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SCI/NASS COMBINATION SIDE IMPACT INFLATABLE OCCUPANT PROTECTION REPORT

CASE NUMBER - NASS-2003-49-205A
LOCATION - Texas
VEHICLE - 2001 OLDSMOBILE AURORA
CRASH DATE - September 2003

Submitted:
June 15, 2004

Revised:
October 13, 2005

Contract Number: DTNH22-01-C-07002

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
National Center for Statistics and Analysis
Washington, D.C. 20590-0003

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The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points be coupled with the investigator' s expert knowledge and experience of vehicle dynamics and occupant kinematics in order to determine the pre-crash, crash, and post-crash movements of involved vehicles and occupants.

Because each crash is a unique sequence of events, generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems.

Technical Report Documentation Page

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15. *Supplementary Notes*
SCI/NASS combination investigation of a crash involving a 2001 Oldsmobile Aurora equipped with dual frontal and side impact air bags, and a 2002 Chevrolet Tahoe

16. *Abstract*

This report covers a SCI/NASS combination investigation of an air bag deployment crash involving a 2001 Oldsmobile Aurora sedan (case vehicle) and a 2002 Chevrolet Tahoe SUV (other vehicle). This crash is of special interest because the case vehicle was equipped with seat-back mounted side impact air bags for the front seat row and the driver's side air bag did deploy. In addition, both vehicles were equipped with Event Data Recorders (EDR) that were successfully downloaded. The case vehicle driver (93-year-old female) was not using the available manual safety belt system and sustained fatal injuries. There were three other occupants (all middle-aged females) in the case vehicle, all of whom were transported to a hospital via ambulance. The case vehicle was traveling northward in the outside northbound lane of a four-lane local road and came to a complete stop at a four-leg intersection. The other vehicle was traveling eastward in the outside eastbound lane of the intersecting two-lane, one-way roadway. It was daylight, the weather was clear, the concrete road surface was dry and with no apparent defects. Starting from a stop, the case vehicle entered the intersection across the path of the other vehicle. The front of the other vehicle impacted the left side of the case vehicle, causing the case vehicle driver's seat back-mounted side impact air bag to deploy. The other vehicle was equipped with frontal air bags that did not deploy. The case vehicle was redirected in a northeasterly direction, its front impacted a guardrail at the northeast corner of the intersection and it came to rest. The case vehicle's frontal air bags did not deploy. There was substantial intrusion into the driver's seat area and the driver was partially ejected such that her head struck the other vehicle's hood. The driver's injuries included: subarachnoid hemorrhage; lacerations of the heart and pericardial sac; fractures of 12 ribs and the sternum; fracture of the pelvis; and other injuries. The three other case vehicle occupants all sustained relatively minor injuries.

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BACKGROUND

This SCI/NASS combination investigation was brought to the NHTSA's attention in September 2003 by NASS/CDS sampling activities and was designated for SCI on February 10, 2004. This crash involved a 2001 Oldsmobile Aurora (case vehicle) and a 2002 Chevrolet Tahoe (other vehicle). The crash occurred in September 2003, at 3:04 p.m., in Texas, and was investigated by the applicable municipal police department. This crash is of special interest because the case vehicle was equipped with seat-back mounted side impact air bags for the front seat row and the driver's side air bag did deploy. In addition, both vehicles were equipped with Event Data Recorders (EDR) that were successfully downloaded. The case vehicle driver (93-year-old female, white, non-Hispanic) was not using the available manual safety belt system and sustained fatal injuries. There were three other occupants in the case vehicle, all of whom were transported to a hospital via ambulance. This report is based on the coded NASS case, occupant kinematic principles and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

The case vehicle was traveling northward in the outside northbound lane of a four-lane local road and came to a complete stop at a four-leg intersection. The other vehicle was traveling eastward in the outside eastbound lane of the intersecting two-lane, one-way roadway. It was daylight, the weather was clear, the concrete road surface was dry and with no apparent defects. The speed limit was 48 km.p.h. [30 m.p.h.] for the case vehicle's north-south roadway and 56 km.p.h. [35 m.p.h.] for the east-west roadway. Starting from a stop, the case vehicle entered the intersection across the path of the other vehicle.

Figure 1: Long view of the case vehicle's northbound approach toward the collision in the intersection

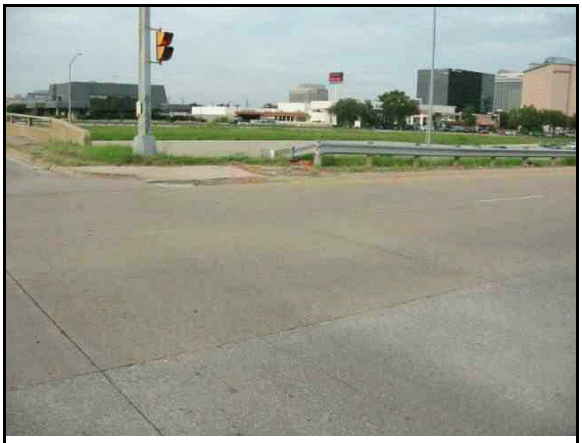


Figure 2: Approximate area of first impact and the case vehicle's post-impact northeastward trajectory toward final rest against the guardrail

The crash occurred within the intersection. The front of the other vehicle impacted the left side of the case vehicle, causing the case vehicle driver's seat back-mounted side impact air bag to deploy. The other vehicle was equipped with frontal air bags that did not deploy. The case vehicle was redirected in a northeasterly direction and the front the case vehicle impacted a guardrail at the northeast corner of the intersection. The case vehicle's frontal air bags did not deploy. The case vehicle came to rest heading slightly east of north, with its front wheels on the roadside and its rear wheels in the east-west roadway. The other vehicle rotated approximately 90 degrees counterclockwise and came to rest within the intersection heading north.

The case vehicle was a 2001 Oldsmobile Aurora front wheel drive, four-door, five-passenger sedan (VIN: 1G3GS64C014------), equipped with a 4.0 liter V8 gasoline engine and an automatic transmission with a console-mounted selector lever. Four-wheel anti-lock brakes and traction control were standard for this model. The case vehicle was equipped with redesigned frontal air bags and seat back-mounted side impact air bags for the two front row seat positions. The odometer reading is not known. Its wheelbase was 285 centimeters [112.2 inches]. The case vehicle was towed due to disabling damage.

The first impact resulted in direct contact damage along the left A-pillar, driver's door, B-pillar and back door, above the sill, with substantial deformation into the passenger compartment and induced buckling of the left roof rail and roof (**Figures 3** and **5**). The crush profile was measured as 260 centimeters [102.4 inches] long, with maximum crush 65 centimeters [25.6 inches] at the center of the driver's door. The windshield was cracked, the two left side windows disintegrated and there was no other glazing damage. The left front wheel/tire was restricted, the right front tire was deflated and there was no other damage to the wheels or tires.

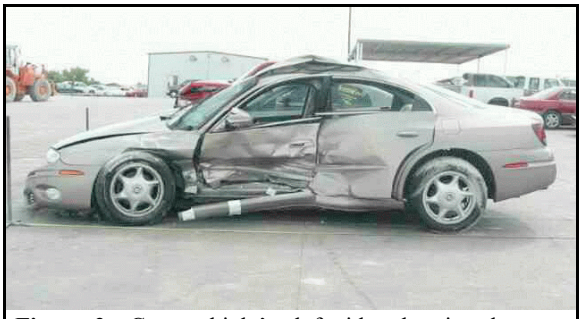


Figure 3: Case vehicle's left side, showing damage from the first impact

The CDC for the first impact was determined to be **10-LYAW-4 (290)**. The WinSMASH reconstruction program, damage algorithm based on the measured crush profile of both vehicles, was used. The total, longitudinal and lateral delta-Vs are, respectively: 33 km.p.h. [20.5 m.p.h.], -11 km.p.h. [-6.8 m.p.h.] and + 31 km.p.h. [+ 19.3 m.p.h.]. These results appear reasonable. This was an impact of moderate severity (24-40 km.p.h. [15-25 m.p.h.]) for the case vehicle.

Figure 4: Case vehicle's front and right side

Figure 5: Case vehicle's front and left side

The case vehicle' s front impact with the guardrail caused relatively modest damage on the front (**Figures 4** and **5**). The bumper cover was torn and the steel bumper was crushed slightly rearward. Maximum crush was measured as 11 centimeters [4.3 inches] at the left front corner, but this probably reflects some distortion from the left side impact. The CDC for the second event was determined to the **12-FZEW-1 (0)**. This impact is out of scope for the WinSMASH reconstruction program because the guardrail yielded, but the barrier equivalent speed was calculated as 12 km.p.h. [7.5 m.p.h.]. This second impact was of minor severity (1-13 km.p.h. [1-8 m.p.h.]) for the case vehicle.

Inspection of the case vehicle' s interior revealed substantial intrusion by numerous components (**Figure 6**). The interior surface of the driver' s door intruded laterally approximately 40 centimeters [15.7 inches] and the left B-pillar 20 centimeters [7.9 inches], with other left side intrusions in the front and back seat areas. The driver' s seat cushion and seat back were displaced laterally and deformed by the intruding components, and the center console intruded into the front right seat position. There were blood smears on the upholstery on the driver' s seat. The left side of the center console showed evidence that the driver had loaded against it.

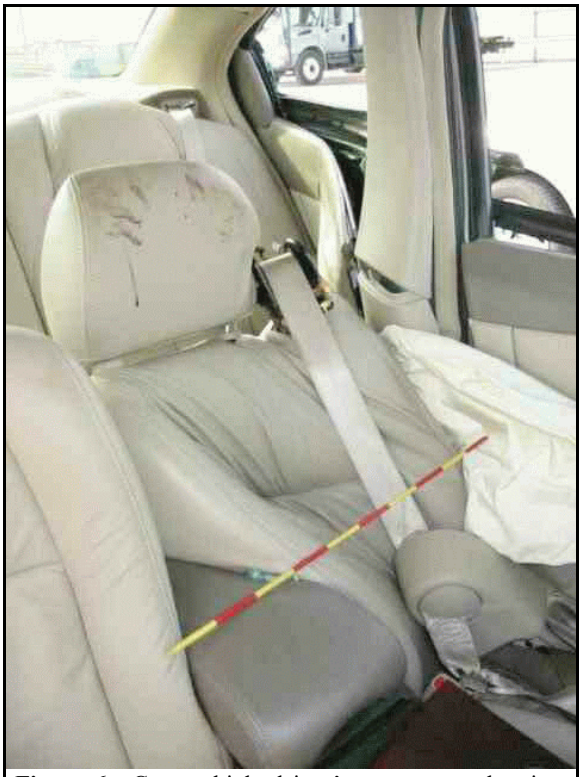


Figure 6: Case vehicle driver' s seat area, showing substantial lateral intrusion and deformation of driver' s seat; note, integrated safety belt system retractor housing displaced

CASE VEHICLE' S EVENT DATA RECORDER

The case vehicle was equipped with an Event Data Recorder (EDR) that was downloaded in the field using the Crash Data Retrieval tool, version 2.10. The Sensing and Diagnostic Module (SDM) reports are included as **Figures 11 - 13**. Multiple events were detected and one event was recorded.

The SDM System Status at Non-Deployment report (**Figure 11**) indicates that the event was recorded on ignition cycle 3,314 and the download was accomplished on 3,318. The driver' s safety belt is reported as not buckled. The report indicates that the data recording for this one event is complete and that there were multiple events detected with additional data not recorded. The maximum recorded longitudinal velocity change is reported as -4.0 km.p.h. [-2.48 m.p.h.], at 102.5 milliseconds [0.1025 seconds] after algorithm enable.

The SDM Pre-Crash Data (**Figure 11**) and the Pre-Crash Graph (**Figure 12**) show that the case vehicle driver was braking with the five percent throttle at five seconds prior to algorithm enable. The case vehicle' s pre-crash travel speed was not recorded. The driver accelerated slightly over the next four seconds, with throttle input increasing to 23 percent, engine rpm

increasing proportionally and the brake lights off at approximately one second prior.

The SDM Non-Deployment Velocity Change Data (**Figure 11**) and Velocity Change Graph (**Figure 13**) show a gradual decline to -3.5 km.p.h. [-2.17 m.p.h.] at 90 milliseconds [0.09 seconds], after which the SDM stopped recording. The maximum recorded longitudinal velocity change is reported as -4.0 km.p.h. [-2.48 m.p.h.], at 102.5 milliseconds [0.1025 seconds] after algorithm enable.

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with frontal air bags and seat back-mounted side impact air bags for the driver and front right passenger seat positions. The driver' s frontal air bag was located in the steering wheel hub and the passenger' s frontal air bag was located in the top of the instrument panel on the right. Neither frontal air bag deployed. The driver' s side impact air bag deployed as a result of the collision events. The passenger' s side impact air bag did not deploy.

The driver' s side impact air bag module was located in the outboard edge of the driver' s seat back. The module measured approximately 9 centimeters [3.5 inches] wide and 22 centimeters [8.7 inches] long (**Figure 7**). The deployed air bag was approximately pear-shaped, measuring 36 centimeters [14.2 inches] horizontally and 30 centimeters [11.8 inches] vertically (**Figure 8**). There was no evidence of damage to any of the side air bag system components.

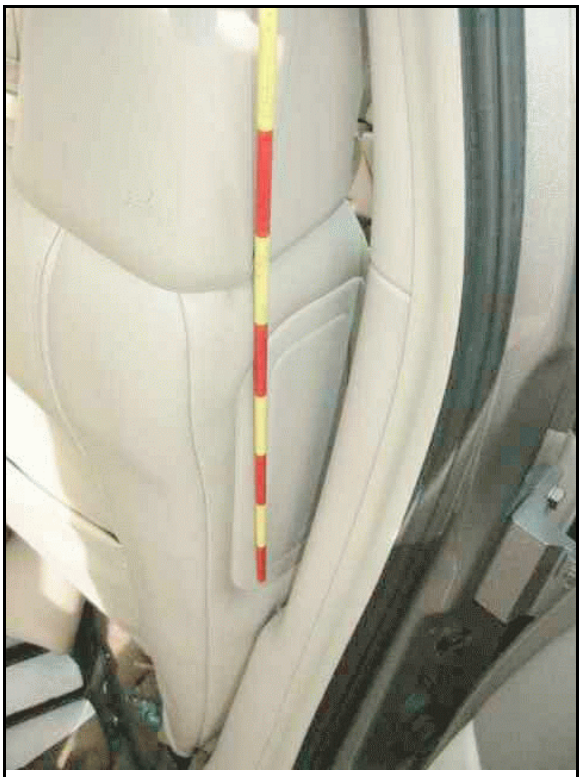


Figure 7: Non-deployed front right seat back-mounted side impact air bag, showing module

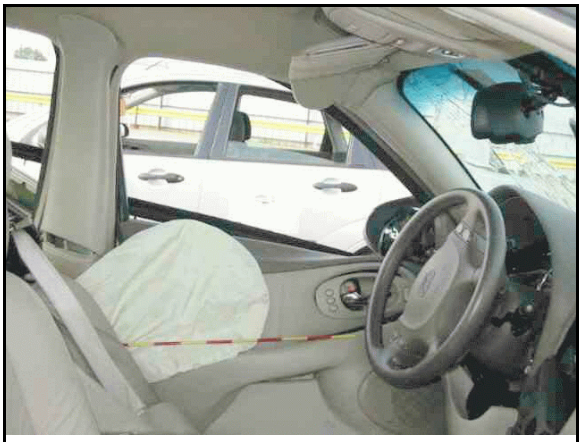


Figure 8: Deployed driver' s seat back-mounted side impact air bag

CASE VEHICLE DRIVER' S KINEMATICS

The case vehicle driver (93-year-old female, white, non-Hispanic, 163 centimeters, 50 kilograms [64 inches, 110 pounds]) was not using the available manual, integrated, three-point, lap-and-shoulder safety belt system. The SDM report indicates that the driver' s safety belt was not buckled, there was no loading evidence on the safety belt components and she did not sustain any safety belt-related injuries. According to the interview information from another passenger, the

driver was seated in a normal driving posture, with her bucket seat track at the middle position and the tilt steering wheel and seat back adjustments not known. She did not attempt any pre-crash avoidance maneuvers and her posture did not change.

The case vehicle' s left side was impacted by the front of the SUV, causing the driver to move leftward and forward, toward the 10:00 o' clock direction of force, and causing the driver' s seat back-mounted side impact air bag to deploy. The case vehicle' s driver' s seat area sustained substantial intrusion as the driver' s door interior panel and window frame, left B-pillar, left roof rail, and left rocker panel intruded laterally. This deformation caused the instrument panel to buckle downward, with longitudinal intrusion by the steering assembly. The driver' s seat was damaged, with lateral deformation and displacement of the seat cushion and seat back. The driver' s unrestrained forward and leftward motion, in combination with the deformation of the seat back, probably resulted in her being somewhat forward of the deployed side air bag. Her chest, abdomen and left thigh loaded against the intruding door panel. Her thorax was compressed between the door panel and the deformed seat back as her hips and thighs were compressed between the door and the center console. She sustained: fractures of right ribs 1 through 12; fracture of the sternum; laceration of the myocardium (heart); laceration of the pericardial sac; fracture of the right superior pubic ramus; a contusion on her left forearm; and contusions on her thighs bilaterally. The driver' s door window glazing disintegrated, spraying the driver with kernelized glass shards. The force of the impact caused her head to flex out through the driver' s door window opening (partial ejection) and her head and face impacted the forward edge of the other vehicle' s hood. The loose glass shards from the shattered window were pressed against the left side of her face as she impacted the other vehicle, causing lacerations and abrasions, and glass was embedded in the SUV' s hood where her face made contact (**Figures 9** and **10**). As a result of this contact with the other vehicle, she sustained a subgaleal hematoma and laceration on the left parietal scalp, lacerations of the left forehead and eyebrow area, and subarachnoid hemorrhage over the right parietal lobe. After the impact with the SUV, the case vehicle traveled off the road and its front impacted a guardrail. Her arms and legs flailed forward. She sustained abrasions and contusions on her forearms bilaterally from contact with the instrument panel, and contusions on her knees bilaterally from contact with the knee bolster. Her position at final rest is not known.

CASE VEHICLE DRIVER' S INJURIES

The case vehicle driver was transported via ambulance to a hospital, where she was pronounced dead approximately 45 minutes after the crash.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Myocardium (heart), laceration (perforation) of anterior right ventricle	critical 441012.5,4	Left side interior surface	certain	autopsy
2	Fractured ribs, right, 1st - 12th	serious 450250.3,1	Center console and seat back	certain	autopsy

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
3	Subarachnoid hemorrhage, right parietal lobe	serious 140684.3,1	Hood of other vehicle	certain	autopsy
4	Fractured sternum	moderate 450804.2,4	Center console and seat back	certain	autopsy
5	Fracture, closed, right superior pubic ramus	moderate 852602.2,5	Center console	certain	autopsy
6	Laceration, pericardial sac	moderate 441602.2,4	Left side interior surface	certain	autopsy
7	Subgaleal hematoma, left temporal scalp	minor 190402.1,2	Hood of other vehicle	certain	autopsy
8	Laceration, left temporal scalp	minor 190602.1,2	Hood of other vehicle	certain	autopsy
9	Laceration, left forehead/eyebrow	minor 290602.1,7	Hood of other vehicle	certain	autopsy
10	Abrasion, left cheek	minor 290202.1,2	Glass shards against hood of other vehicle	certain	autopsy
11	Laceration, left cheek	minor 290602.1,2	Glass shards against hood of other vehicle	certain	autopsy
12	Contusion, left forearm	minor 790402.1,2	Left side interior surface	certain	autopsy
13	Abrasions, forearms, bilaterally	minor 790202.1,3	Left instrument panel	certain	autopsy
14	Contusions, forearms, bilaterally	minor 790402.1,3	Left instrument panel	certain	autopsy
15	Contusion, left thigh	minor 890402.1,2	Left side hardware	certain	autopsy
16	Contusion, right thigh	minor 890402.1,1	Center console	certain	autopsy
17	Contusions, knees, bilaterally	minor 890402.1,3	Knee bolster	certain	autopsy

CASE VEHICLE FRONT RIGHT PASSENGER' S KINEMATICS

The case vehicle front right passenger (49-year-old female, Asian or Pacific Islander, 157 centimeters, 45 kilograms [62 inches, 99 pounds]) was restrained by the available manual, integrated, three-point, lap-and-shoulder safety belt system. She was seated in a normal posture, with the seat back upright and the seat track adjusted at the middle position.

The case vehicle driver did not attempt any avoidance maneuvers and the front right passenger' s posture did not change prior to the impact. The impact caused the front right passenger to move forward and leftward, toward the 10:00 o' clock direction of force. Her left abdomen, hip and thigh loaded against the center console. She sustained abrasions and/or contusions on her left abdomen, hip, thigh and knee. She also sustained a contusion on her forehead, from an unknown source, and she was briefly unconscious and had no memory of the collision events. Her position at final rest is not known.

CASE VEHICLE FRONT RIGHT PASSENGER' S INJURIES

The front right passenger was transported via ambulance to a hospital, where she was treated and released.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Non-anatomic brain injury (unconsciousness less than one hours, amnesia, GCS = 15)	moderate 160414.2,0	Unknown	unknown	emergency room
2	Left hip abrasion	minor 890202.1,2	Floor or console mounted shifter	certain	emergency room
3	Left hip, thigh and knee contusions	minor 890402.1,2	Floor or console mounted shifter	certain	interview
4	Left abdomen contusion	minor 590402.1,2	Floor or console mounted shifter	certain	interview
5	Left forehead contusion	minor 290402.1,7	Unknown	unknown	interview

CASE VEHICLE BACK LEFT PASSENGER' S KINEMATICS

The case vehicle back left passenger (26-year-old female, Asian or Pacific Islander, 152 centimeters, 49 kilograms [60 inches, 108 pounds]) was not restrained by the available manual, three-point, lap-and-shoulder safety belt system. She was seated in a normal posture, with her seat back and seat track not adjustable.

The driver did not attempt any avoidance maneuvers and the back left passenger' s posture did not change. The impact caused her to move forward and leftward, toward the 10:00 o' clock direction of force. Her head and back were contacted by intruding left side components and she sustained abrasions on her back. She was briefly unconscious, dizzy and nauseous. As she rebounded from the left side contact, her right arm contacted the seat back and she sustained abrasions and lacerations on the right elbow.

The back left passenger was transported via ambulance to a hospital. She was admitted to the hospital for one day.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Non-anatomic brain injury (dizzy, nausea, unconsciousness less than one hour, GCS = 14)	moderate 160610.2,0	Left roof rail	certain	hospitalization records
2	Abrasions on back, NFS, aspect unknown	minor 690202.1,9	Left side interior surface	certain	emergency room
3	Abrasion, right elbow	minor 790202.1,1	Seat, back support	certain	emergency room
4	Laceration, right elbow	minor 790602.1,1	Seat, back support	certain	emergency room

CASE VEHICLE BACK RIGHT PASSENGER' S KINEMATICS

The case vehicle back right passenger (30-year-old female, Asian or Pacific Islander, 165 centimeters, 50 kilograms [65 inches, 110 pounds]) was not restrained by the available manual, three-point, lap-and-shoulder safety belt system. She was seated in a normal posture, with her seat back and seat track not adjustable.

The case vehicle driver did not attempt any avoidance maneuvers and the back right occupant' s posture did not change. The impact caused her to move forward and leftward, toward the 10:00 o' clock direction of force. She sustained minor head injuries including dizziness and nausea, an unknown injury to the temporomandibular joint (aspect unknown), and blood was noted in her auditory canal on the left. The source(s) of these injuries are unknown. She also sustained abrasions on her left hand, probably from flying glass. Her posture at final rest is not known.

CASE VEHICLE BACK RIGHT PASSENGER' S INJURIES

The back right passenger was transported via ambulance to a hospital. She was admitted to the hospital for one day.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Non-anatomic brain injury (dizzy, nausea, no unconsciousness)	minor 160402.1,0	Unknown	unknown	emergency room
2	Temporomandibular joint, NFS, aspect unknown	minor 251699.1,9	Unknown	unknown	emergency room

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
3	Left ear, blood in auditory canal, NFS	minor 240299.1,2	Unknown	unknown	emergency room
4	Abrasion, left hand	minor 790202.1,2	Flying glass	probable	emergency room

OTHER VEHICLE

The other vehicle was a 2002 Chevrolet Tahoe 1500 rear wheel drive, four-door, five-passenger sport utility vehicle (VIN: 1GNEC13Z32R------), equipped with a 5.3 liter V8 flexible fuel engine and an automatic transmission with a column-mounted selector lever. Four-wheel anti-lock brakes were standard for this model. The Tahoe was equipped with an EDR that was successfully downloaded. Its wheelbase was 295 centimeters [116.0 inches]. The Tahoe was towed due to damage.

The Tahoe sustained direct contact damage across the entire front (**Figures 9** and **10**). The bumper was crushed rearward, the grille was displaced and the leading edge of the hood was folded downward and crushed rearward. The left headlamp and turn signal assemblies were displaced or shattered and the left fender showed induced buckling, but the front right components were relatively undamaged except the bumper was crushed rearward. Maximum crush was measured as 20 centimeters [7.9 inches], near the middle of the front bumper. The left wheelbase was shortened by 8 centimeters [3.1 inches] and the right wheelbase was unchanged. Both front tires were restricted due to the bumper being crushed against them, and there was no other wheel/tire damage. There was no glazing damage.

Figure 9: Other vehicle' s front and right side; highlighting shows where the case vehicle driver' s head left an imprint

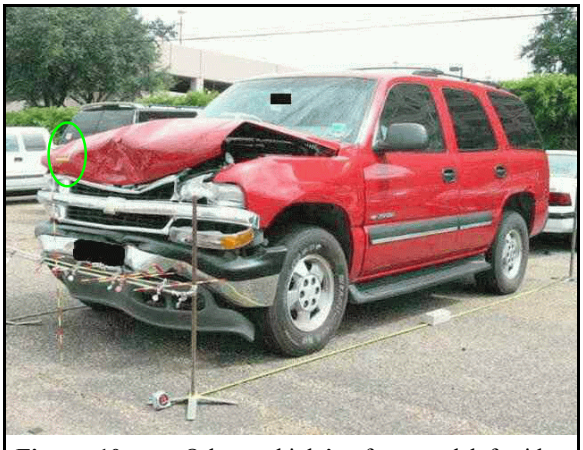


Figure 10: Other vehicle' s front and left side; highlighting shows where the case vehicle driver' s head left an imprint

The CDC for the Tahoe' s single impact was determined to be **01-FDEW-1 (20)**. The WinSMASH reconstruction program, damage algorithm based on the measured crush profiles of

both vehicles, was used. The total, longitudinal and lateral delta-Vs are, respectively: 27 km.p.h. [16.8 m.p.h.], -25 km.p.h. [-15.5 m.p.h.], and -9 km.p.h. [-5.6 m.p.h.]. These results appear reasonable. This was a crash of moderate severity (24-40 km.p.h. [15-25 m.p.h.]) for the Tahoe.

OTHER VEHICLE' S EVENT DATA RECORDER

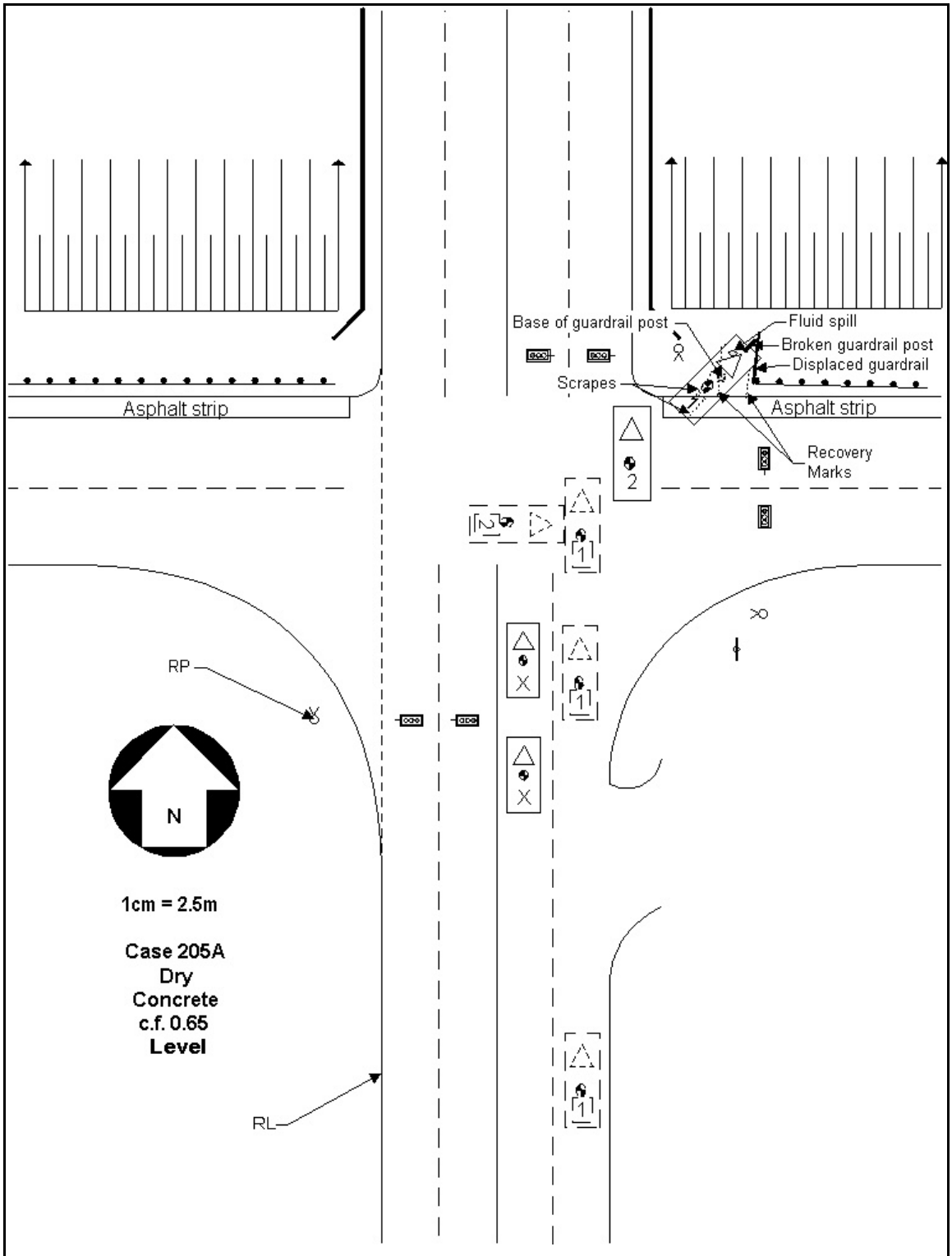
The Tahoe was equipped with an Event Data Recorder (EDR) that was downloaded in the field using the Crash Data Retrieval tool, version 2.10. The Sensing and Diagnostic Module (SDM) reports are included as **Figures 14 - 16**. A single non-deployment event was detected and recorded.

The Tahoe' s SDM System Status at Non-Deployment report (**Figure 14**) indicates that the event was recorded on ignition cycle 4,568 and the download was accomplished on 4,572. The driver' s safety belt is reported as buckled. The report indicates that the data recording for this one event is complete and that there were no other events detected. The maximum recorded longitudinal velocity change is reported as -29.2 km.p.h. [-18.15 m.p.h.], at 127.5 milliseconds [0.1275 seconds] after algorithm enable.

The SDM Pre-Crash Data (**Figure 14**) and the Pre-Crash Graph (**Figure 15**) show that the case vehicle was traveling 74 km.p.h. [46 m.p.h.] with the zero throttle and the brake light circuit off at five seconds prior to algorithm enable. The driver increased throttle input over the next three seconds, to 48 percent, with engine rpm increasing proportionally and with travel speed dropping slightly to 71 km.p.h. [44 m.p.h.] at approximately two seconds prior to algorithm enable. The Tahoe' s driver released the throttle, applied the brakes and the Tahoe' s speed dropped to 66 km.p.h. [41 m.p.h.] at approximately one second prior.

The SDM Non-Deployment Velocity Change Data (**Figure 14**) and Velocity Change Graph (**Figure 16**) show a steep decline to -29.0 km.p.h. [-17.99 m.p.h.] at 130 milliseconds [0.130 seconds]. The data show that this reading was maintained for the interval 130 - 150 milliseconds, after which the SDM stopped recording. The maximum recorded longitudinal velocity change is reported as -29.2 km.p.h. [-18.15 m.p.h.], at 127.5 milliseconds [0.1275 seconds] after algorithm enable. Note, the exact moment of maximum velocity change did not fall on one of the 10 millisecond increments that are reported in the data table (**Figure 14**) or included in the plotted graph (**Figure 16**).

The Tahoe' s driver (49-year-old male, white, unknown if Hispanic, height/weight unknown) was reported as restrained by the available, manual, three-point, lap-and-shoulder safety belt system. The driver sustained police-report " B" (non-incapacitating) injuries, was treated at the scene by EMS personnel and was not transported via ambulance. There was no other occupant in the Tahoe.



Case Vehicle (V#1, northbound): 2001 Oldsmobile Aurora
Other Vehicle (V#2, eastbound): 2002 Chevrolet Tahoe

1G3GS64C014[redacted] System Status At Non-Deployment	
SIR Warning Lamp Status	ON
Driver's Belt Switch Circuit Status	UNBUCKLED
Ignition Cycles At Non-Deployment	3314
Ignition Cycles At Investigation	3318
Maximum SDM Recorded Velocity Change (MPH)	-2.48
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	102.5
Event Recording Complete	Yes
Multiple Events Associated With This Record	Yes
One Or More Associated Events Not Recorded	Yes

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.31	-0.62	-1.24	-1.24	-1.86	-2.17	-2.17	-2.17	-2.17	-2.17	N/A	N/A	N/A	N/A	N/A

PRE-CRASH DATA				
Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	Invalid	1216	5	ON
-4	Invalid	1152	5	ON
-3	Invalid	1664	18	ON
-2	Invalid	1856	18	ON
-1	Invalid	2176	23	OFF

Figure 11: Case Vehicle' s System Status at Non-Deployment report

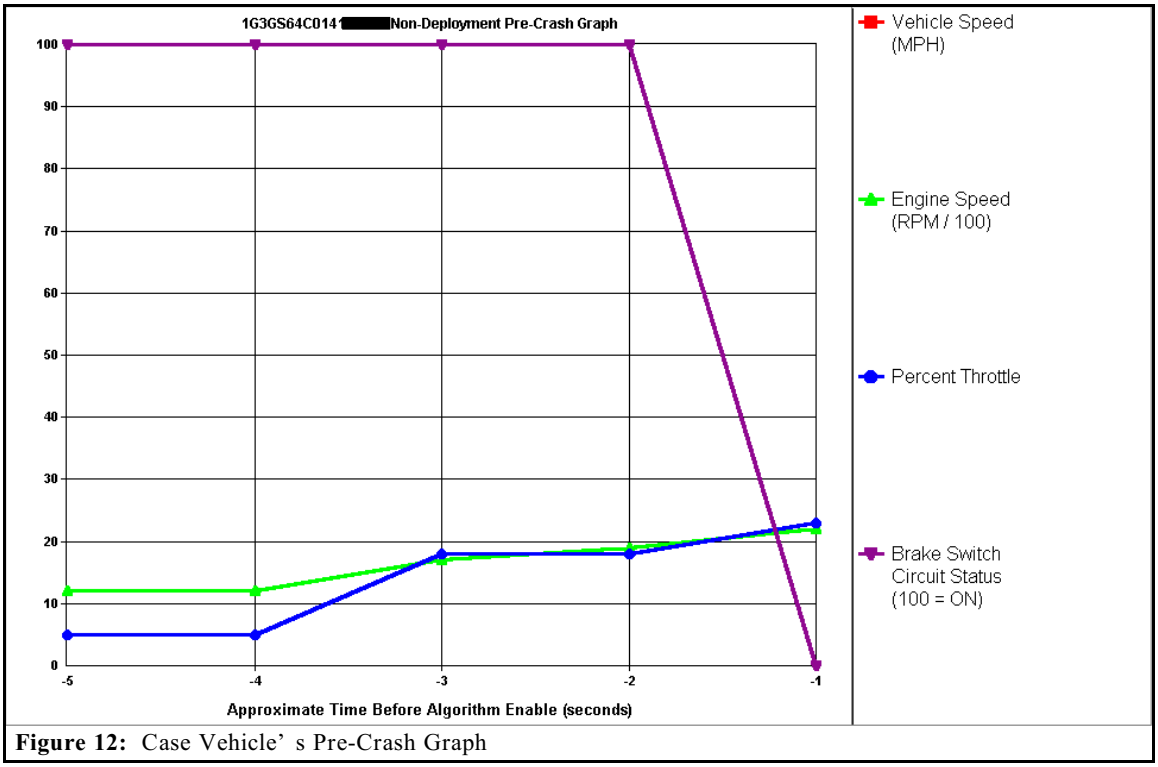


Figure 12: Case Vehicle' s Pre-Crash Graph

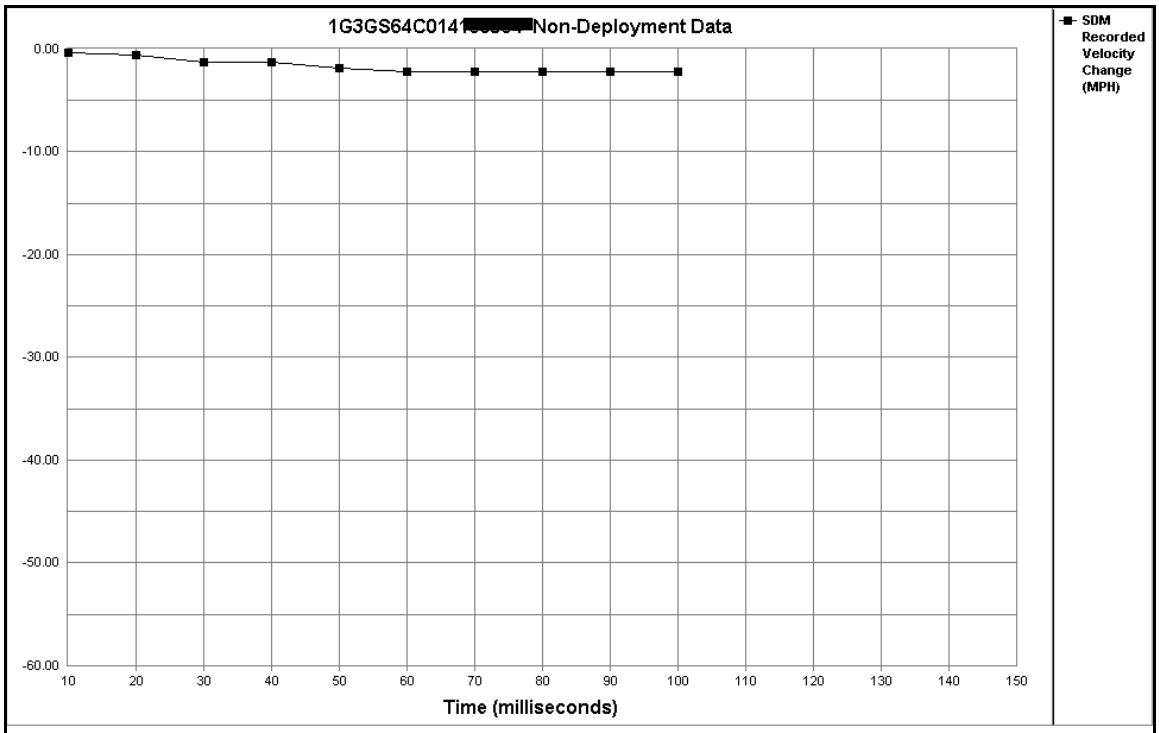


Figure 13: Case Vehicle' s Non-Deployment Data graph

1GNEC13Z32[redacted] System Status At Non-Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Passenger Front Air Bag Suppression Switch Circuit Status	Air Bag Not Suppressed
Ignition Cycles At Non-Deployment	4568
Ignition Cycles At Investigation	4572
Maximum SDM Recorded Velocity Change (MPH)	-18.15
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	127.5

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
SDM Recorded Velocity Change	0.00	-1.76	-4.39	-6.58	-8.78	-10.97	-13.16	-14.92	-16.24	-17.11	-17.55	-17.55	-17.99	-17.99	-17.99

PRE-CRASH DATA

Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status
-5	46	1216	0	OFF
-4	46	1216	0	OFF
-3	44	1280	21	OFF
-2	44	1728	48	OFF
-1	41	1280	0	ON

Figure 14: Other Vehicle' s System Status at Non-Deployment report

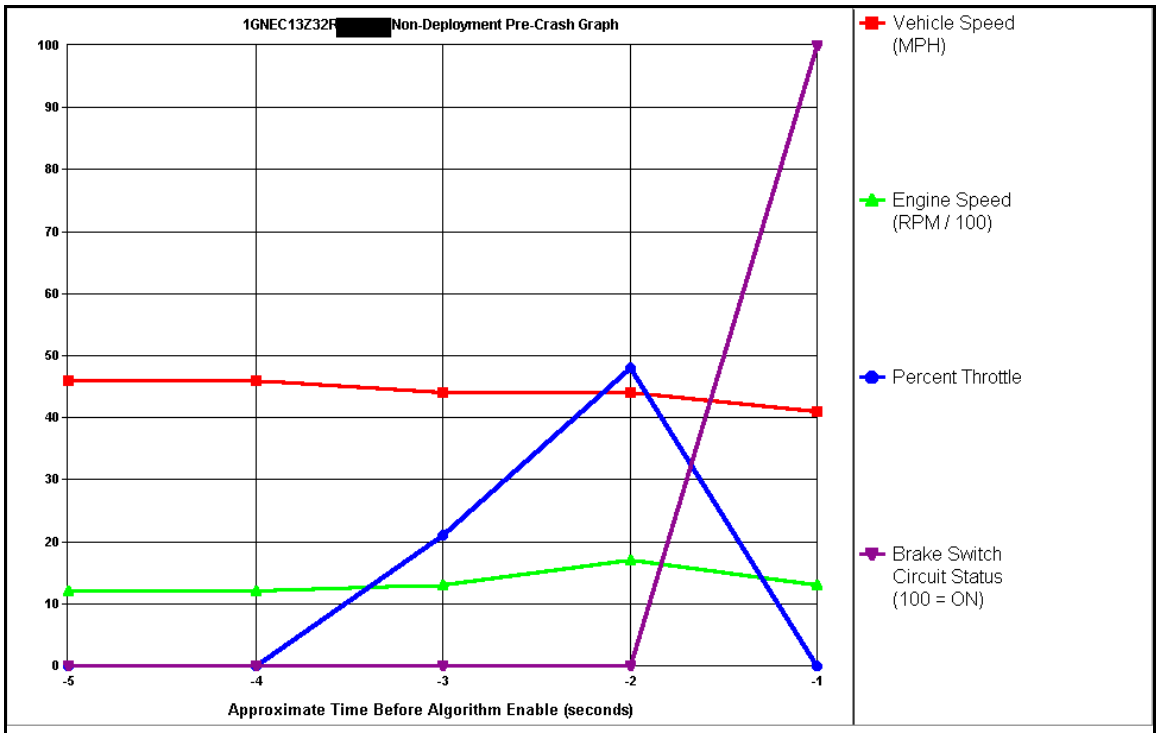


Figure 15: Other Vehicle' s Non-Deployment Pre-Crash Graph

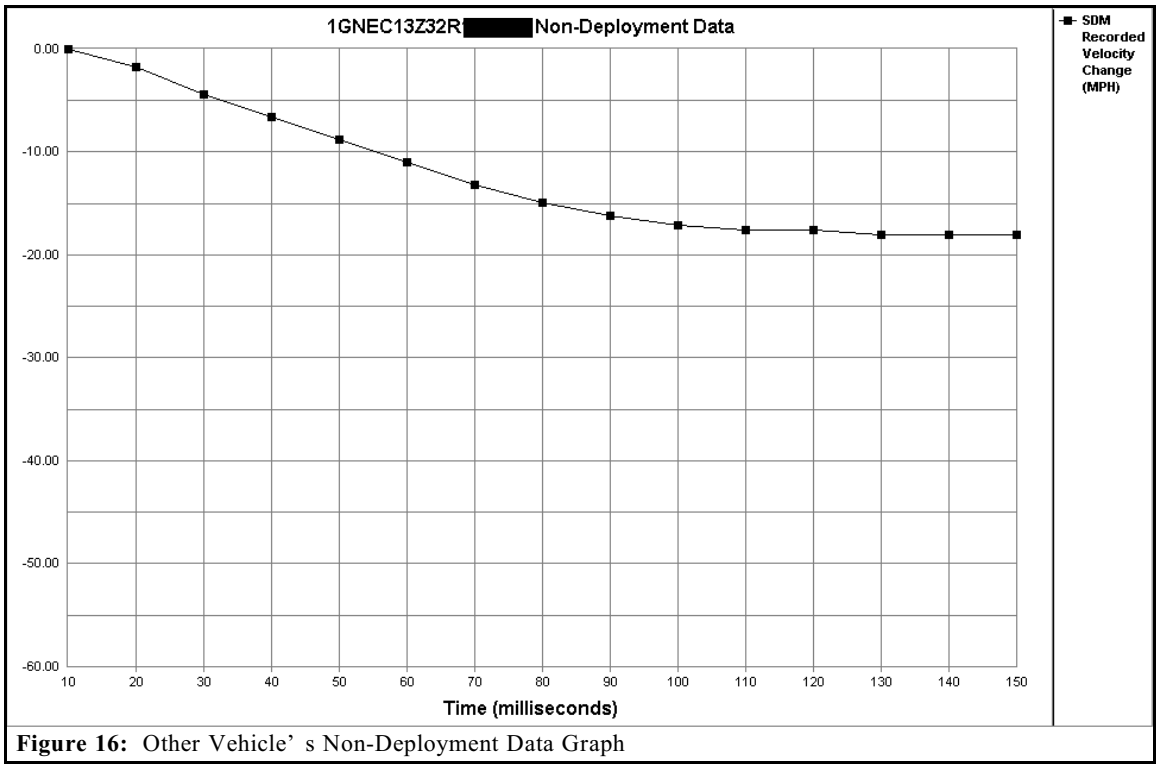


Figure 16: Other Vehicle' s Non-Deployment Data Graph