Side Air Curtain Investigation/ Vehicle to Vehicle
Dynamic Science, Inc. / Case Number: DS04022
2004 Saturn Vue Sport Utility Vehicle
Colorado
November, 2004

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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-scene investigation focused primarily on the deployment of a side air curtain resultant to a head-on crash that occurred in the state of Colorado. In addition, the dual frontal air bag units deployed due to the significant frontal impact. This two vehicle, front to front head-on impact occurred November 2004. The case vehicle is a 2004 Saturn Vue all-wheel-drive (AWD) four-door sport utility vehicle that was being driven by a restrained 17 year old female who was proceeding westbound. The front, right seat was occupied by a 15 year-old female. The other vehicle was a 2001 Chevrolet Prizm four-door sedan that was being driven by a police reported restrained 72 year-old male. The driver of the Prizm was proceeding southbound. The Prizm veered left and crossed the centerlines. The driver of the case vehicle detected the Geo Prizm cross the centerlines and she applied the brakes in an effort to avoid the impending crash. The front of the Prizm impacted the front left bumper corner of the case vehicle in an off-set frontal impact. As a result of the frontal impact, both front air bags, in addition to the driver's head curtain side air bag, deployed. The driver of the case vehicle sustained numerous facial abrasions due to contact with the front and side air bags. In addition, she sustained an abrasion to her left upper arm and a left clavicle contusion due to loading the shoulder belt webbing. The front right seated passenger sustained a facial laceration and left forearm contusion due to contact with the front, right passenger air bag. The driver of the other vehicle died.

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Dynamic Science, Inc.
Crash Investigation
Case Number: DS04022

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BACKGROUND:

Description

This on-site investigation focused on the performance of the frontal air bags and side curtain air bags installed in a 2004 Saturn Vue sport utility vehicle. The Vue was occupied by a restrained 17-year-old female driver and a restrained 15-year-old front right seat passenger. The Vue was struck in the front end by a 2001 Chevrolet Prizm. The impact resulted in sufficient longitudinal deceleration to command the deployment of the frontal air bags and left side air curtain. The Vue rotated in a counterclockwise direction and came to rest off the roadway facing southeast. The driver of the case vehicle sustained numerous facial abrasions due to contact with the front and side air bags. In addition, she sustained an abrasion to her left upper arm and a left clavicle contusion due to loading the shoulder belt webbing. The front right seated passenger sustained a facial laceration and left forearm contusion due to contact with the front, right passenger air bag. Both occupants were extricated from the vehicle by fire rescue personnel and transported by ground ambulance to a local hospital where they were treated for their injuries and released the same day of the crash.

This case was initially reported to DSI by a state trooper in Colorado on November 10, 2004. DSI reported the case to NHTSA and was subsequently assigned the case on November 23, 2004. The Electronic Data Recorder (EDR) results were obtained from the investigating police agency. Field work was completed on November 30, 2004.

SUMMARY:

Crash Site

This on-scene investigation focused primarily on the deployment of a side curtain air bag in a head-on crash that occurred in the state of Colorado. In addition, the dual frontal air bags deployed due to the significant frontal impact. This two vehicle, head-on impact occurred in November 2004 at 1457 hours. It was daytime, the weather was clear and the level asphalt surface was dry. The roadway consists of a westbound travel lane and one eastbound travel lane. A yellow, dashed (pass with care) centerline is present for eastbound traffic while a solid yellow (no passing) centerline exists for eastbound traffic. The roadway is bordered by solid white fog lines with adjacent paved shoulders. There is a depressed field area bordering the roadway. The posted speed limit is 89 km/h (55 mph) and there were no traffic controls present.

Figure 1. Direction of travel, and impact areas (west) case vehicle

Pre-Crash

The case vehicle is a 2004 Saturn Vue four-door sport utility vehicle that was being driven by a restrained 17 year old female who was proceeding westbound. The front, right seat was occupied by a 15 year-old female who was also wearing the available three-point manual lap and shoulder restraint.

The other vehicle was a 2001 Chevrolet Prizm four-door sedan that was being driven by a 72 year-old male. The police reported that the driver was restrained. The driver of the Prizm was proceeding southbound at a police estimated speed of 89 km/h (55 mph). The investigating police officer and a witness indicated that the driver of the Prizm may have suffered a sudden incapacitating medical condition which ultimately caused the driver to apply an abrupt left steering input . This caused the Prizm to traverse the centerlines and enter the opposing westbound travel lane.

Crash

The 17 year-old driver of the case vehicle detected the Geo Prizm cross the centerlines and she applied the brakes in an effort to avoid the impending crash. The investigating police officer documented longitudinal skid marks from the case vehicle that measured 3.0 m (9.8 ft.) in length. The front of the Prizm impacted the front left bumper corner of the case vehicle (12FLEW4) in an off-set head-on impact. As a result of the significant frontal impact, both front air bags in addition to the driver's side curtain air bag deployed. The case vehicle's EDR revealed that the case vehicle underwent a 50.58 km/h (-31.43) change in velocity and a calculation utilizing the Missing Vehicle Algorithm of WinSmash showed a Delta V of 59.0 km/h (36.7 mph) with a latitudinal Delta V of -10.2 km/h (-6.4 mph).

Figure 2. Front, left three-quarter view showing frontal deformation and "snagged" left front tire of case vehicle

Post-Crash

The case vehicle rotated counterclockwise, departed the north roadside as it traveled backwards in a northwesterly direction for approximately 15.5 m (51.0 ft.) before coming to rest in a dirt field facing in a southeasterly direction. The Prizm initiated a rapid counterclockwise fashion as it was thrust 5.2m (17.0 ft.) in a southwesterly direction before coming to rest straddling the south road edge line and facing southwest.

The front doors of the case vehicle were jammed shut, so the driver and front right seated passenger could not exit the vehicle after the crash. Fire rescue personnel were notified at 1459 hours (2 minutes post-crash) and arrived on scene at 1503 hours (six minutes post-crash). It was apparent to the police and rescue personnel that the occupants of the case vehicle were conscious and had sustained visible non-incapacitating injuries. Both occupants were extricated from the vehicle by fire rescue personnel and transported by ground ambulance to a local hospital, where they were treated for their injuries and released that same day.

Figure 3. Final rest area (northwest) case vehicle

The driver of the case vehicle sustained numerous facial abrasions (AIS-1) due to contact with the front and side air bags. In addition, she sustained an abrasion to her left upper arm (AIS-1) and a left clavicle contusion (AIS-1) due to loading the shoulder belt webbing. The front right seated passenger sustained a facial laceration (AIS-1) and left forearm contusion (AIS-1) due to contact with the front, right passenger air bag.

The driver of the other vehicle succumbed due to his injuries. He was found unconscious and unresponsive behind the steering wheel of the vehicle. A witness that arrived at the vehicle, immediately after the crash, indicated that it was evident that the driver had expired. The county coroner pronounced him deceased at 1515 hours (18 minutes post-crash).

Both vehicles were towed from the scene to an official police impound lot.

VEHICLE DATA - 2004 Saturn Vue Sport Utility Vehicle

The 2004 Saturn Vue Sport Utility Vehicle was identified by the Vehicle Identification Number (VIN): 5GZCZ63414SXXXXXX. The 2004 Saturn Vue Sport Utility Vehicle was equipped with a 3.5 liter V6 cylinder engine along with a 5-speed automatic transmission. The case vehicle was equipped with power assisted, ventilated front disc and rear drum brakes. The vehicle's drive system consists of an All Wheel Drive train, with power assisted steering and a four-wheel independent suspension system. The reading from the instrument panel odometer was not readable due to LED and power outage.

The 2004 Saturn Vue Sport Utility Vehicle was equipped with Bidgestone Dueler H/T P235/60R17 tires. The recommended cold pressure is 207 kPa (30 psi). The specific tire data is as follows:

Tire	Tread	Measured pressure	Manufacturer recommended pressure
LF	7 mm (9/32 in)	Flat	276 kPa (40 psi)
LR	8 mm (10/32 in)	Flat	276 kPa (40 psi)
RR	8 mm (10/32 in)	Flat	276 kPa (40 psi)
RF	8 mm (10/32 in)	179 kPa (26 psi)	276 kPa (40 psi)

The front seating positions in the 2004 Saturn were configured with combination fabric/leather covered forward facing bucket seats. Both front bucket seats are equipped with adjustable head restraints that were undamaged. The seat track position for the left front seat is unknown, but based on the position of the front, right seat, it is suspected to be close to the mid position. The front, left seat rotated slightly in a counterclockwise fashion due to longitudinal intrusion from the toe pan/floor, instrument panel and left A-pillar. The front, right seat was undamaged and the seat back was found to be fully reclined. This likely occurred post-crash, either as a result of emergency medical personnel or police removal of the EDR module.

The second seating row consists of a combination fabric /leather covered split bench with folding back(s). There are adjustable head restraints available at the outboard rear seated positions and they were undamaged.

VEHICLE DAMAGE

Exterior Damage - 2004 Saturn Vue Sport Utility Vehicle

Damage Description:	The case vehicle sustained major damage to its frontal plane with direct contact deformation extending to the left rear door. The combined direct and induced damage length along the left side was 243.0 cm (95.7 in) in length. Both front doors were jammed shut and were subsequently opened by use of a hydraulic Hurst tool with interchangeable power shears. Rescue personnel completely removed the front, left door. The front, left side glazing disintegrated due to impact forces. Damaged components included the bumper fascia and reinforcement bar, upper and lower radiator supports, the grille area, hood, left front fender, windshield header, and roof panel The laminated windshield glazing was cracked due to impact forces. The left wheelbase was reduced in length by 91.0 cm (35.8 in) while the right wheelbase was lengthened by 5.0 cm (1.9 in).	
CDC:	12FLEW4	
Delta V:	Total	59.0 km/h (36.7 mph)
	Longitudinal	-58.1 km/h (36.1 mph) **Note:** EDR output -50.5 km/h (-31.43 mph)
	Latitudinal	-10.2 km/h (-6.4 mph)
	Energy	233,177 joules (171,982 ft lbs)

C-measurements (crush profile): The combined direct and induced damage length was 120.0 cm (47.2 in) and involved the entire frontal plane. The direct contact damage was 48.0 cm (18.9 in.) in length and initiated 26.0 cm (10.2 in) left of the vehicle centerline. Six equidistant crush measurements were documented at the bumper bar level (fascia was missing) and the crush profile is as follows: C_1 = 84.0 cm (33.0 in), C_2 = 80.0 cm (31.5 in), C_3 = 67.0 cm (26.3 in), C_4 = 47.0 cm (18.5 in), C_5 = 24.0 cm (9.4 in), C_6 = 2.0 cm (0.8 in). The maximum crush depth was 84.0 cm (33.0 in) and was located at C_1 or at the front left bumper bar corner.

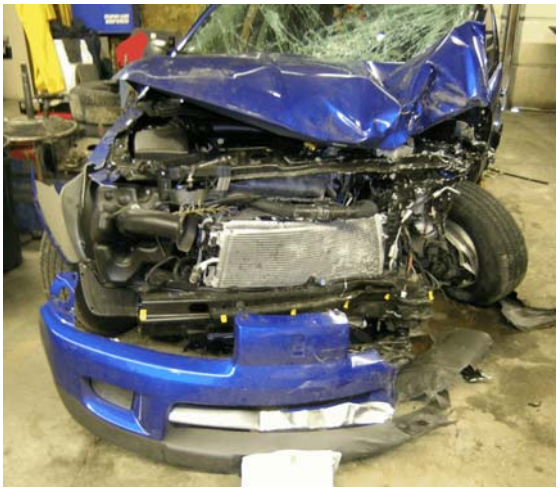


Figure 4. Front, 2004 Saturn Vue

Interior Damage - 2004 Saturn Vue Sport Utility Vehicle

The interior greenhouse area of the case vehicle sustained intrusion which was isolated to the front, left seated area and greatly reduced that area due to the longitudinal and lateral displacement of numerous components. The windshield header, windshield, left A-pillar, instrument panel and toe pan were displaced longitudinally rearward. While the left front door panel and the side kick-panel located forward of the A-pillar, intruded laterally.

Position	Intruded Component	Magnitude of Intrusion	Direction
LF	A-pillar	36.0 cm (14.1 in)	Longitudinal
LF	Kick Panel	17.0 cm (6.7 in)	Lateral
LF	Instrument Panel	34.0 cm (13.3 in)	Longitudinal
LF	Door Panel	32.0 cm (12.6 in)	Lateral
LF	Roof	3.0 cm (1.2 in)	Vertical
LF	Toe Pan	20.0 cm (7.9 in)	Longitudinal
LF	Windshield	35.0 cm (13.8 in)	Longitudinal

The laminated AS-1 windshield glazing was cracked and the left front, side tempered glazing disintegrated due to the impact forces. Residual scuff marks were identified to the instrument panel front, left and front right seated positions. These scuffs were attributed to occupant knee contacts.

The interior of the case vehicle consisted of two front seated positions with combination fabric/leather covered bucket seats. The front left seat rotated slightly counterclockwise due to passenger compartment intrusion. The adjustable head restraints were undamaged. The second row was comprised of a fabric/leather covered split bench seat with folding seat backs. There are adjustable head restraints at the outboard rear seated positions. There was no damage to the interior seats or head restraints.

MANUAL RESTRAINT SYSTEMS - 2004 Saturn Vue Sport Utility Vehicle

The driver's manual restraint system consisted of a continuous loop three-point lap and shoulder belt with a free sliding latch plate and an Emergency Locking Retractor (ELR). The shoulder belt adjuster was in the full down position. The driver's lap and shoulder belt webbing exhibited evidence of heavy occupant loading. The belt webbing was observed to have been stretched and plastic residue transfers were located on the shoulder belt webbing due to load forces applied on the D-ring. The pretensioners activated and locked the excess webbing in a spooled out position. In addition, the driver's lap and shoulder belt exhibited evidence of historical usage as scratching and striations were documented to the free sliding latch plate.

The front, right passenger's manual restraint system consisted of a continuous loop three-point lap and shoulder belt with a free sliding latch plate and an Emergency Locking Retractor (ELR). The shoulder belt adjuster was in the full down position. The driver's lap and shoulder belt exhibited evidence of heavy occupant loading. The belt webbing was observed to have been stretched and plastic residue transfers were located on the shoulder belt webbing due to load forces applied on the D-ring. The pretensioners actuated and locked the excess webbing in a spooled out position upon vehicle inspection. In addition, the driver's lap and shoulder belt exhibited evidence of historical usage as scratching and striations were documented to the free sliding latch plate.

Figure 5. Loading to driver's seat belt

Both front seats were equipped with pretensioners (Automatic Tensioning System) that actuated in response to the significant frontal impact.

The three seated positions of the rear bench seat are equipped with manual three-point lap and shoulder belts with free sliding latch plates and switchable (ELR/ALR) retractors.

Figure 6. Loading to front right passenger seat belt

FRONTAL AND SIDE CURTAIN AIR BAG SYSTEM - 2004 Saturn Vue Sport Utility Vehicle

This 2004 Saturn Vue was equipped with advanced dual stage driver and front passenger air bags, left and right head curtain side air bags that cover the 1st and 2nd row side glass, height adjustable front safety seat belts with pretensioners with energy absorbing retractors, and a driver's seat position sensor.

Figure 7. Driver and FR passenger air bags

Both the driver's and front right passenger's air bags deployed during the crash. The driver air bag module was located in the center hub of the steering wheel rim with a vertically oriented flap tear seam (I-configuration). The diameter of the deflated circular air bag was 57.0 cm (22.4 in). It was equipped with three internal tether straps and had two vent ports (11 and 1 o'clock positions). The maximum deflated air bag excursion measured approximately 24.0 cm (9.4 in). There were no indications of any damage to driver's air bag or the module cover flaps. Blood was spattered along the top face, lower left and middle of the face of the air bag. There was grease deposits on the middle of the air bag.

Figure 8. Driver's head curtain side air bag

The front right passenger air bag was a mid instrument panel mount module with a single module cover flap. The deflated air bag was rectangular in shape with a height of approximately 50.0 cm (19.7 in) and a width of approximately 43.0 cm (16.9 in). The maximum deflated air bag excursion measured approximately 56.0 cm (22.0 in). The air bag was not tethered, and had two vent ports at the 2 and 10 o'clock positions. There were no indications of any damage to front right passenger air bag. There was faint evidence of vinyl transfer to the membrane from expansion within the module along the top portion of the air bag. There was blood all distributed across the left side of the face of the air bag, as well as both sides. The single hinged module cover flap was rectangular in shape and measured 34.0 cm (13.4 in) wide by 20.0 cm (7.9 in) high. The center of the module cover flap was scuffed from probable front right occupant leg contact.

The left head curtain side air bag also deployed. The head curtain side air bag deployed downward from the roof cladding. The curtain was rectangular in shape and measured 41.0 cm (16.1 in) wide by 178.0 cm (70.0 in) long. It was attached to the A pillar by a single 58.0 cm (22.8 in) long tether, and to the roof railing 6.0 cm (2.4 in) from the C pillar by a 35.0 cm (13.8 in) long tether. The distance from the front of the curtain to the mid point of the B pillar was 38.0 cm (14.9 in). The head curtain side air bag comes down 49.0 cm (19.3 in) from the top window

railing. Both left side windows were covered by the deployed head curtain side air bag. There was no damage or occupant contacts found on the left curtain.

The air bag system is controlled by the Sensing Diagnostic Module (SDM). The system records the vehicle's forward velocity change. The SDM will record 100 milliseconds of data after the deployment criteria is met and up to 50 milliseconds of data before deployment criteria is met. The SDM will also record 150 milliseconds of data after non-deployment criteria is met. As indicated earlier in this report, the SDM was removed by the investigating police officer. The downloaded data report was provided to this contractor. A deployment was recorded by the SDM.

System Status at deployment indicated that:

1. The SIR warning lamp status was OFF.
2. The driver's belt switch circuit status was BUCKLED.
3. Ignition cycles at deployment were 1016.
4. Ignition cycles at investigation were 1017.
5. A Maximum SDM recorded velocity change was -50.58 km/h (-31.43 mph).
6. Algorithm enable (AE) to maximum SDM recorded velocity change was 107.5 milliseconds.
7. Driver first stage time algorithm enabled to deployment command criteria met was 7.5 milliseconds.
8. Driver second stage time algorithm enabled to deployment command criteria met was 10 milliseconds.
9. Passenger first stage time algorithm enabled to deployment command criteria met was 7.5 milliseconds.
10. Passenger second stage time algorithm enabled to deployment command criteria met was 10 milliseconds.
11. Event recording complete was YES.
12. The vehicle speed was 97 km/h (60 mph) five seconds prior to AE and the vehicle decelerated to 93 km/h (58 mph) one second prior to AE.
13. The brake switch circuit status was OFF from five seconds through 4 seconds prior to AE, ON 3 seconds prior to AE, and OFF from two seconds through 1 second prior to AE.

VEHICLE DATA - 2001 Chevrolet Prizm

Description:	2001 Chevrolet Prizm four-door sedan	
VIN:	1YSK52871ZXXXXXX	
Odometer:	Unknown	
Engine:	1.8 liter, 4 cylinder	
Reported Defects:	Unknown	
Cargo:	Unknown	
Damage Description:	Severe/Primary Frontal Impact Deformation: (specifics are unknown)	
TDC:	N/A	
Delta V:	Total	85.0 km/h (52.8 mph)
	Longitudinal	-83.7 km/h (52.0 mph)
	Latitudinal	-14.8 km/h (-9.2 mph)
	Energy	354,986 joules (261,824 ft lbs)

OCCUPANT DEMOGRAPHICS - 2004 Saturn Vue Sport Utility Vehicle

	Driver	Occupant 2
Age/Sex:	17/Female	15/Female
Seated Position:	Front, left	Front, right
Seat Type:	Bucket, combination fabric/leather covered	Bucket, combination fabric/leather covered
Height:	Unknown	Unknown
Weight:	Unknown	Unknown
Occupation:	Student	Student
Pre-existing Medical Condition:	Unknown	Unknown
Alcohol/Drug Involvement:	None	None
Driving Experience:	Limited/ specifics unknown	N/A
Body Posture:	Upright, specifics are unknown	Upright, specifics are unknown
Hand Position:	At least one hand on the steering wheel rim at an unknown o'clock position	Unknown
Foot Position:	Right foot depressing brake pedal and left foot on the floor/toe pan foot rest.	Both feet presumably on floor
Restraint Usage:	Three-point manual lap and shoulder belt utilized with the shoulder belt extending across her front and lap belt extending across he hips (based on injury information)	Three-point manual lap and shoulder belt utilized with the shoulder belt extending across her front chest region and unknown location of lap belt placement
Air bag:	Front left driver's air bag deployed in addition to deployment of the left head curtain side air bag	Front, right passenger's air bag deployed

OCCUPANT DEMOGRAPHICS - other vehicle

Age/Sex:	72/Male
Seated Position:	Front, left
Seat Type:	Bucket
Height:	Unknown
Weight:	Unknown
Occupation:	Retired
Pre-existing Medical Condition:	Underwent a pre-crash medical condition (specifics are unknown)
Alcohol/Drug Involvement:	Unknown
Driving Experience:	Unknown
Body Posture:	Unknown, possibly slumping
Hand Position:	Unknown
Foot Position:	Unknown
Restraint Usage:	Police reported that the three-point manual lap and shoulder belt was worn.

OCCUPANT INJURIES - 2004 Saturn Vue Sport Utility Vehicle

Driver: Injuries obtained from Emergency Department and Radiologist reports

Injury	Injury Code	Injury Source	Confidence Level
Superficial abrasions across her forehead	290202.1,7	Driver's frontal air bag	Certain
3.0 cm (1.2 in) linear abrasion over the right eyebrow	290202.1,7	Driver's frontal air bag	Certain
Abrasion left temporal region	290202.1,7	Side air bag curtain	Certain
Abrasion to the right side, bridge of her nose	290202.1,4	Driver's frontal air bag	Certain
Abrasion over the lateral aspect of the left upper extremity	790202.1,2	Side air bag curtain	Probable
Left clavicle contusion	790402.1,2	Shoulder belt webbing	Certain

Front Right Occupant : Injuries obtained from Emergency Department and Radiologist reports

Injury	Injury Code	Injury Source	Confidence Level
5.0 cm (1.9 in) horizontal laceration that extends from the left side of her forehead down to her left eyebrow region. Laceration is deep through subcutaneous tissue into underlying muscle	290602.1,7	Front right passenger air bag	Probable
Contusion, left forearm	790402.1,2	Front right passenger air bag	Probable

OCCUPANT INJURIES - other vehicle

Injury	Injury Code	Injury Source	Confidence Level
Fatally injured / Specifics are unknown	Unknown	Unknown	Unknown

OCCUPANT KINEMATICS - 2004 Saturn Vue Sport Utility Vehicle

Driver kinematics

The 17 year-old female driver of the case vehicle was wearing the available three-point manual lap and shoulder belt with the shoulder belt webbing extending across her chest and the lap belt webbing presumably placed across her hips. The shoulder belt adjuster was at the full down position and the seat track position is unknown due to damage. The seat back support was slightly reclined at 20 degrees from the vertical. It is unknown whether the driver had one or two hands on the steering wheel rim and her right foot was depressing the brake pedal while her left foot was on the floor.

Figure 9. View showing intrusion at drivers position and lower extremity contacts to deformed knee bolster

She responded to the 12 o'clock impact force by moving forward. The pretensioners activated as the driver loaded the lap and shoulder belt webbing. The lap and shoulder belt webbing showed evidence of stretching and residual D-ring material transfers were documented to the webbing. There were significant, deep webbing load marks on the plastic D-ring material. The driver sustained a left clavicle/shoulder contusion (AIS-1) due to loading the shoulder belt webbing. As her upper torso was restricted from continuing significantly forward, her head likely pitched downward contacting the deploying drivers front air bag. Her knees impacted the intruding lower instrument panel/knee bolster, but did not result in any documented injury. As a result of her interaction with the drivers air bag, the driver sustained superficial abrasions across her forehead (AIS-1), a linear abrasion over the right eyebrow (AIS-1), and an abrasion to the right side bridge of her nose (AIS-1).

Due to the offset configuration of the impact, the case vehicle initiated a rapid counterclockwise rotation. The side air bag curtain deployed as the driver moved to her left in response to the case vehicle rotation. The left side of her head/face contacted the air bag curtain which resulted in an abrasion to her left temporal region (AIS-1). In addition, her upper left arm contacted the side air bag which resulted in an abrasion over the lateral aspect of the left upper extremity (AIS-1). She never lost consciousness and came to rest in her respective seat.

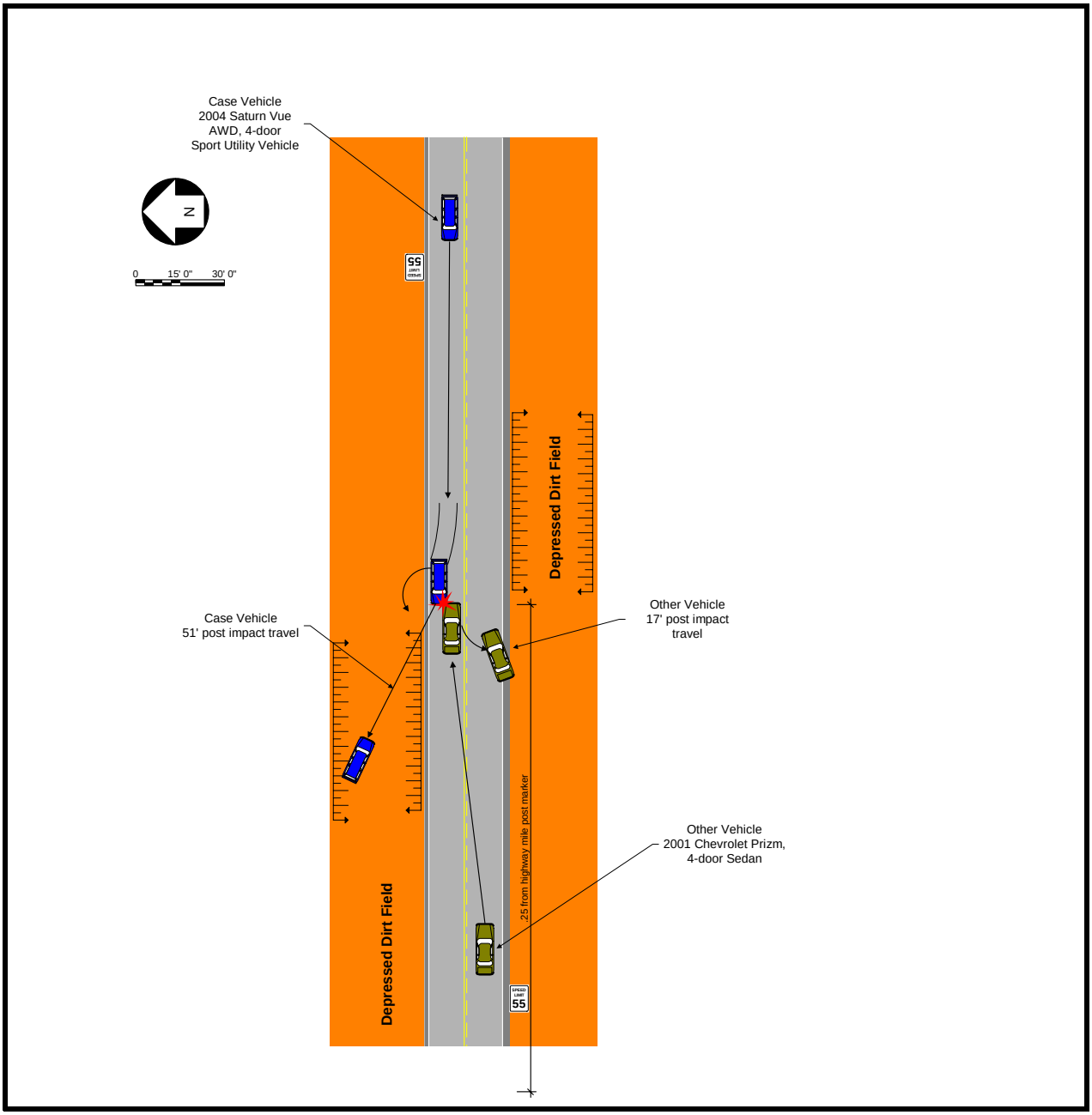
Front right occupant kinematics

The fully restrained 15 year old female front right seated passenger responded to the 12 o'clock impact force by moving forward and loading the applied lap and shoulder restraint. This was evidenced by observed stretching to the webbing and D-ring material transfers on the webbing. In addition, there was significant webbing load marks on the plastic D-ring material. Although her upper torso was restricted from extended forward movement, her head and face pitched

downward, impacting the deploying passengers frontal air bag. This contact resulted in a horizontal laceration that extends from the left side of her forehead down to her left eyebrow region (AIS-1). Her arms continued forward, resulting in a contusion to her left forearm (AIS-1) from contact with the frontal air bag.

As the case vehicle rotated and then came to rest, she rebounded into her respective seated position. She never lost consciousness and was transported and released the same day.

Attachment 1. Scene Diagram



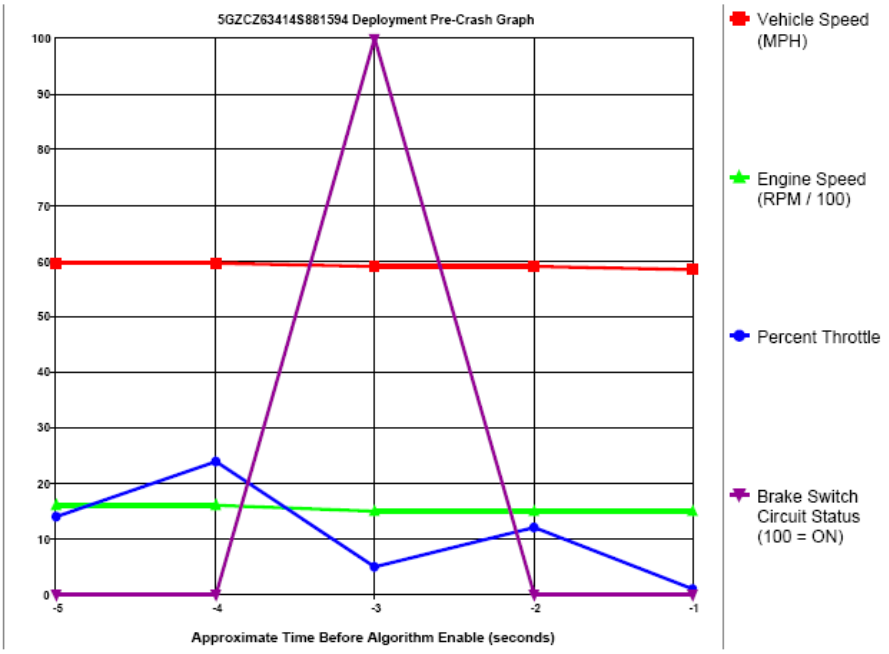
Attachment 2. Vetronix output

Vetronix

CDR CRASH DATA RETRIEVAL SYSTEM

System Status At Deployment

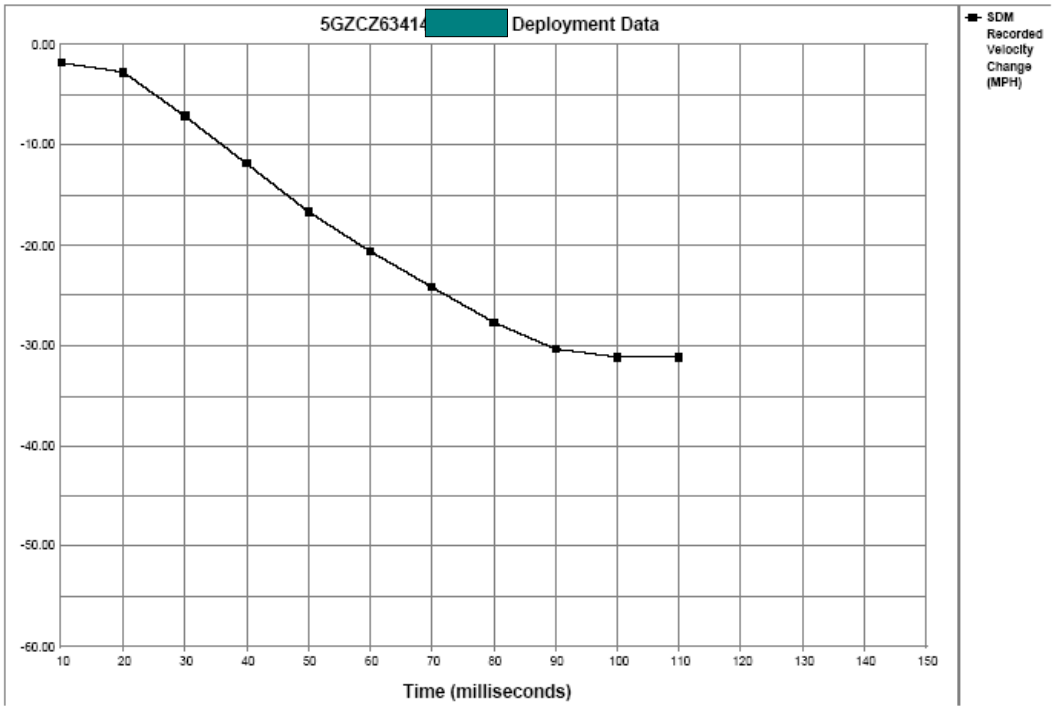
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Deployment	1016
Ignition Cycles At Investigation	1017
Maximum SDM Recorded Velocity Change (MPH)	-31.43
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	107.5
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	7.5
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	10
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	7.5
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	10
Event Recording Complete	Yes



Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	60	1600	14	OFF
-4	60	1600	24	OFF
-3	59	1536	5	ON
-2	59	1536	12	OFF
-1	58	1536	1	OFF

Vetronix

CDR CRASH DATA RETRIEVAL SYSTEM



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Recorded Velocity Change	-1.76	-2.63	-7.02	-11.85	-16.67	-20.62	-24.13	-27.64	-30.28	-31.15	-31.15	N/A	N/A	N/A	N/A