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ON-SITE CERTIFIED ADVANCED 208-COMPLIANT VEHICLE INVESTIGATION

CASE NUMBER - IN-04-024
LOCATION - Texas
VEHICLE - 2003 CHEVROLET C1500 SILVERADO, EXTENDED CAB
CRASH DATE - June 2004

Submitted:

July 21, 2005
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Contract Number: DTNH22-01-C-07002

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National Highway Traffic Safety Administration
National Center for Statistics and Analysis
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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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16. *Abstract*

This report covers an on-site investigation of an air bag deployment crash that involved a 2003 Chevrolet C1500 Silverado extended cab pickup truck (case vehicle),which ran-off-road and impacted a median guardrail. This crash is of special interest because the case vehicle was equipped with manufacturer certified advanced 208-compliant air bags as well as an Event Data Recorder (EDR), and the case vehicle's driver (32 year-old, female) sustained several minor injuries related to the deployment of her air bag. The case vehicle was northwest bound in the inside center through-lane of a multiple lane Interstate highway in heavy traffic during a heavy rainstorm. Traffic in front of the case vehicle slowed, the driver steered left to avoid the vehicle in front of her, and the case vehicle began to rotate counterclockwise on the rain slick roadway. The case vehicle crossed the inside lane and shoulder, and the front of the vehicle impacted a median guardrail causing a first stage deployment of the driver's air bag. The front right passenger air bag was suppressed by the case vehicle's AOPs system because there was no front right passenger in the vehicle. The case vehicle was deflected to the right and continued to rotate counterclockwise back across the roadway. The front of the vehicle then sustained a minor impact with the guardrail on the north side of the roadway as the case vehicle came to final rest. Just prior to impact with the median guardrail, the case vehicle's driver was most likely leaned slightly to her right due to the counterclockwise rotation of the vehicle. She had her left foot on the floor, her right foot on the brake pedal and both hands on the steering wheel, and was most likely bracing for impact. She was restrained by her integral, lap-and-shoulder safety belt system; her seat track was located in its rear-most position, her seat back was slightly reclined and the tilt steering column was located in its full down position. The impact with the median guardrail caused the driver to move forward and to the right. She loaded her lap-and-shoulder belt, her face and left thumb impacted her deployed air bag, her right foot loaded the brake pedal and her left knee and shin impacted the knee bolster. The driver sustained lacerations, contusions and abrasions and a sprained right ankle due to her interaction with these components. In addition, the driver reported a burn on her left forearm, most likely due to exhaust gas from the air bag's left vent port. The driver refused transport to a medical facility at the scene and sought no treatment for her injuries subsequent to the crash.

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This investigation was brought to NHTSA's attention on or about July 16, 2004 by NASS CDS/GES sampling activities. This crash involved a 2003 Chevrolet C1500 Silverado extended cab pickup truck (case vehicle), which ran off-road and impacted two longitudinal barriers (i.e., guardrails). The crash occurred in June 2004, at 7:10 a.m. in Texas and was investigated by the applicable city police department. This crash is of special interest because the case vehicle was equipped with certified advanced 208-compliant air bags, as well as an Event Data Recorder (EDR) and the case vehicle's driver [32-year-old, White (non-Hispanic) female] sustained several minor injuries due to contact with her deployed air bag. The manufacturer has certified that this vehicle meets the advanced air bag requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. This contractor inspected the scene and vehicle, and downloaded the data from the onboard EDR on July 29-30, 2003. This contractor interviewed the driver on August 6, 2004. This report is based on the police crash report, an interview with the case vehicle driver, scene and vehicle inspections, occupant kinematic principles, and this contractor's evaluation of the evidence.

SUMMARY

The case vehicle was northwest bound in the inside center through-lane of a multiple lane Interstate highway in heavy traffic during a heavy rainstorm. Traffic in front of the case vehicle slowed, the driver steered left to avoid the vehicle in front of her, and the case vehicle began to rotate counterclockwise on the rain slick roadway. The case vehicle crossed the inside lane and the shoulder, and the front of the vehicle impacted a steel, blocked-out, W-beam, median guardrail causing a first stage deployment of the driver's air bag. The front right passenger air bag was suppressed because there was no front right passenger in the vehicle. The case vehicle was deflected to the right by the guardrail, continued to rotate counterclockwise back across the roadway, and the front of the vehicle sustained a minor impact with the guardrail on the north side of the roadway as the case vehicle came to final rest.

The CDCs for the case vehicle were determined to be **01-FDEW-1** (**40** degrees) and **12-F9L9-1** (**0** degrees). The crash was out-of-scope for the WinSMASH reconstruction program due to the yielding nature of the guardrail impact. However, WinSMASH was used to calculate a barrier equivalent speed of 15.2 km.p.h. (9.4 m.p.h.) based on the damage to the case vehicle. The maximum longitudinal component of Delta V was recorded by the case vehicle's EDR as -22.64 km.p.h. (-14.07 m.p.h.). The Total and Lateral components of Delta V at the time of the peak longitudinal Delta V based on the EDR data and the case vehicle's 40 degree direction of principal force were calculated as 29.56 km.p.h. (18.37 mph.) and -19.0 km.p.h. (-11.81 m.p.h.).

Just prior to the impact with the median guardrail, the case vehicle's driver probably leaned slightly to her right due to the counterclockwise rotation of the vehicle. She had her left foot on the floor, her right foot on the brake pedal and both hands on the steering wheel, and was probably bracing for impact. She was restrained by her integral, lap-and-shoulder safety belt system; her seat track was located in its rear-most position, her seat back was slightly reclined and the tilt steering column was located in its full down position. The impact with the median guardrail caused the driver to move forward and to the right. She loaded her lap-and-shoulder belt, her face

and left thumb impacted her deployed air bag, her right foot loaded the brake pedal and her left knee and shin impacted the knee bolster. Her interaction with the safety belt system caused a laceration on the left side of her neck and a contusion that extended from her left shoulder, across her chest to her right hip. Her impact with the air bag caused a laceration above her left eyebrow and an abrasion on her left thumb. In addition the driver reported a burn on the inside of her left forearm, probably due to exhaust gas from the air bag's left vent port. She also sustained a contusion to her left knee and shin from impact with the knee bolster, and a right ankle sprain due to loading the brake pedal. She was able to exit the case vehicle under her own power following the crash. The driver's use of her safety belt system and the first stage deployment of her air bag mitigated her interaction with the steering wheel and instrument panel and most likely prevented more serious injury.

The police crash report indicated the driver sustained a "B" (non-incapacitating-evident) injury and refused transport to a medical facility. The driver stated she did not seek any treatment for her injuries subsequent to the crash.

CRASH CIRCUMSTANCES

Crash Environment: The trafficway on which the case vehicle was traveling was an eight-lane, divided, Interstate highway, traversing in a northwesterly and southeasterly direction. The trafficway was divided by a steel, blocked-out, W-beam median guardrail and each travel direction had four travel lanes with paved shoulders. Each travel lane was approximately 3.7 meters (12 feet) wide, and the shoulders were approximately 3 meters (10 feet) wide. Roadway pavement markings consisted of broken white lane lines, a solid yellow median edge line on the south side and a solid white edge line on the north side. The case vehicle's roadway had a concrete bridge rail and a guardrail adjacent to the outside shoulder. The speed limit was 97 km.p.h. (60 mph). There was no regulatory speed limit sign posted near the crash scene. At the time of the crash the light condition was daylight, the atmospheric condition was heavy rain and the roadway pavement was wet, traveled polished concrete. The estimated roadway coefficient of friction at the time of the crash was 0.50, and the roadway was approximately level in the area of the crash. Traffic density was heavy and the site of the crash was urban commercial and industrial. See the Crash Diagram at the end of this report

Pre-Crash: The case vehicle was traveling northwest in the inside center through-lane, and the driver was intending to continue straight ahead (**Figure 1**). The police crash report indicated that, based on a witness statement, the driver lost control of the vehicle as a vehicle in front of it slowed for traffic. The police crash schematic shows the case vehicle rotating counterclockwise to the left prior to the impact. The driver stated she hydroplaned due to the wet pavement and went to the left. She also stated she steered left and braked, but she was not clear as to when the

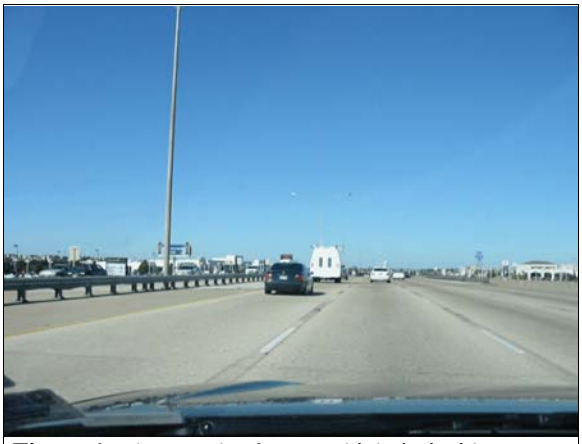


Figure 1: Approach of case vehicle in inside center through-lane

steer maneuver took place in relation to the braking maneuver. The EDR pre-crash data indicates the driver was accelerating five seconds prior to the crash, and her foot was off the accelerator four seconds prior to the crash. The brakes were recorded as on one second prior to the crash. The evidence indicates the driver steered left to avoid the vehicle slowing in front of her, lost control of her vehicle on the rain slick roadway, rotated counterclockwise and applied the brakes in an attempt to avoid a crash. The case vehicle rotated counterclockwise across the inside lane and shoulder, and the crash occurred off the roadway at the median guardrail.

Figure 2: Front damage to case vehicle from impact with the median guardrail, each stripe on rod is 5 cm (2 in)

Crash: The front right of the case vehicle (**Figure 2**) impacted the steel, blocked-out, W-beam median guardrail (**Figure 3**) causing the case vehicle's driver air bag to deploy. Based on the EDR data, the deployment command criteria was met for only the first stage of the two stage driver air bag system. The case vehicle was equipped with a front right passenger air bag equipped with an air bag suppression switch that was set to the "auto" position and an occupant detection sensor in the front right seat. Deployment of this air bag was properly suppressed during the crash sequence because there was no front right passenger in the vehicle. Following the median guardrail impact, the case vehicle deflected to the right, continued to rotate counterclockwise and traveled diagonally across all four lanes of the roadway and the outside shoulder. The front right of the case vehicle then sustained a minor impact with the steel guardrail on the right side of the roadway (**Figure 4**).

Figure 3: Overview of median guardrail impacted by case vehicle, arrow shows new section of guardrail indicating likely area of impact

Post-Crash: The case vehicle came to rest on the outside shoulder of the roadway facing north with the front right of the vehicle against the guardrail (**Figure 4**).

Figure 4: View northwest to area of second guardrail impact and final rest of case vehicle

The 2003 Chevrolet C1500 Silverado was a rear wheel drive, extended cab pickup truck (VIN: 2GCEC19T6312------) equipped with a 5.3 L, V-8 engine and a four-speed automatic transmission with overdrive. Braking was achieved by power-assisted, four wheel, anti-lock disc brakes. The split bench front seat was equipped with adjustable head restraints; integral, three-point, lap-and-shoulder safety belt systems with seat belt usage sensors in the driver and front right seat positions and a lap belt in the center seat position, dual stage driver and front right passenger air bags, seat position sensors, front right air bag suppression switch, occupant detection system in the front right seat and an EDR contained within the vehicle's Sensing and Diagnostic Module (SDM). The back bench seat was equipped with adjustable head restraints and manual, three-point, lap-and-shoulder safety belt systems in the outboard seat positions, a lap belt in the center seat position and a LATCH system for securing child safety seats. Traction control was listed as an option for the case vehicle, but it is not known if the vehicle was so equipped. The case vehicle's wheelbase was 364 centimeters (143.3 inches). The odometer reading is not known because the vehicle was equipped with an electronic odometer; however, the driver estimated that the case vehicle had approximately 36,818 kilometers (22,878 miles) on it at the time of the crash.

The various sensors in the case vehicle's advanced occupant restraint system analyze a combination of factors including the predicted crash severity and safety belt usage to determine the front air bag inflation level appropriate for the severity of the crash. For the front right seat position, an occupant weight pressure sensor and a seat belt tension sensor provide data to the electronic control module. The electronic control module compares the seat pressure and seat belt tension data to threshold values, determines if the front right air bag should be suppressed or enabled and communicates the decision to the air bag control module. The air bag will be suppressed when the seat pressure is at or below what a 6-year-old child in a booster seat produces, or when the belt tension is above 6.8 kilograms (15 pounds). The air bag will be enabled if the seat pressure is at or above what a 46.7 kilograms (103 pound) occupant produces and the seat belt tension is below (15 pounds). The air bag is also suppressed for the empty seat.

CASE VEHICLE DAMAGE

Exterior Damage:: The case vehicle's impact with the median guardrail involved the front plane of the vehicle. Direct damage began at the right bumper corner and extended 151 centimeters (59.4 inches), along the front bumper. Residual maximum crush was measured as 25 centimeters (9.8 inches) at C_5 (**Figure 5** below). The case vehicle's front bumper, bumper fascia, grille, radiator, right fender, and front edge of the hood were directly damaged and crushed rearward as well as to the left. The table below shows the case vehicle's crush profile.

Units	Event	Direct Damage		Field L	C_1	C_2	C_3	C_4	C_5	C_6	Direct	Field L
		Width CDC	Max Crush								±D	±D
cm	1	151	25	167	7	5	4	13	25	19	13	0
in		59.4	9.8	65.7	2.8	2.0	1.6	5.1	9.8	7.5	5.1	0.0

The case vehicle's wheelbase was unaltered by the crash. Induced damage involved the hood and both the right and left fenders (**Figures 6** and **7**). The front grille and headlamp/ turn lamp assemblies had been removed from the vehicle and were not available at the time of the inspection.

The recommended tire size was: P255/70R16, but the case vehicle was equipped with tire size: P245/70R16 on the front wheels and LT265/75R16 on the rear. It appears that none of the tires on the case vehicle at the inspection were on the vehicle during the crash. According to the case vehicle's driver, the original front wheels had been removed. She stated she did know why they were removed or where they were located. The tires on the back of the vehicle, in addition to being a different size than the recommended tire, also did not appear to be original. The wheels were held in place with only two lug nuts (as were the front wheels) and the left rear appeared to be a spare tire. The case vehicle's tire data is not known.

Vehicle Interior: Inspection of the case vehicle's interior (**Figure 8** below) revealed no obvious occupant contacts on the interior surfaces of the vehicle. However, what appeared to be makeup transfers were observed on the right upper quadrant of the driver's air bag, indicating the driver's face contacted the air bag during the crash. In addition, the driver's safety belt appeared to be stretched due to the driver loading it during the crash. No deformation of the steering wheel rim or compression of the energy absorbing steering column was observed (**Figure 9** below). Lastly, the case vehicle sustained no occupant compartment intrusions.

Figure 5: Right side view of crush to case vehicle's front bumper, each stripe on rods is 5 cm (2 in), the front baseline is set 17 cm (6.7 in) beyond the undeformed front bumper position

Figure 6: Overview of front and left side of case vehicle, each black mark on tape measure is 0.31 meter (1 foot)

Figure 7: Overview of front and right side of case vehicle

Figure 8: Overview of case vehicle's windshield, steering wheel and instrument panel

Figure 9: Case vehicle's steering column and steering wheel

Damage Classification: Based on the vehicle inspection, the CDC for the case vehicle was determined to be: **01-FDEW-1** (**40** degrees). No distinguishable damage was found on the bumper from the second guardrail impact. An estimated CDC of **12-F9L9-1** (**0** degrees)was assigned for this reported impact.

The impact with the median guardrail is out of scope for the WinSMASH reconstruction program due to the yielding nature of the guardrail. However, the WinSMASH, barrier algorithm, was used to determine a Barrier Equivalent Speed (BES) based on the damage to the case vehicle. The calculated BES was 15.2 km.p.h (9.5 m.p.h.). Based on the damage to the case vehicle, the results of the WinSMASH BES reconstruction appeared low. Maximum Delta V data was recorded by the case vehicle's EDR. However, the EDR reports only the longitudinal component of the Delta V, which was recorded as -22.64 km.p.h. (-14.07 m.p.h.). The Total and Lateral Delta Vs can be calculated based on the longitudinal Delta V and the assigned 40 degree direction of principal force. The Total, and Lateral Delta Vs at the time of the peak longitudinal Delta V based on these data were calculated respectively as: 29.56 km.p.h. (18.37 mph.) and -19.0 km.p.h. (-11.81 m.p.h.). The case vehicle was towed due to damage.

AUTOMATIC RESTRAINT SYSTEM

The case vehicle's driver air bag (**Figure 10** below) was located in the steering wheel hub. An inspection of the air bag module cover flaps and the air bag's fabric revealed that the cover flaps opened at the designated tear points (**Figure 11** below), and there was no evidence of damage during the deployment to the air bag or the cover flaps. The module cover consisted of "I" configuration cover flaps made of pliable vinyl each 7.5 centimeters (3.0 inches) in width at the top, 5.0 centimeters (2.0 inches) in width at the bottom and 13 centimeters (5.1 inches) in height at the center tear seam. The driver's air bag was designed with two tethers, each approximately 13.5 centimeters (5.3 inches) in width. The driver's air bag had two vent ports, (**Figure 12** below) approximately 3.0 centimeters (1.2 inches) in diameter, located at the 10:00 and 2:00 clock positions. The deployed driver's air bag was round with a diameter of approximately 65 centimeters (25.6 inches). The distance between the mid-center of the driver's seat back, as

positioned at the time of the vehicle inspection, and the front surface of the air bag at full excursion was 39 centimeters (15.4 inches). An inspection of the driver's air bag fabric revealed probable makeup transfers on the right upper quadrant of the air bag (**Figure 13**), and a few light scuffs were noted on the back of the air bag, which appeared to be due to deployment.

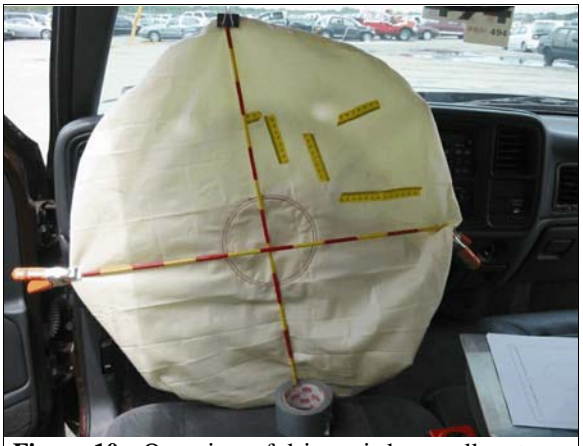


Figure 10: Overview of driver air bag, yellow tape shows probable make-up transfer on air bag

Figure 11: Driver air bag module cover flaps and the steering wheel

Figure 12: Driver's air bag vent ports

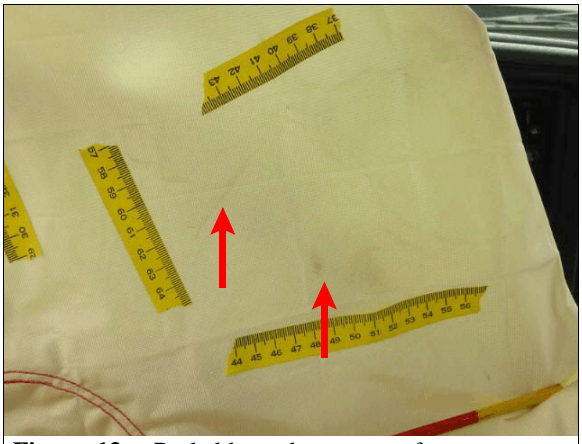


Figure 13: Probable make up transfers on upper right quadrant of air bag

The front right passenger's air bag was located in the middle of the instrument panel (**Figure 14** below) and properly did not deploy. The case vehicle's front right seat occupant sensing system correctly determined the absence of a front right occupant and suppressed deployment of the front right air bag. The case vehicle was also equipped with a suppression switch for this air bag, which was set to the "Auto" position (**Figure 15** below).

The download of the case vehicle's EDR was done during the vehicle inspection through the diagnostic link connector. The EDR recorded a deployment event and a non-deployment event. The EDR reports for both events are presented at the end of this report (**Figures 16-21**). The EDR recorded the SIR warning lamp as "off" and the driver's safety belt switch circuit as "buckled". The system status report for the deployment event indicates the driver's air bag, first stage deployment criteria was met at 32.5 milliseconds after algorithm enable (AE), and the maximum SDM recorded velocity change was -22.63 km.p.h. (-14.07 m.p.h.) occurring 174 milliseconds after AE.

Figure 14: Overview of location of front right air bag in middle of instrument panel above glove box door

The pre-crash data for the deployment event recorded the case vehicle traveling 113 km.p.h. (70 mph) at 87% throttle five seconds prior to the crash (i.e., AE). At four seconds prior to the crash, the percent throttle drops to zero and speed drops to 100 km.p.h. (62 m.p.h.). The speed continues to drop and the throttle remains at zero percent for the remaining three sample periods. The brake switch circuit status is then recorded as on at the last sample period (i.e., one second prior to the crash) indicating the driver applied the brakes prior to impacting the median guardrail.

Figure 15: Front right passenger air bag suppression switch set to "AUTO" position

The non-deployment event was very minor. The EDR recorded the maximum SDM recorded velocity change as 0.00 km.p.h. (0.00 m.ph.) occurring at 207.5 milliseconds after algorithm enable, indicating the event was just sufficient to wake up the crash sensing algorithm. It is this contractor's opinion that the non-deployment event was the result of a minor second contact with the median guardrail.

CASE VEHICLE DRIVER KINEMATICS

Immediately prior to the crash the case vehicle's driver [32-year-old, White (non-Hispanic) female; 173 centimeters and 129 kilograms (68 inches, 285 pounds)] was seated in an upright posture with her back against the seat back, her left foot on the floor, her right foot on the brake and both hands on the steering wheel. Her seat track was located in its rear most position, the seat back was slightly reclined, and the tilt steering column was located in its full down position. In addition, the driver was wearing contact lenses at the time of the crash.

The case vehicle's driver was restrained by her integral, three-point, lap-and-shoulder safety belt system. This determination was based on the inspection of the safety belt webbing, which appeared to be stretched, and supported by the EDR data. In addition, the driver stated that she was restrained and received belt pattern bruising from her left shoulder, across her chest to her right hip.

The case vehicle's driver stated she lost control of the vehicle as it hydroplaned on the wet pavement. She stated she steered to the left and braked after the case vehicle began to rotate counterclockwise in an attempt to avoid a crash. However, if her recollection is correct, the left steer maneuver likely resulted in increased counterclockwise rotation. As a result of the attempted avoidance maneuvers, she probably moved slightly forward and to her right just prior to impact. The case vehicle's impact with the median guardrail caused the case vehicle's driver to move forward and rightward along a path opposite the case vehicle's 40 degree direction of principal force as the case vehicle decelerated. The driver loaded her safety belt, her face and left thumb impacted her deployed air bag, her left knee and shin impacted the knee bolster and her right foot loaded the brake pedal. Her interaction with the air bag left a probable transfer of makeup on the right upper quadrant of the air bag (**Figure 13** above) and caused a laceration above her left eye, an abrasion to her left thumb, and a minor thermal burn to her left forearm, probably due to exhaust gas from the air bag's left vent port. The driver's interaction with her safety belt system caused a laceration to the left side of her neck and a bruise that extended from her left shoulder, across her chest to her right hip. The driver's left knee and shin contact with the knee bolster caused a bruise to her left knee and shin, and she sprained her right ankle due to loading the brake pedal. Following the impact with her air bag, the driver most likely rebounded and may have moved to the right and back to the left as the vehicle decelerated and continued to rotate counterclockwise across all four lanes of traffic and the outside shoulder. The driver remained restrained and in her seat as the case vehicle made minor contact with the outside steel guardrail as the vehicle came to rest. She was able to exit the case vehicle under her own power.

CASE VEHICLE DRIVER INJURIES

The police crash report indicated the case vehicle's driver sustained a "B" (non-incapacitating-evident) injury and refused transport to a treatment facility. The driver stated in her interview that she sought no medical treatment subsequent to the crash. However, she did report numerous minor injuries that she sustained in the crash, which are shown in the table below. The driver also stated that she lost one work day as a result of the crash.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Laceration {cut} above left eyebrow	minor 290602.1,7	Air bag, driver's	Certain	Interviewee (same person)
2	Laceration {cut}, 7.6 cm (3 in) on left lateral neck	minor 390602.1,2	Torso portion of safety belt system	Certain	Interviewee (same person)

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
3	Contusion {bruising} left shoulder, diagonally oriented	minor 790402.1,2	Torso portion of safety belt system	Certain	Interviewee (same person)
4	Contusion {bruising} central chest, diagonally oriented	minor 490402.1,4	Torso portion of safety belt system	Certain	Interviewee (same person)
5	Contusion {bruising} right hip and/or flank area, diagonally oriented	minor 590402.1,1	Torso portion of safety belt system	Certain	Interviewee (same person)
6	Burn {thermal} medial left forearm	minor 792002.1,2	Noncontact injury: air bag exhaust gases	Probable	Interviewee (same person)
7	Abrasion to left thumb from 1st knuckle to base	minor 790202.1,2	Air bag, driver's	Probable	Interviewee (same person)
8	Contusion {bruise} to medial left knee and to left leg on shin from just below knee downward	minor 890402.1,2	Knee bolster, driver's, left of steering column	Probable	Interviewee (same person)
9	Sprain {twisted} right ankle, not further specified	minor 850206.1,1	Floor, foot controls	Probable	Interviewee (same person)

2GCEC19T631xxxxxx System Status At Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Deployment	2083
Ignition Cycles At Investigation	2091
Maximum SDM Recorded Velocity Change (MPH)	-14.07
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	175
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	32.5
Driver Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Passenger First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A
Time Between Non-Deployment And Deployment Events (sec)	N/A
Frontal Deployment Level Event Counter	1
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.62	-1.55	-2.48	-4.03	-5.27	-6.51	-7.13	-8.06	-8.68	-9.92	-10.85	-11.78	-12.71	N/A	N/A

PRE-CRASH DATA				
Seconds Before AE	**Vehicle Speed (MPH)**	**Engine Speed (RPM)**	**Percent Throttle**	**Brake Switch Circuit Status**
-5	70	5312	87	OFF
-4	62	2368	0	OFF
-3	45	1344	0	OFF
-2	42	1216	0	OFF
-1	31	768	0	ON

Figure 16: Case vehicle's System Status at Deployment report

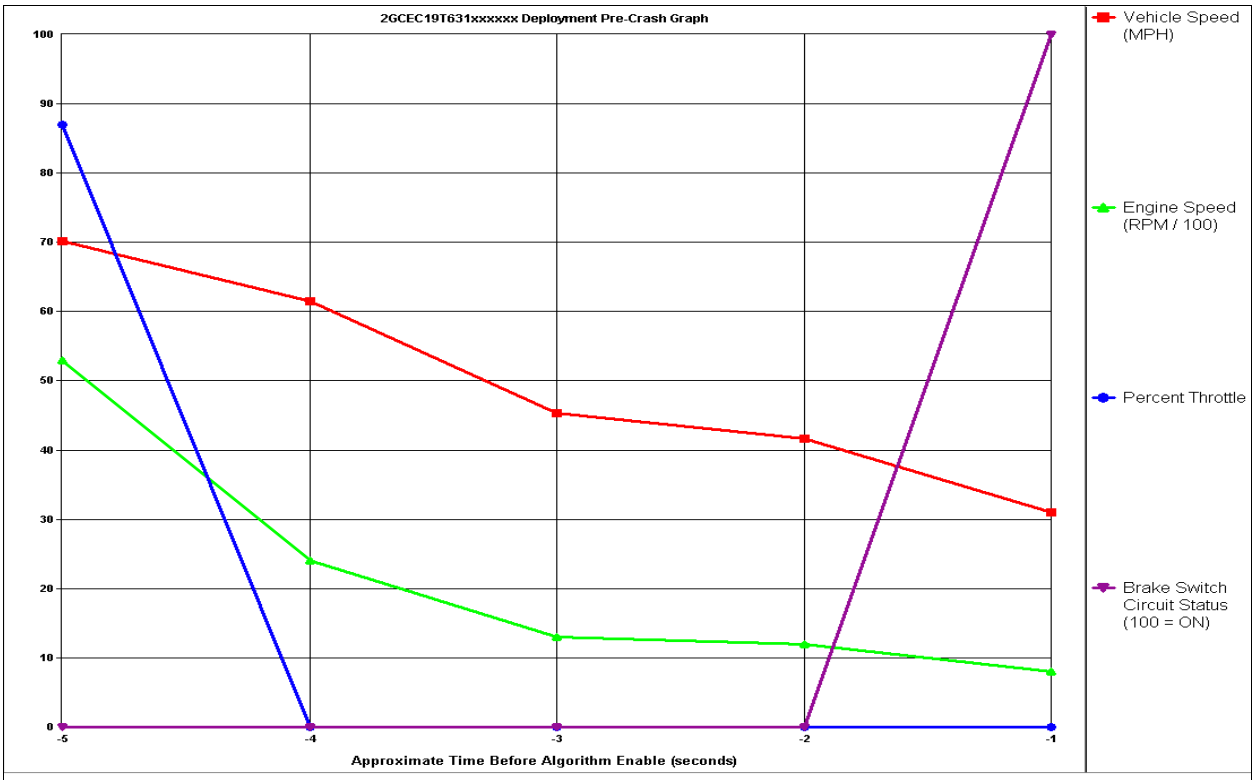


Figure 17: Case vehicle's Deployment Pre-Crash Graph

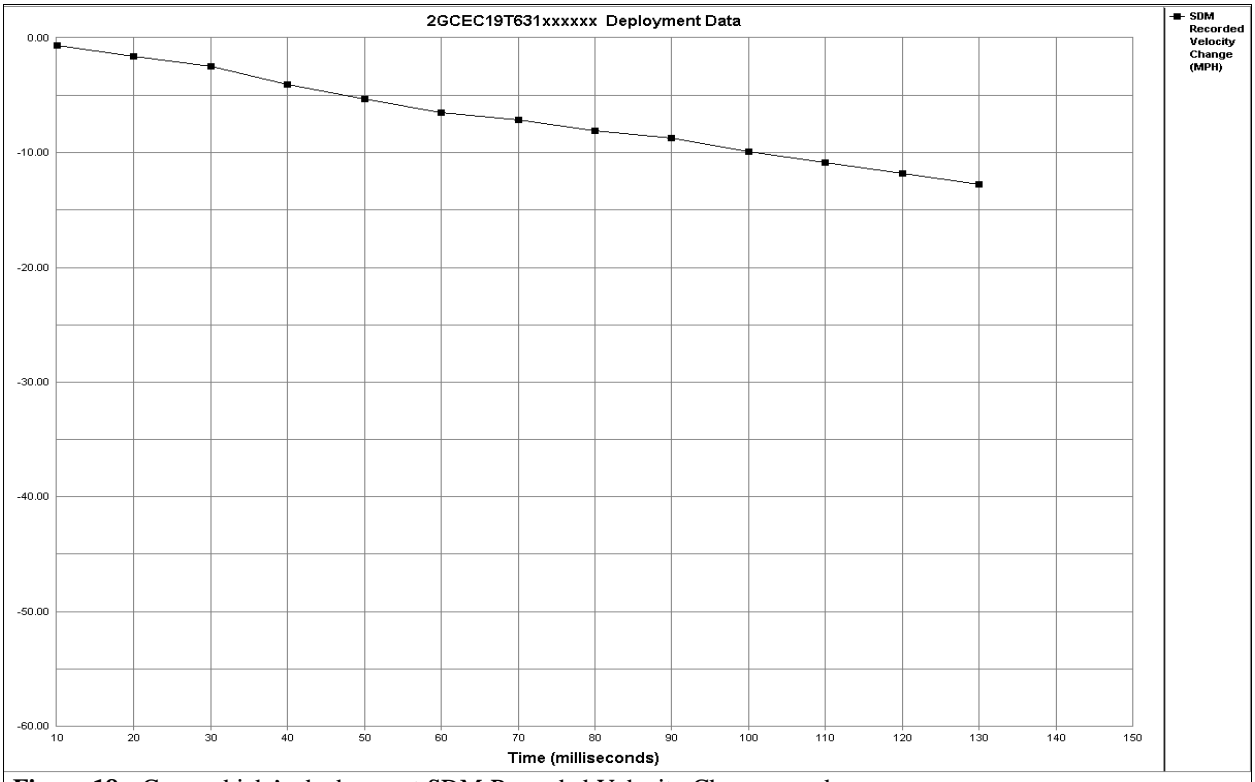


Figure 18: Case vehicle's deployment SDM Recorded Velocity Change graph

2GCEC19T631xxxxxx System Status At Non-Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	BUCKLED
Ignition Cycles At Non-Deployment	2083
Ignition Cycles At Investigation	2091
Maximum SDM Recorded Velocity Change (MPH)	0.00
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	207.5
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No

Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

PRE-CRASH DATA				
Seconds Before AE	**Vehicle Speed (MPH)**	**Engine Speed (RPM)**	**Percent Throttle**	**Brake Switch Circuit Status**
-5	70	5312	87	OFF
-4	62	2368	0	OFF
-3	45	1344	0	OFF
-2	42	1216	0	OFF
-1	31	768	0	ON

Figure 19: Case vehicle's System Status at Non-Deployment report

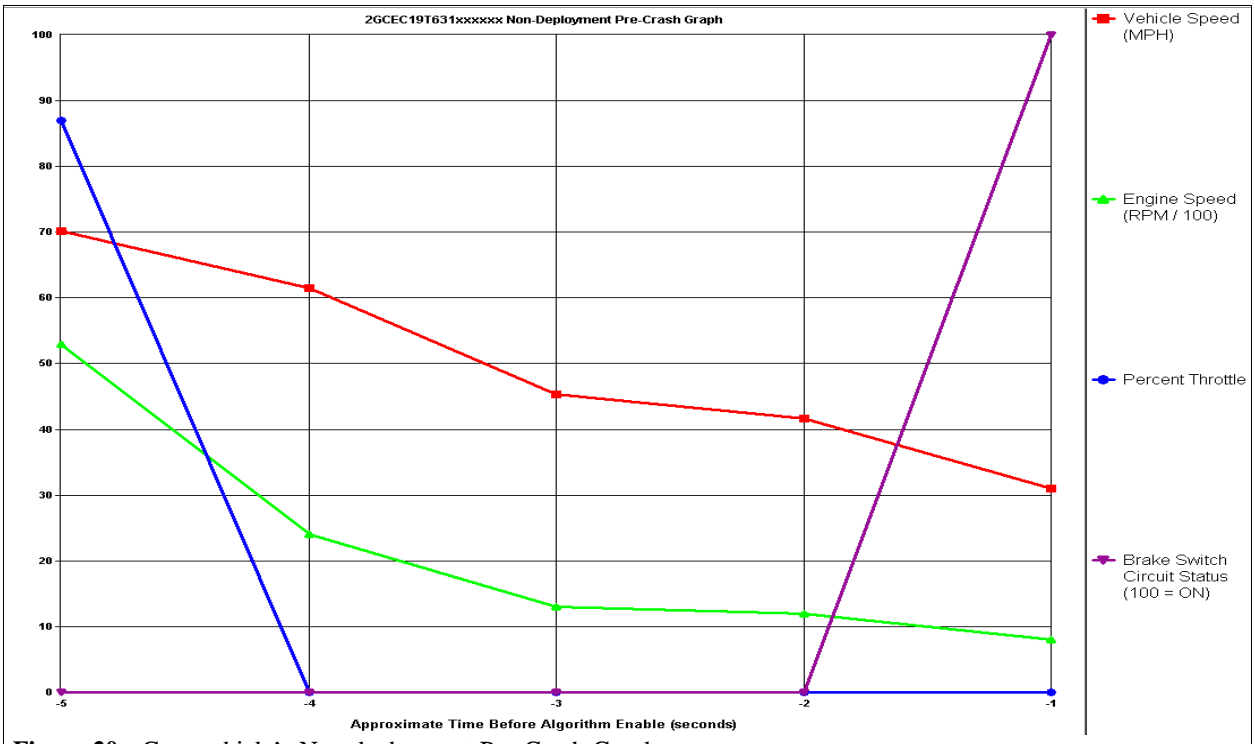


Figure 20: Case vehicle's Non-deployment Pre-Crash Graph

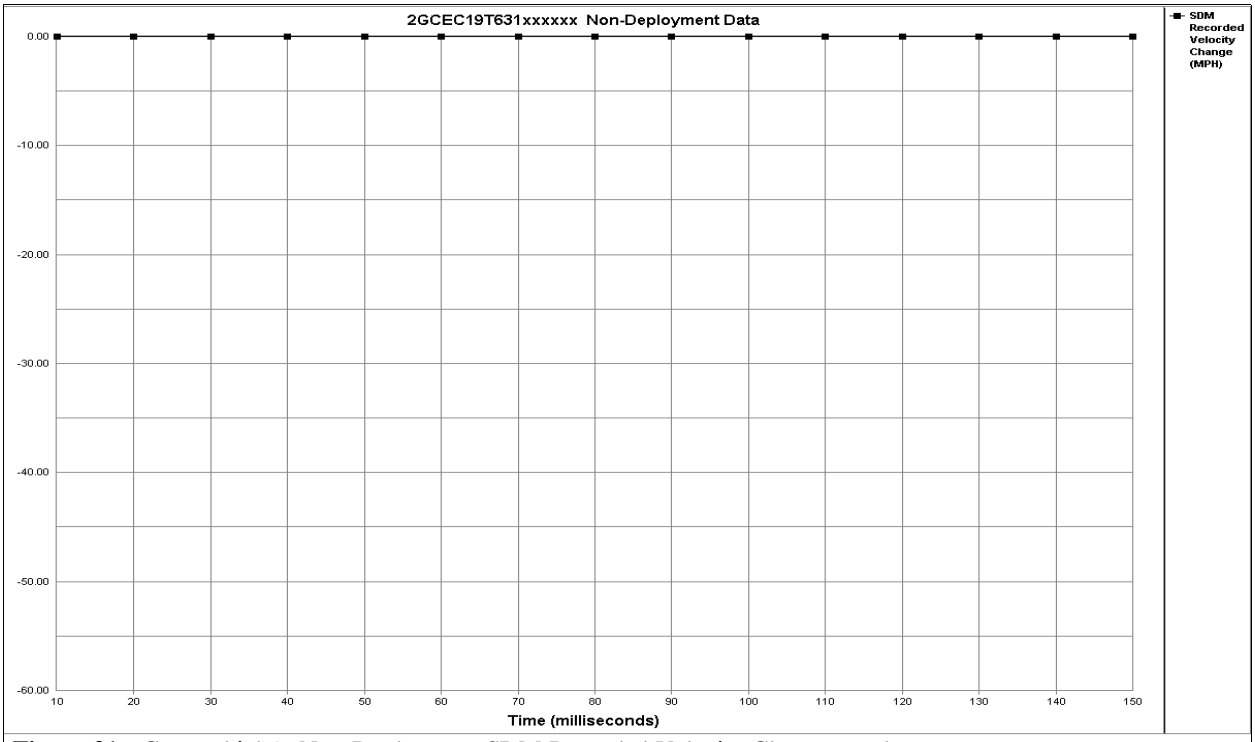
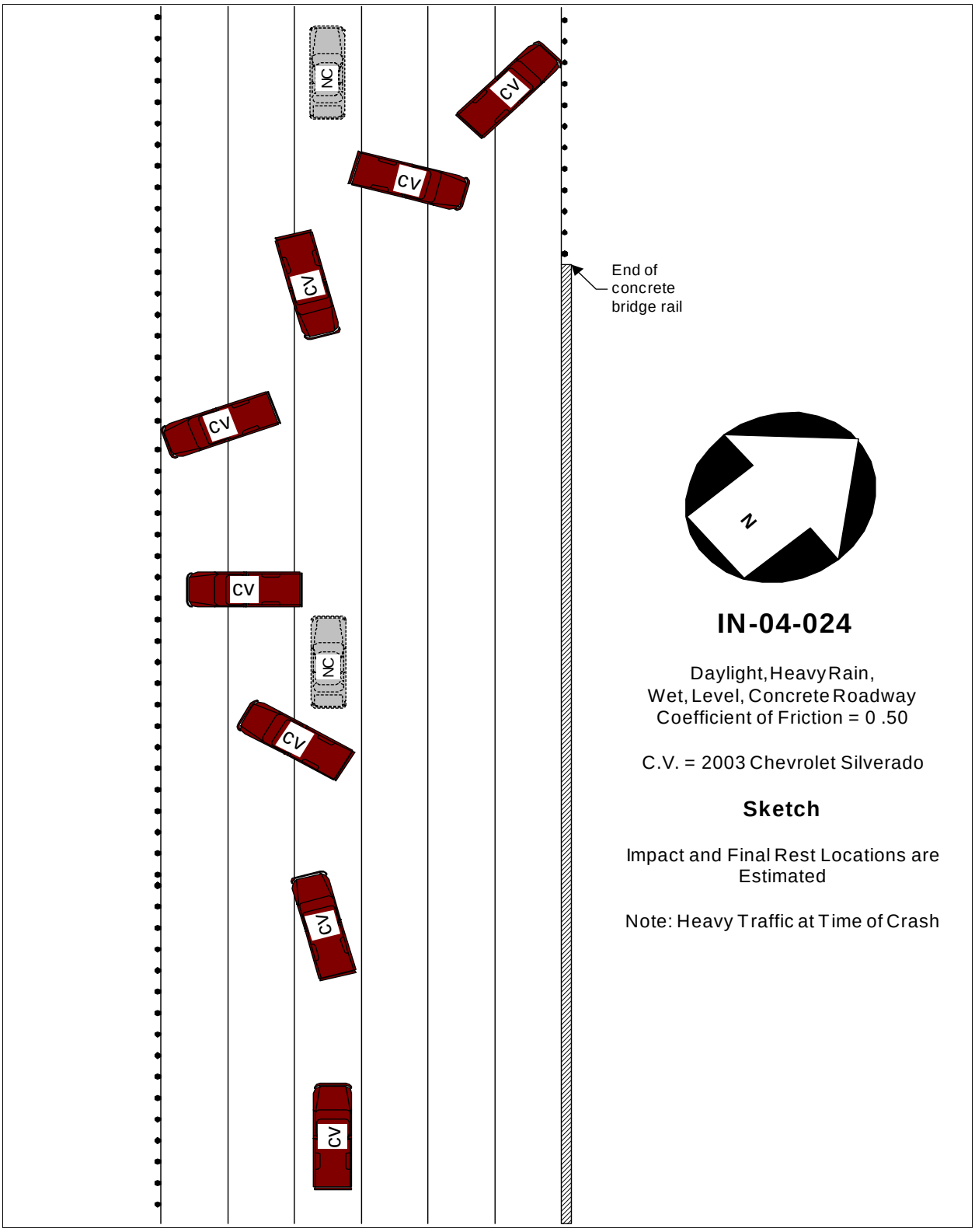


Figure 21: Case vehicle's Non-Deployment SDM Recorded Velocity Change graph



IN-04-024

Daylight, Heavy Rain,
Wet, Level, Concrete Roadway
Coefficient of Friction = 0 .50

C.V. = 2003 Chevrolet Silverado

Sketch

Impact and Final Rest Locations are Estimated

Note: Heavy Traffic at Time of Crash