas of scuffing consistent with contact from the gravel and ground. Based on the EDR, the IC air bags deployed prior to the rollover; the air bags probably remained inflated during the rollover event. The first quarter-turn resulted in left side lateral intrusion of the front row left window frame and disintegration of the front row left side glass. The second quarter-turn resulted in vertical crush to the windshield header. The vehicle came to final rest on its roof and facing northeast.

Due to the gravel surface, the vehicle's post-impact trajectory, and its rotational dynamics, the vehicle's braking forces applied by the driver during the crash did little to reduce the likelihood of a rollover.

A neighbor who was on-scene indicated during the scene inspection the at-rest location and orientation of the Ford. Based on the witness statement, the estimated roll distance of the vehicle was determined to be 4.0 m (13.1 ft). The roll distance was mitigated by the positive 8.2 percent slope of the driveway and the gravel surfaces.

Event Data Recorder

The EDR for this vehicle can record up to two deployment events. This EDR recorded data for one deployment record. Event recorded data are collected both internally (Belt Switch Circuits, Seat Track Position Switch Circuit, Front and Side Impact Sensors, and Occupant Classification Sensor) and externally (Powertrain Control Module, Brake Module) to the EDR. The recorded crash data was summarized as follows:

- At 51.5 milliseconds (msec) after Algorithm Enable (AE) the frontal air bags deployed and the safety belt pretensioners actuated.
- At 52.5 msec after AE the right passenger IC air bag deployed.
- At 54.5 msec after AE the right passenger seat-mounted side air bag deployed.
- At 87.0 msec after AE the driver's IC air bag deployed.
- At 89.0 msec after AE the driver's seat-mounted side air bag deployed.
- The Driver and Passenger Seat Belt Switch Circuit Status was "BUCKLED".
- At AE Vehicle Speed was 76.4 km/h (47.5 mph).
- At 100 msec after AE the Cumulative Longitudinal Velocity Change was -16.56 km/h (-10.29 mph).
- At 0.0 msec the Cumulative Lateral Velocity Change was -4.75 km/h (-2.95 mph).

Occupant Demographics

Driver

Age/Sex:	17 years/Male
Height:	183 cm (72 in)
Weight:	59 kg (130 lb)
Seat type:	Bucket with adjustable head restraint
Seat track position:	Between middle and full-rear
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection
Air bags:	Frontal air bag, seat-mounted side air bag, and IC air bag, deployed
Alcohol, drug involvement:	None
Type of medical treatment:	None

Front Right Occupant

Age/Sex:	16 years/Female
Height:	163 cm (64 in)
Weight:	54 kg (119 lb)
Seat type:	Bucket with adjustable head restraint
Seat track position:	Between full-forward and middle
Manual restraint usage:	Lap and shoulder belt
Usage source:	Vehicle inspection
Air bags:	Frontal air bag, seat-mounted side air bag, and IC air bag, deployed
Type of medical treatment:	None

Occupant Kinematics

Driver

The 17-year-old male driver was seated in an upright posture and was restrained by the vehicle's lap and shoulder belt. At 4.0 seconds prior to AE, the vehicle was traveling in the northbound lane at an EDR reported speed of 95.5 km/h (59.3 mph). At that point, the roadway was straight and had a slight positive grade. As the vehicle entered the left curve, the driver was actively steering the vehicle with both hands and negotiating the curve. The vehicle departed the roadway on the right side and traveled across a shoulder of loose gravel. Due to the pronounced curve and the vehicle's high speed relative to roadway conditions, the vehicle rotated slightly counterclockwise and departed the roadway. The driver braked with his right foot prior to impact; the EDR reported that at AE an ABS event was In Progress and the Brake Lamp Switch was Depressed.

The vehicle's right side plane then impacted the fire hydrant, the driver's frontal and side air bags deployed and the safety belt pretensioners actuated. The driver was displaced forward and right in response to the direction of force, and he loaded the safety belt and frontal air bag. The safety belt webbing and latch plate revealed load marks and the air bag revealed a fabric transfer and a skin oil transfer. The driver's right hip contacted either the safety belt webbing or buckle resulting in an abrasion to the right hip. The vehicle then impacted four small-diameter trees with its right side and a telephone utility marker with its front end. The driver was held in place in his seat by the safety belt and actuated pretensioner.

Following the horizontal impacts, the vehicle rotated 90 degrees clockwise and initiated a left side leading trip rollover. During the first quarter-turn the driver was displaced to the left, loaded the left IC air bag with his forearm, and loaded the seat-mounted side air bag with his left shoulder. The left side glass disintegrated and the IC air bag contacted the ground. The IC air bag shielded the driver from the flying glass and the ground. The outboard panel of the seat-mounted side air bag exhibited scuff marks from contact with the side door panel when the occupant loaded to the air bag. The vehicle then rolled a second quarter-turn and came to rest on its roof. During the second quarter-turn the driver was displaced toward the roof and then suspended upside down in his seat. After the vehicle came to rest, the driver unbuckled his safety belt and exited the vehicle through the second row right side door. He awaited the arrival of on-scene responders and was transported home by a family member. The driver did not miss school due to injury and did not seek medical treatment.

Front Right Occupant

The 16-year-old female occupant was seated in an upright posture and was restrained by the vehicle's lap and shoulder belt. Her feet were on the floor and her arms and hands were resting at her sides. At impact with the fire hydrant, the occupant's frontal and side air bags deployed and her safety belt pretensioner actuated. She loaded the safety belt and latch plate depositing stretch marks to the webbing and scuff marks to the latch plate. She loaded the frontal air bag resulting in a scuff to the left side panel, a make-up transfer to the upper right quadrant of the front panel, and a fabric transfer to the lower right quadrant of the front panel. When the occupant loaded the air bag, the air bag in turn contacted the trim panel in the middle IP and the air vent on the right IP, displacing both components. No injuries resulted from occupant loading of the safety belt or frontal air bag. She

contacted right seat-mounted side air bag with her right shoulder resulting in two scuffs to the outboard panel from the door panel. She loaded the IC air bag with her right upper arm, sustaining a contusion to the right upper arm consistent with a transfer to the right IC air bag.

During the first quarter-turn of the rollover, the occupant was displaced to the left but remained in her seat, held in place by the vehicle's safety belt and the actuated pretensioner. During the second quarter-turn she was displaced toward the roof and then suspended upside down in her seat. Once the vehicle came to rest on its roof, the occupant unbuckled her safety belt and was assisted into the second row by the driver. She then exited the vehicle through the second row right side door. The occupant was mobile at the scene and awaited the arrival of on-scene responders. She was transported home by a family member. The front right occupant did not miss school due to injury and did not seek medical treatment.

Occupant Injuries

Injury data was obtained from the driver interview.

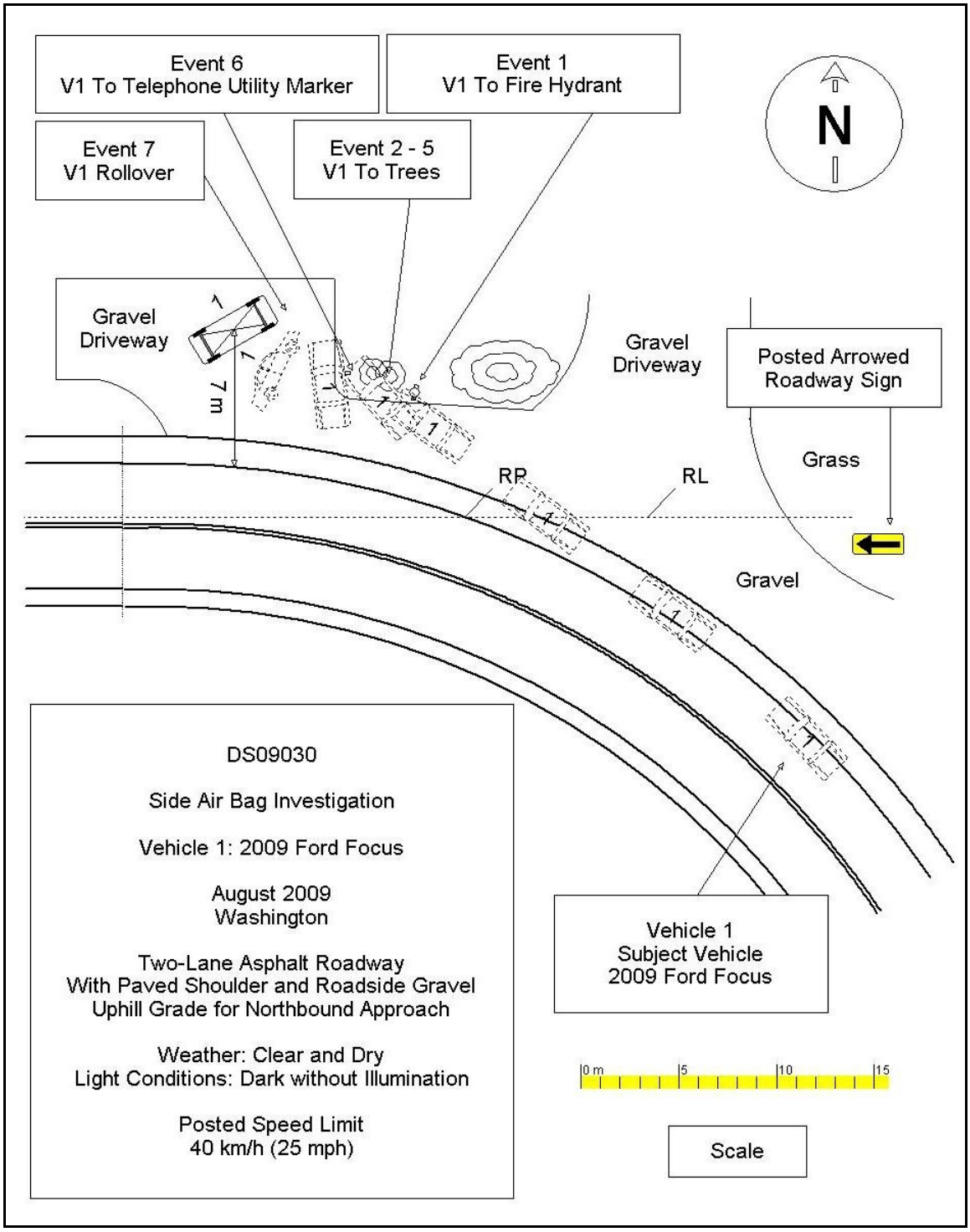
Driver

Injury	OIC Code	Injury Mechanism	Confidence Level
Abrasion, right hip	890202.1, 1	Safety belt webbing, buckle	Certain

Front Right Occupant

Injury	OIC Code	Injury Mechanism	Confidence Level
Contusion, right upper arm	790402.1, 1	Right IC air bag	Probable

Attachment 1. Scene Diagram



Attachment 2. Bosch EDR Crash Data Report

CDR File Information

User Entered VIN	1FAHP36N49W******
User	
Case Number	
EDR Data Imaging Date	
Crash Date	
Filename	
Saved on	
Collected with CDR version	Crash Data Retrieval Tool 3.3
Reported with CDR version	Crash Data Retrieval Tool 3.3
EDR Device Type	airbag control module
ACM Adapter Detected During Download	No
Event(s) Recovered	1
First Event Recorded	Deployment event status undefined

IMPORTANT NOTICE: Robert Bosch LLC recommends that the latest production release of Crash Data Retrieval software be utilized when viewing, printing or exporting any retrieved data from within the CDR program. This ensures that the retrieved data has been translated using the most recent information including but not limited to that which was provided by the manufacturers of the vehicles supported in this product.

Module Information

The retrieval of this data has been authorized by the vehicle's owner, or other legal authority such as a subpoena or search warrant, as indicated by the CDR tool user on Tuesday, October 20 2009 at 09:02:50 AM .

Restraints Control Module Recorded Crash Events:
Deployment Events cannot be overwritten or cleared from the Restraints Control Module (RCM). Once the RCM has deployed any airbag device, the RCM must be replaced. The data from events which did not qualify as deployable events can be overwritten by subsequent events.
The RCM can store up to two deployment events.

Airbag Module Data Limitations:

• Restraints Control Module Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced from the point of algorithm wake up. It is not the speed the vehicle was traveling before the event. Note that the vehicle speed is recorded separately five seconds prior to algorithm wake up. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change.
• Event Recording Complete will indicate if data from the recorded event has been fully written to the RCM memory or if it has been interrupted and not fully written.
• If power to the Airbag Module is lost during a crash event, all or part of the crash record may not be recorded.

Airbag Module Data Sources:
• Event recorded data are collected either INTERNALLY or EXTERNALLY to the RCM.

- INTERNAL DATA is measured, calculated, and stored internally, sensors external to the RCM include the following:
> The Driver and Passenger Belt Switch Circuits are wired directly to the RCM.
> The Driver's Seat Track Position Switch Circuit is wired directly to the RCM.
> The Side Impact Sensors (if equipped) are located on the side of vehicle and are wired directly to the RCM.
> The Occupant Classification Sensor is located in the front passenger seat and transmits data directly to the RCM on high-speed CAN bus.
> Front Impact Sensors (right and left) are located at the front of vehicle and are wire directly to the RCM.

- EXTERNAL DATA recorded by the RCM are data collected from the vehicle communication network from various sources such as Powertrain Control Module, Brake Module …

System Status at Time of Data Retrieval

VIN as programmed into RCM at factory	1FAHP36N49W******
Current Lifetime Operating Timer (sec)	94,059
Deployment Command Counter	1
First Record Recording Status	Completed & Locked
Second Record Recording Status	No Data
Restraints Control Module Part Number	9S43-14B321-CB
Restraints Control Module (Serial Number)	301C1312
Occupant Classification System ECU (Serial Number)	474?554714629112
Driver Front Crash Sensor (Serial Number)	04C1718F
Driver 1st Row Side Crash Sensor (Serial Number)	085BCEA9
Passenger 1st Row Side Crash Sensor (Serial Number)	086AC527
Driver 2nd Row Side Crash Sensor (Serial Number)	04C76214
Passenger 2nd Row Side Crash Sensor (Serial Number)	04C5DE55

Deployment Data (First Record)

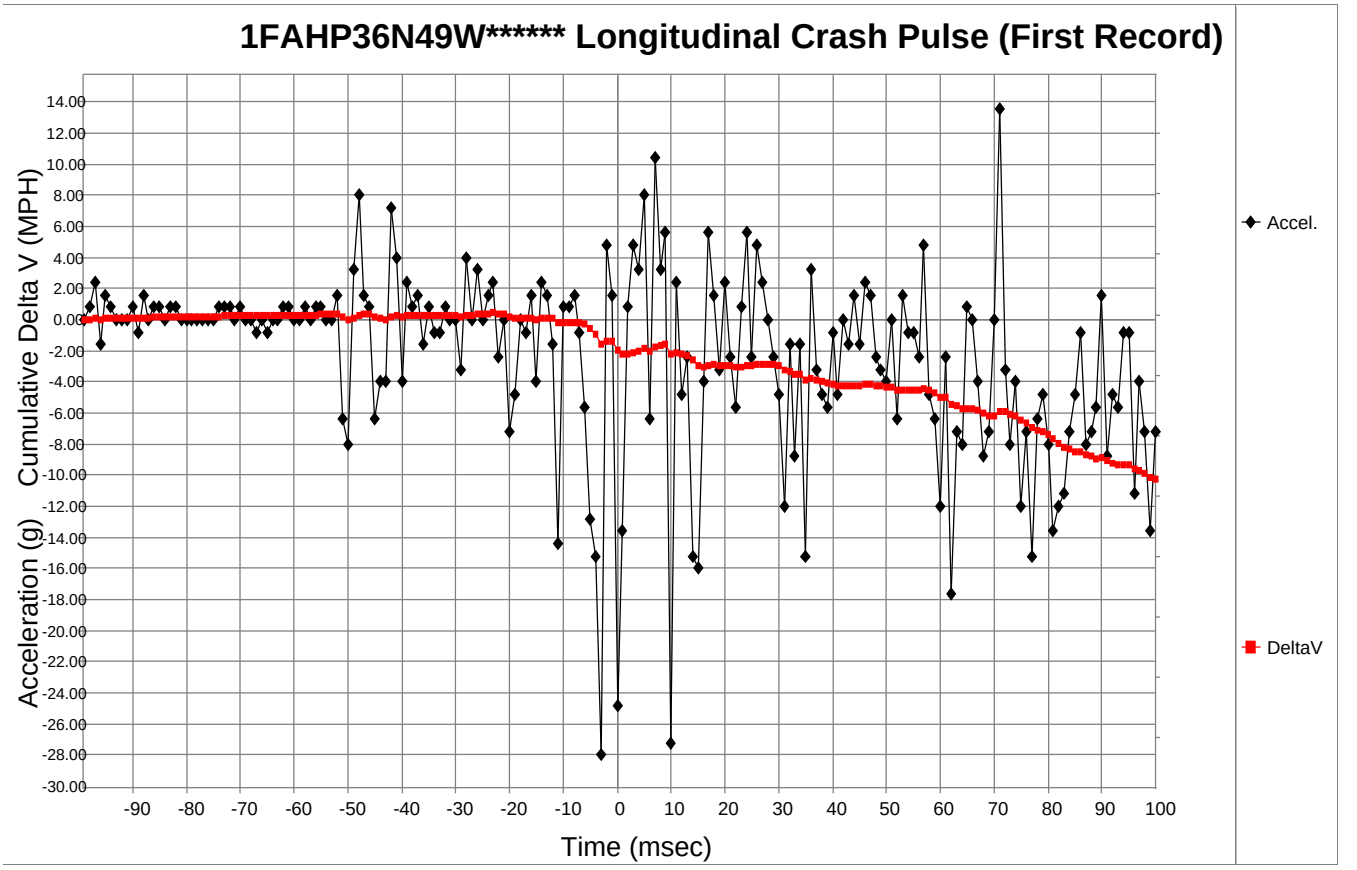
Driver First Stage Airbag Deployment Time (msec)	51.5
Driver Second Stage Airbag Deployment Time (msec)	201.5
Passenger First Stage Airbag Deployment Time (msec)	51.5
Passenger Second Stage Airbag Deployment Time (msec)	201.5
Driver Pretensioner Deployment Time (msec)	51.5
Passenger Pretensioner Deployment Time (msec)	51.5
Driver SIDE Airbag Deployment Time (msec)	89.0
Passenger SIDE Airbag Deployment Time (msec)	54.5
Driver CURTAIN Airbag Deployment Time (msec)	87.0
Passenger CURTAIN Deployment Time (msec)	52.5

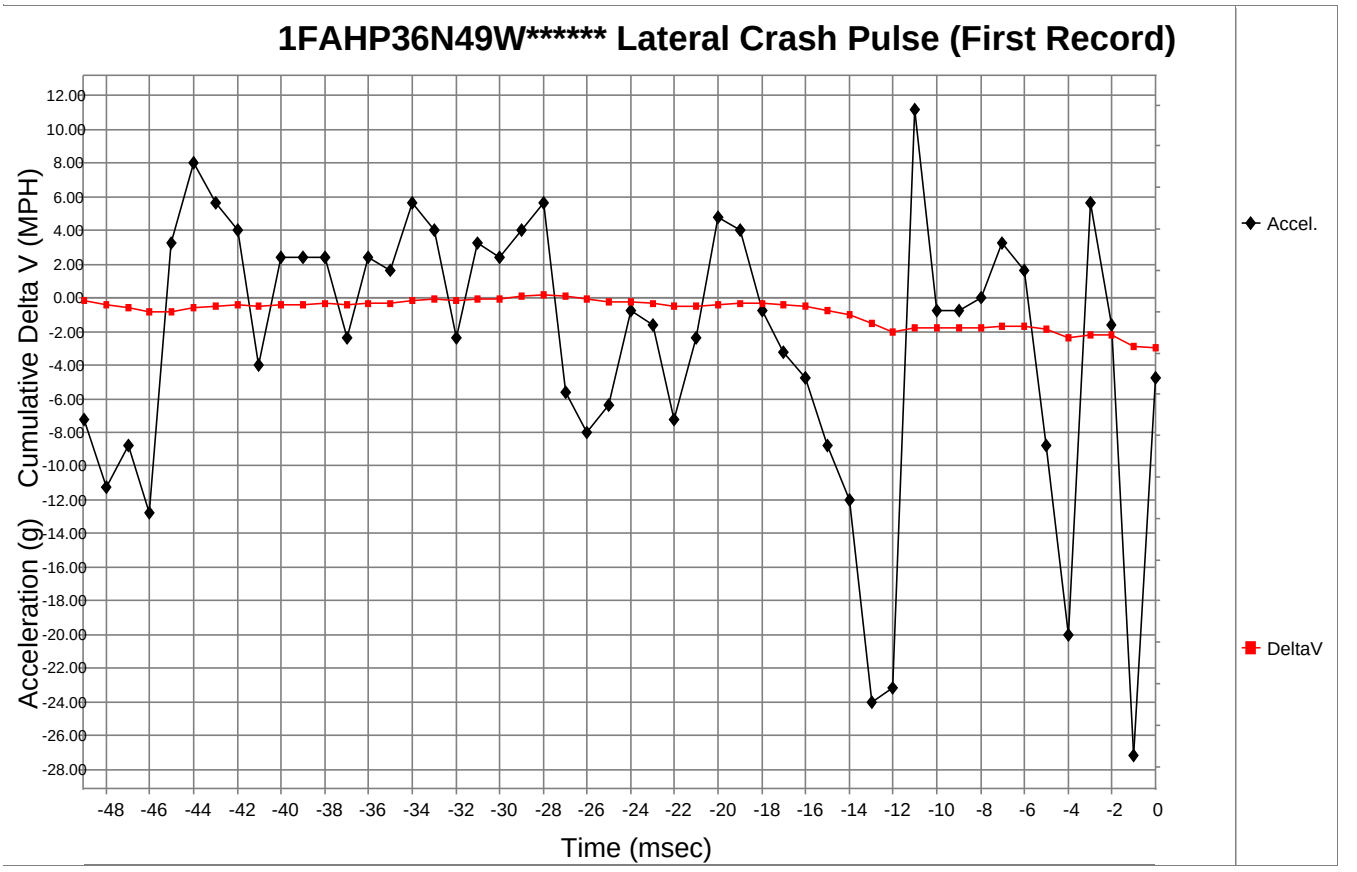
System Status at Event (First Record)

Lifetime Operating Timer at Algorithm Wake-up (sec)	74,594
Key On Timer at Algorithm Wake-up (sec)	1,314
Battery voltage at Algorithm Wake-up (volts)	13.72
RCM Energy Reserve voltage at Algorithm Wake-up (volts)	24.72
Driver Seat Belt Switch Circuit Status at Algorithm Wake-up	Buckled
Driver Seat Belt Switch Fault at Algorithm Wake-up	No
Driver Seat Track Forward of Switch Point at Algorithm Wake-up	Not Forward
Driver Seat Track Position Switch Fault at Algorithm Wake-up	No
Passenger Seat Belt Switch Circuit Status at Algorithm Wake-up	Buckled
Passenger Seat Belt Switch Fault at Algorithm Wake-up	No
Passenger Classification Status at Algorithm Wake-up	Occupied Enable Small
OCS Passenger State at Algorithm Wake-up	Small
Driver Front Crash Sensor Fault at Algorithm Wake-up	No
Driver SIDE Crash Sensor Row 1 Fault at Algorithm Wake-up	No
Driver SIDE Crash Sensor Row 2 Fault at Algorithm Wake-up	No
Passenger Front Crash Sensor Fault at Algorithm Wake-up	No
Passenger SIDE Crash Sensor Row 1 Fault at Algorithm Wake-up	No
Passenger SIDE Crash Sensor Row 2 Fault at Algorithm Wake-up	No

Pre-Crash Data (First Record)

Time (sec)	-4	-3	-2	-1	0
Accelerator Pedal Position (%)	9	0	0	10	0
Vehicle Speed (MPH [km/h])	59.3 [95.5]	57.7 [92.9]	55.1 [88.6]	52.1 [83.9]	47.5 [76.4]
ABS Event in Progress	No	No	No	No	Yes
ESP Event in Progress	No	No	No	No	No
TCS Event in Progress	No	No	No	No	No
Brake Lamp Switch Depressed (from PCM)	No	Yes	Yes	No	Yes
RCM Serial Number Received by OCS	Yes	Yes	Yes	Yes	Yes
OCS Sensor Status	Occupied Enable Small	Occupied Enable Small	Occupied Enable Small	Occupied Enable Small	Occupied Enable Small
OCS System Level 1 Fault	No	No	No	No	No
OCS System Level 2 Fault	No	No	No	No	No
Vehicle Calibration ID	4F	4F	4F	4F	4F
Vehicle Model Year Calibration ID	08	08	08	08	08


1FAHP36N49W****** Longitudinal Crash Pulse (First Record)
Cumulative Delta V (MPH)
Acceleration (g)
Time (msec)
Accel.
DeltaV


1FAHP36N49W****** Lateral Crash Pulse (First Record)
Cumulative Delta V (MPH)
Acceleration (g)
Time (msec)
Accel.
DeltaV

Longitudinal Crash Pulse (First Record)

Time (msec)	Recorded Vehicle Longitudinal Acceleration (g)	Cumulative Longitudinal Velocity Change (MPH [km/h])
-99	0.00	0.00 [0.00]
-98	0.80	0.02 [0.03]
-97	2.40	0.07 [0.11]
-96	-1.60	0.04 [0.06]
-95	1.60	0.07 [0.11]
-94	0.80	0.09 [0.14]
-93	0.00	0.09 [0.14]
-92	0.00	0.09 [0.14]
-91	0.00	0.09 [0.14]
-90	0.80	0.11 [0.18]
-89	-0.80	0.09 [0.14]
-88	1.60	0.12 [0.19]
-87	0.00	0.12 [0.19]
-86	0.80	0.14 [0.23]
-85	0.80	0.16 [0.26]
-84	0.00	0.16 [0.26]
-83	0.80	0.18 [0.29]
-82	0.80	0.19 [0.31]
-81	0.00	0.19 [0.31]
-80	0.00	0.19 [0.31]
-79	0.00	0.19 [0.31]
-78	0.00	0.19 [0.31]
-77	0.00	0.19 [0.31]
-76	0.00	0.19 [0.31]
-75	0.00	0.19 [0.31]
-74	0.80	0.21 [0.34]
-73	0.80	0.23 [0.37]
-72	0.80	0.25 [0.40]
-71	0.00	0.25 [0.40]
-70	0.80	0.26 [0.42]
-69	0.00	0.26 [0.42]
-68	0.00	0.26 [0.42]
-67	-0.80	0.25 [0.40]
-66	0.00	0.25 [0.40]
-65	-0.80	0.23 [0.37]
-64	0.00	0.23 [0.37]
-63	0.00	0.23 [0.37]
-62	0.80	0.25 [0.40]
-61	0.80	0.26 [0.42]
-60	0.00	0.26 [0.42]
-59	0.00	0.26 [0.42]
-58	0.80	0.28 [0.45]
-57	0.00	0.28 [0.45]
-56	0.80	0.30 [0.48]
-55	0.80	0.32 [0.51]
-54	0.00	0.32 [0.51]
-53	0.00	0.32 [0.51]
-52	1.60	0.35 [0.56]
-51	-6.40	0.21 [0.34]
-50	-8.00	0.04 [0.06]

Time (msec)	Recorded Vehicle Longitudinal Acceleration (g)	Cumulative Longitudinal Velocity Change (MPH [km/h])
-49	3.20	0.11 [0.18]
-48	8.00	0.28 [0.45]
-47	1.60	0.32 [0.51]
-46	0.80	0.33 [0.53]
-45	-6.40	0.19 [0.31]
-44	-4.00	0.11 [0.18]
-43	-4.00	0.02 [0.03]
-42	7.20	0.18 [0.29]
-41	4.00	0.26 [0.42]
-40	-4.00	0.18 [0.29]
-39	2.40	0.23 [0.37]
-38	0.80	0.25 [0.40]
-37	1.60	0.28 [0.45]
-36	-1.60	0.25 [0.40]
-35	0.80	0.26 [0.42]
-34	-0.80	0.25 [0.40]
-33	-0.80	0.23 [0.37]
-32	0.80	0.25 [0.40]
-31	0.00	0.25 [0.40]
-30	0.00	0.25 [0.40]
-29	-3.20	0.18 [0.29]
-28	4.00	0.26 [0.42]
-27	0.00	0.26 [0.42]
-26	3.20	0.33 [0.53]
-25	0.00	0.33 [0.53]
-24	1.60	0.37 [0.60]
-23	2.40	0.42 [0.68]
-22	-2.40	0.37 [0.60]
-21	0.00	0.37 [0.60]
-20	-7.20	0.21 [0.34]
-19	-4.80	0.11 [0.18]
-18	0.00	0.11 [0.18]
-17	-0.80	0.09 [0.14]
-16	1.60	0.12 [0.19]
-15	-4.00	0.04 [0.06]
-14	2.40	0.09 [0.14]
-13	1.60	0.12 [0.19]
-12	-1.60	0.09 [0.14]
-11	-14.40	-0.23 [-0.37]
-10	0.80	-0.21 [-0.34]
-9	0.80	-0.19 [-0.31]
-8	1.60	-0.16 [-0.26]
-7	-0.80	-0.18 [-0.29]
-6	-5.60	-0.30 [-0.48]
-5	-12.80	-0.58 [-0.93]
-4	-15.20	-0.91 [-1.46]
-3	-28.00	-1.53 [-2.46]
-2	4.80	-1.42 [-2.29]
-1	1.60	-1.39 [-2.24]
0	-24.80	-1.93 [-3.11]

Longitudinal Crash Pulse (First Record) - Continued

Time (msec)	Recorded Vehicle Longitudinal Acceleration (g)	Cumulative Longitudinal Velocity Change (MPH [km/h])
1	-13.60	-2.23 [-3.59]
2	0.80	-2.21 [-3.56]
3	4.80	-2.11 [-3.40]
4	3.20	-2.04 [-3.28]
5	8.00	-1.86 [-2.99]
6	-6.40	-2.00 [-3.22]
7	10.40	-1.77 [-2.85]
8	3.20	-1.70 [-2.74]
9	5.60	-1.58 [-2.54]
10	-27.20	-2.18 [-3.51]
11	2.40	-2.13 [-3.43]
12	-4.80	-2.23 [-3.59]
13	-2.40	-2.28 [-3.67]
14	-15.20	-2.62 [-4.22]
15	-16.00	-2.97 [-4.78]
16	-4.00	-3.06 [-4.92]
17	5.60	-2.93 [-4.72]
18	1.60	-2.90 [-4.67]
19	-3.20	-2.97 [-4.78]
20	2.40	-2.92 [-4.70]
21	-2.40	-2.97 [-4.78]
22	-5.60	-3.09 [-4.97]
23	0.80	-3.07 [-4.94]
24	5.60	-2.95 [-4.75]
25	-2.40	-3.00 [-4.83]
26	4.80	-2.90 [-4.67]
27	2.40	-2.85 [-4.59]
28	0.00	-2.85 [-4.59]
29	-2.40	-2.90 [-4.67]
30	-4.80	-3.00 [-4.83]
31	-12.00	-3.27 [-5.26]
32	-1.60	-3.30 [-5.31]
33	-8.80	-3.50 [-5.63]
34	-1.60	-3.53 [-5.68]
35	-15.20	-3.86 [-6.21]
36	3.20	-3.79 [-6.10]
37	-3.20	-3.86 [-6.21]
38	-4.80	-3.97 [-6.39]
39	-5.60	-4.09 [-6.58]
40	-0.80	-4.11 [-6.61]
41	-4.80	-4.22 [-6.79]
42	0.00	-4.22 [-6.79]
43	-1.60	-4.25 [-6.84]
44	1.60	-4.22 [-6.79]
45	-1.60	-4.25 [-6.84]
46	2.40	-4.20 [-6.76]
47	1.60	-4.16 [-6.69]
48	-2.40	-4.22 [-6.79]
49	-3.20	-4.29 [-6.90]
50	-4.00	-4.37 [-7.03]
51	0.00	-4.37 [-7.03]
52	-6.40	-4.51 [-7.26]
53	1.60	-4.48 [-7.21]
54	-0.80	-4.50 [-7.24]
55	-0.80	-4.51 [-7.26]
56	-2.40	-4.57 [-7.35]
57	4.80	-4.46 [-7.18]
58	-4.80	-4.57 [-7.35]
59	-6.40	-4.71 [-7.58]
60	-12.00	-4.97 [-8.00]
61	-2.40	-5.02 [-8.08]
62	-17.60	-5.41 [-8.71]
63	-7.20	-5.57 [-8.96]
64	-8.00	-5.74 [-9.24]
65	0.80	-5.73 [-9.22]
66	0.00	-5.73 [-9.22]
67	-4.00	-5.81 [-9.35]
68	-8.80	-6.01 [-9.67]
69	-7.20	-6.16 [-9.91]
70	0.00	-6.16 [-9.91]
71	13.60	-5.87 [-9.45]
72	-3.20	-5.94 [-9.56]
73	-8.00	-6.11 [-9.83]
74	-4.00	-6.20 [-9.98]
75	-12.00	-6.46 [-10.40]
76	-7.20	-6.62 [-10.65]
77	-15.20	-6.96 [-11.20]
78	-6.40	-7.10 [-11.43]
79	-4.80	-7.20 [-11.59]
80	-8.00	-7.38 [-11.88]
81	-13.60	-7.68 [-12.36]
82	-12.00	-7.94 [-12.78]
83	-11.20	-8.18 [-13.16]
84	-7.20	-8.34 [-13.42]
85	-4.80	-8.45 [-13.60]
86	-0.80	-8.47 [-13.63]
87	-8.00	-8.64 [-13.90]
88	-7.20	-8.80 [-14.16]
89	-5.60	-8.92 [-14.36]
90	1.60	-8.89 [-14.31]
91	-8.80	-9.08 [-14.61]
92	-4.80	-9.19 [-14.79]
93	-5.60	-9.31 [-14.98]
94	-0.80	-9.33 [-15.02]
95	-0.80	-9.34 [-15.03]
96	-11.20	-9.59 [-15.43]
97	-4.00	-9.68 [-15.58]
98	-7.20	-9.84 [-15.84]
99	-13.60	-10.13 [-16.30]
100	-7.20	-10.29 [-16.56]

Lateral Crash Pulse (First Record)

Time (msec)	Recorded Vehicle Lateral Acceleration (g)	Cumulative Lateral Velocity Change (MPH [km/h])
-49	-7.20	-0.16 [-0.26]
-48	-11.20	-0.40 [-0.64]
-47	-8.80	-0.60 [-0.97]
-46	-12.80	-0.88 [-1.42]
-45	3.20	-0.81 [-1.30]
-44	8.00	-0.63 [-1.01]
-43	5.60	-0.51 [-0.82]
-42	4.00	-0.42 [-0.68]
-41	-4.00	-0.51 [-0.82]
-40	2.40	-0.46 [-0.74]
-39	2.40	-0.40 [-0.64]
-38	2.40	-0.35 [-0.56]
-37	-2.40	-0.40 [-0.64]
-36	2.40	-0.35 [-0.56]
-35	1.60	-0.32 [-0.51]
-34	5.60	-0.19 [-0.31]
-33	4.00	-0.11 [-0.18]
-32	-2.40	-0.16 [-0.26]
-31	3.20	-0.09 [-0.14]
-30	2.40	-0.04 [-0.06]
-29	4.00	0.05 [0.08]
-28	5.60	0.18 [0.29]
-27	-5.60	0.05 [0.08]
-26	-8.00	-0.12 [-0.19]
-25	-6.40	-0.26 [-0.42]
-24	-0.80	-0.28 [-0.45]
-23	-1.60	-0.32 [-0.51]
-22	-7.20	-0.47 [-0.76]
-21	-2.40	-0.53 [-0.85]
-20	4.80	-0.42 [-0.68]
-19	4.00	-0.33 [-0.53]
-18	-0.80	-0.35 [-0.56]
-17	-3.20	-0.42 [-0.68]
-16	-4.80	-0.53 [-0.85]
-15	-8.80	-0.72 [-1.16]
-14	-12.00	-0.98 [-1.58]
-13	-24.00	-1.51 [-2.43]
-12	-23.20	-2.02 [-3.25]
-11	11.20	-1.77 [-2.85]
-10	-0.80	-1.79 [-2.88]
-9	-0.80	-1.81 [-2.91]
-8	0.00	-1.81 [-2.91]
-7	3.20	-1.74 [-2.80]
-6	1.60	-1.70 [-2.74]
-5	-8.80	-1.90 [-3.06]
-4	-20.00	-2.34 [-3.77]
-3	5.60	-2.21 [-3.56]
-2	-1.60	-2.25 [-3.62]
-1	-27.20	-2.85 [-4.59]
0	-4.80	-2.95 [-4.75]