CRASH DATA RESEARCH CENTER
Calspan Corporation
Buffalo, NY 14225

CALSPAN ON-SITE ROLLOVER CRASH INVESTIGATION
CALSPAN CASE NO: CA08031

VEHICLE: 2007 CHEVROLET SILVERADO
LOCATION: NORTH CAROLINA
CRASH DATE: JUNE, 2008

Contract No. DTNH22-07-C-00043

Prepared for:

U.S. Department of Transportation
National Highway Traffic Safety Administration
Washington, D.C. 20590

DISCLAIMER

This document is disseminated under the sponsorship of the Department of Transportation in the interest of information exchange. The United States Government assumes no responsibility for the contents or use thereof.

The opinions, findings, and conclusions expressed in this publication are those of the authors and not necessarily those of the National Highway Traffic Safety Administration.

The crash investigation process is an inexact science which requires that physical evidence such as skid marks, vehicular damage measurements, and occupant contact points are 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 STANDARD TITLE PAGE

1. Report No. CA08031	*2. Government Accession No.*	*3. Recipient's Catalog No.*	
4. Title and Subtitle Calspan On-Site Rollover Crash Investigation Vehicle: 2007 Chevrolet Silverado Location: North Carolina		*5. Report Date*: October 2009	
		6. Performing Organization Code	
7. Author(s) Crash Data Research Center		*8. Performing Organization Report No.*	
9. Performing Organization Name and Address Calspan Corporation Crash Data Research Center P.O. Box 400 Buffalo, New York 14225		*10. Work Unit No.*	
		11. Contract or Grant No. DTNH22-07-C-00043	
12. Sponsoring Agency Name and Address U.S. Department of Transportation National Highway Traffic Safety Administration Washington, D.C. 20590		*13. Type of Report and Period Covered* Technical Report Crash Date: June 2008	
		14. Sponsoring Agency Code	

15. Supplementary Note

An investigation of the intersection crash of a 2007 Chevrolet Silverado and a 2007 Chevrolet Cobalt with a subsequent rollover of the Chevrolet Silverado.

16. Abstract

This on-site investigation focused on the rollover of a multiple-event crash of a 2007 Chevrolet Silverado C2500 pickup truck. The Chevrolet Silverado was involved in an intersection crash with a 2007 Chevrolet Cobalt and subsequently rolled over three-quarter turns coming to rest on its right side against a utility pole. The Chevrolet Silverado was equipped with a redesigned frontal air bag system that deployed during the frontal crash. The Chevrolet Silverado was occupied by an unrestrained 52-year-old male driver. The driver of the Chevrolet Silverado sustained soft tissue injuries and was transported to a local hospital where he was treated and released.

This crash was identified by the Crash Investigation Division (CID) of the National Highway Traffic Safety Administration (NHTSA). The CID provided notification to the Calspan Special Crash Investigations (SCI) team on August 1, 2008. Calspan SCI initiated follow-up investigation and established cooperation with the insurance carrier for the Chevrolet Silverado. The vehicle was deemed a total loss and was available for inspection at an insurance salvage facility. The Chevrolet Cobalt was sold and crushed prior to the SCI notification of the crash and was not available for inspection. The Agency subsequently assigned an on-site investigation of the crash to the SCI team due its interest in rollover crashes involving late model year vehicles. The on-site portion of the investigation was conducted on August 11, 2008.

17. Key Words Rollover Intersection Crash Event Data Recorder Minor Injuries		*18. Distribution Statement* General Public	
19. Security Classif. (of this report) Unclassified	*20. Security Classif. (of this page)* Unclassified	*21. No. of Pages* 18	*22. Price*

TABLE OF CONTENTS

CALSPAN ON-SITE ROLLOVER CRASH INVESTIGATION
SCI CASE NO.: CA08031

VEHICLE: 2007 CHEVROLET SILVERADO
LOCATION: NORTH CAROLINA
CRASH DATE: JUNE 2008

BACKGROUND

This on-site investigation focused on the rollover of a multiple-event crash of a 2007 Chevrolet Silverado C2500 pickup truck **(Figure 1).** The Chevrolet Silverado was involved in an intersection crash with a 2007 Chevrolet Cobalt and subsequently rolled over three-quarter turns before coming to rest on its right side against a utility pole. The Chevrolet Silverado was equipped with a redesigned frontal air bag system that deployed during the frontal crash. The Chevrolet Silverado was occupied by an unrestrained 52-year-old male driver. The driver of the Chevrolet Silverado sustained soft tissue injuries and was transported to a local hospital where he was treated and released.

Figure 1: Front view of the damaged 2007 Chevrolet Silverado.

This crash was identified by the Crash Investigation Division (CID) of the National Highway Traffic Safety Administration (NHTSA). The CID provided notification to the Calspan Special Crash Investigations (SCI) team on August 1, 2008. Calspan SCI initiated follow-up investigation and established cooperation with the insurance carrier for the Chevrolet Silverado. The vehicle was deemed a total loss and was available for inspection at an insurance salvage facility. The Chevrolet Cobalt was sold and crushed prior to the SCI notification of the crash and was not available for inspection. The Agency subsequently assigned an on-site investigation of the crash to the SCI team due its interest in rollover crashes involving late model year vehicles. The on-site portion of the investigation was conducted on August 11, 2008.

SUMMARY

VEHICLE DATA

2007 Chevrolet Silverado

The 2007 Chevrolet Silverado 2500 Heavy Duty extended cab pickup truck was manufactured in October 2006 and was identified by Vehicle Identification Number (VIN): 1GCHC29U07E (production number deleted). The vehicle had a Gross Vehicle Weight Rating (GVWR) of 4,173 kg (9,200 lb) and was configured on a 400 cm (157.5 in) wheelbase. The Chevrolet was powered by a 6.0-liter, conventionally mounted 8-cylinder engine linked to a 6-speed automatic transmission with a column mounted shift lever. The service brakes were power-assisted front and rear disc with antilock and electronic brake force distribution. The Chevrolet was also equipped with an indirect Tire Pressure Monitoring System (TPMS). The tires were Bridgestone

VSteel, size LT245/75R16 mounted on OEM steel wheels. The vehicle manufacturer recommended cold tire pressure was 379 kPa 552 kPa (55 PSI) for the front and (80 PSI) for the rear. The tire data at the time of the SCI inspection was as follows:

Position	Measured Pressure	Measured Tread Depth	Damage
Left Front	462 kPa (67 PSI)	8 mm (10/32”)	None
Left Rear	483 kPa (70 PSI)	5 mm (6/32”)	None
Right Rear	483 kPa (70 PSI)	5 mm (6/32”)	None
Right Front	455 kPa (66 PSI)	8 mm (10/32”)	None

The interior safety systems consisted of 3-point lap and shoulder belts for the front and rear positions, a front center lap belt, and a redesigned frontal air bag system with a front right cut-off switch. The Chevrolet was equipped with an air bag Sensing and Diagnostic Module (SDM) that had Event Data Recording (EDR) capabilities. The EDR data was imaged at the time of the SCI inspection and the output is attached to the end of this narrative report as Attachment A.

An aftermarket ladder rack was attached to the bed of the truck and extended over the cab. Steel toolboxes were mounted longitudinally to the sides of the pickup bed. The estimated weight of the ladder rack and empty toolboxes was 113 kg (250 lb). The loaded weight of pickup’s cargo at the time of the crash could not be determined.

2007 Chevrolet Cobalt

The 2007 Chevrolet Cobalt contained the VIN 1G1AK55F777 (production sequence deleted). The Chevrolet Cobalt was sold from the insurance salvage yard to a recycler where it was crushed prior to the case assignment and was not inspected. The damage assessment was based on images provided by the insurance company.

CRASH SITE

This crash occurred during the daytime hours of June 2009, at a four-leg intersection (**Figure 2**). At the time of the crash the weather conditions were reported as clear. In the eastbound direction, the roadway was configured with a right turn only lane, a through traffic lane, and a left turn only lane. Beyond the intersection, the eastbound leg transitioned to a single through traffic lane. The westbound direction was configured with a through traffic/right turn lane and a left turn only lane. The westbound leg expanded to two through traffic lanes beyond the intersection. Traffic flow through the intersection was controlled by overhead three-phase traffic lights. The posted speed limit was 56 km/h (35 mph). The southwest quadrant of the intersection was bordered by a mountable concrete curb. The southwest roadside contained a grass area, metal and wood utility poles, and street signs. An asphalt-surfaced parking lot extended beyond the grass. The scene schematic is included as **Figure 11** of this report.

Figure 2: View of the area of impact from the eastbound approach of the Chevrolet Silverado.

CRASH SEQUENCE

Pre-Crash

The unrestrained 52-year-old male driver of the Chevrolet Silverado was operating the vehicle eastbound approaching the intersection in the (center) through lane. The Chevrolet Cobalt was operated by a 30-year-old female. She was traveling in the westbound direction approaching the intersection in the left turn lane. As both vehicles entered the intersection, the driver of the Chevrolet Cobalt initiated a left turn across the path of the Chevrolet Silverado.

Crash

The front plane of the Chevrolet Silverado impacted the right plane of the Chevrolet Cobalt within the intersection (Event 1). The force of the impact resulted in the deployment of the driver air bag in the Chevrolet Silverado. The resultant directions of force for the Chevrolet Silverado and the Chevrolet Cobalt were within the 11 and 2 o'clock sectors, respectively. The Damage Algorithm of the WinSMASH program was used to compute the severity of the crash (delta-V). The total delta-V for the Chevrolet Silverado was 24.0 km/h (14.9 mph), with a longitudinal component of -22.6 km/h (-14.0 mph) and a lateral component of 8.2 km/h (5.1 mph). The total delta-V for the Chevrolet Cobalt was 52.0 km/h (32.3 mph). The longitudinal and lateral components for the Chevrolet Cobalt were -33.4 km/h (-20.8 mph) and -39.8 km/h (-24.7 mph), respectively.

Immediately after the first impact the Chevrolet Silverado began to rollover. The frontal impact induced a slight clockwise (CW) rotation which exacerbated the initial rollover forces. The Chevrolet Silverado rolled three-quarter turns to the left (Event 2) as is it traveled in a southeast trajectory. The Chevrolet Silverado departed the southeast quadrant and entered the grass roadside where it impacted a wooden utility pole with the undercarriage (Event 3). The Chevrolet Silverado came to rest on its right side against the utility pole. The interrupted roll distance was approximately 24 m (80 ft). **Figure 3** is a look back view from the Chevrolet Silverado's final rest position toward the intersection. The Chevrolet Cobalt rotated CW and was redirected in a southeast trajectory where it departed the southeast roadside. The Chevrolet Cobalt came to rest in the parking lot on the southeast roadside 25 m (82 ft) from the impact.

Figure 3: Look back view from the Chevrolet Silverado's final rest toward the

Post-Crash

Police and emergency medical personnel responded to the crash site. The unrestrained 52-year-old male driver of the Chevrolet Silverado sustained minor soft tissue injuries and was transported to a local hospital where he was treated and released. The driver of the Chevrolet Cobalt sustained minor injuries and was transported to a local hospital for treatment. Both vehicles sustained disabling damage and were towed from the crash site. Both vehicles were subsequently deemed total losses by their respective insurance companies and were transferred to a salvage yard.

2007 CHEVROLET SILVERADO

Exterior Damage

The Chevrolet Silverado sustained moderate severity frontal damage from the initial impact with the Chevrolet Cobalt (Event 1). **Figure 4** is a view of the frontal deformation. The damage was biased to the right and consisted of longitudinal deformation to the frontal structure. The width of the direct contact damage measured 112 cm (44 in) and began 46 cm (18 in) left of the centerline extending to the front right bumper corner. The maximum crush measured 34 cm (13.4 in) and was located at the right corner. The residual crush was measured along the front bumper beam and was as follows: C1 = 0 cm, C2 = 5 cm (2 in), C3 = 27 cm (10.6 in), C4 = 29 cm (11.4 in), C5 = 18 cm (7.1 in), C6 = 34 cm (13.4 in). The right wheelbase dimension was reduced 17 cm (6.7 in). The Collision Deformation Classification (CDC) of this impact was: 11-FZEW2.

Figure 4: Residual front damage from the impact with the Chevrolet Cobalt.

The rollover sequence (Event 2) resulted in minor severity damage to the side and top planes of the Chevrolet Silverado **(Figure 5)**. The damage consisted of scattered abrasions and body panel deformation. The roof area sustained the majority of the deformation with 5 cm (4 in) of maximum vertical crush occurring in the right rear aspect of the roof area. There was no lateral deformation of the roof structure. The CDC assigned to this impact was 00-TDDO2.

The final impact (Event 3) in this crash sequence consisted of the undercarriage of the Chevrolet Silverado impacting a utility pole as it traveled to final rest **(Figure 6)**. The direct contact damage occurred on the right sill area beginning 279 cm (110 in) forward of the rear bumper. The total direct damage measured 33 cm (13 in) in length. The damage from this impact was evidence by 15 cm (6 in) of vertical crush at the right sill, 296 cm (116.5 in) forward of the rear bumper. The CDC for this non-horizontal impact was 00-UZDN2.

Figure 5: Rollover damage to the roof.

Figure 6: Right sill damage from the utility pole impact.

The four doors remained closed during the crash and were operational post-crash. The windshield was fractured during the crash and the left side, rear, and right rear glazing were disintegrated. The right front door glazing was not damaged during this crash sequence.

2007 CHEVROLET COBALT

Exterior Damage

The 2007 Chevrolet Cobalt sustained severe damage to the right plane as a result of the intersection impact (Event 1). The Chevrolet had been crushed for recycling and was not inspected by the SCI investigator. The damage assessment was based on the images provided by the insurance company. The direct contact damage began immediately forward of the right A-pillar and extended to the aft aspect of the right rear door. The estimated width of the damage pattern was 215 cm (85 in). The maximum crush occurred at the B-pillar area and was estimated to be 46 cm (18 in) in depth. Based on the images, it appeared that the A-pillar mounted door hinges separated during the crash resulting in an integrity loss of the front right door. The right front door was displaced rearward creating an opening at the forward aspect that was approximately 25 cm (10 in) in length. The B-pillar hinges were not visible in the provided images; therefore, an assessment was not conducted. The right rear door appeared to have sustained damage to the latch and striker. The integrity of the right rear door did not appear to be compromised. The CDC of the Chevrolet Cobalt was 02-RPEW3.

Figure 7: Right view of the damage at the A-pillar of the Chevrolet Cobalt. Image supplied by the vehicle's insurance company.

Figure 8: View of the damage to the right plane of the Chevrolet Cobalt. Insurance company image.

2*007 CHEVROLET SILVERADO*

Interior Damage

The interior of the Chevrolet consisted of vinyl-upholstered six-passenger seating. The front row was configured with front bucket seats with a center flip and fold seat/armrest. The second row was a three-passenger bench seat. The outboard seating positions were equipped with adjustable head restraints. The front left and rear right head restraints were adjusted to 3 cm (1 in) above the full-down positions. The front right and rear left were adjusted to the full-down positions. At the time of the SCI inspection, the driver's seat back was adjusted to a measured angle of 30 degrees aft of vertical with the seat track adjusted to the full-forward track position. Based on

the seat's close proximity to the steering assembly and the lack of interior room, it was determined that this was not the at-crash position of the seat.

The interior of the Chevrolet sustained minor severity damage as a result the deployment of the driver air bag and minor occupant contact points. The interior contact points consisted of three scuff marks to the headliner. Two of the scuff marks were located over the driver's seat position, 22 cm (8.5 in) and 38 cm (15 in) inboard of the roof side rail, respectively. These scuff marks contained dirt and a blue-colored transfer. The third transfer was located 38 cm (15 in) rear of the windshield header and began 13 cm (5 in) left of the centerline. This scuff mark extended 53 cm (21 in) onto the right sun visor. There was no occupant compartment intrusion in the front row. The vertical intrusion of the roof measured 10 cm (4 in) in the second to right position. **Figure 8** is a right lateral view of the front row. **Figure 9** depicts the occupant contact points to the roof identified during the inspection.

Figure 9: Right lateral view across the front row.

Figure 10: Occupant contact points to the roof.

2007 CHEVROLET SILVERADO
Manual Restraint Systems

The driver's manual restraint consisted of a 3-point lap and shoulder safety belt that was integrated into the outboard aspect of the seat. The continuous loop webbing was stowed on the Emergency Locking Retractor (ELR) at initial inspection. The sliding latch plate revealed historical usage indicators. Examination of the latch plate hardware and the webbing was unremarkable for crash-related evidence of use. It was determined that the diver was unrestrained at the time of the crash. The lack of restraint use was confirmed by the imaged EDR data.

2007 CHEVROLET SILVERADO
Frontal Air Bag System

The Chevrolet was equipped with a redesigned frontal air bag system for the driver and front right passenger positions. The driver's frontal air bag deployed during the crash. The driver air bag was housed within an I-configuration module that was located in the four-spoke steering wheel. The symmetrical cover flaps measured 8 cm (3 in) in width and 12 cm (4.8 in) in height.

The air bag measured 66 cm (26 in) in diameter in its deflated state and contained multiple expansion transfers on the left side of the air bag. The air bag was tethered and vented by two ports located on the back side of the bag in the 11/1 o'clock positions. A post-crash body fluid was noted at the 5 o'clock sector.

The front right air bag was controlled by an OEM manual keyed cut-off switch mounted to the center instrument panel. The switch was in the Air Bag Off-position and suppressed the deployment of front right air bag.

2007 CHEVROLET SILVERADO

Event Data Recorder

The EDR data was imaged at the time of the SCI inspection utilizing the vehicle's intact electrical system and the Bosch Crash Data Retrieval (CDR) tool. The CDR hardware was connected the vehicle's Diagnostic Link Connector and 12-volt electrical power was supplied to the vehicle's battery. The data was collected using software version 2.9 and reported with version 3.3. The EDR had two stored events, a deployment event and a non-deployment event. Both events occurred on Ignition Cycle 2537.

Analysis of the data indicated that the deployment event occurred first and was related to the intersection impact. The Air Bag Warning Lamp in the instrument cluster was "Off" indicating there were no faults with the air bag system. The pre-crash speed of the Chevrolet Silverado was 72 km/h (45 mph) one second prior to Algorithm Enable (AE). The brake switch circuit was "Off" throughout the pre-crash recorded time period. The driver's safety belt was unbuckled. A Stage-one driver air bag deployment was commanded 25 milliseconds after AE and the front right passenger air bag was suppressed (consistent with the vehicle inspection). The maximum recorded longitudinal delta-V was -17.2 km/h (-10.69 mph).

The imaged data indicated that the non-deployment event occurred at least five seconds after the deployment event. The Air Bag Warning Lamp was "On" at the time of the non-deployment event. The maximum longitudinal delta-V of the non-deployment was -2.1 km/h (-1.3 mph). The non-deployment event was most likely related to the utility pole impact (Event 3). The imaged EDR data is attached to the end of this narrative report as Attachment A.

DRIVER DEMOGRAPHICS

Age/Sex:	52-year-old/Male
Height:	Unknown
Weight:	Unknown
Seat Track Position:	Unknown
Safety Belt Usage:	None used
Usage Source:	SCI vehicle inspection
Egress from Vehicle:	Self extricated
Mode of Transport from Scene:	Ground Ambulance
Type of Medical Treatment:	Treated and released

DRIVER INJURIES

Injury	*Injury Severity (AIS 90/ Update 98)*	*Injury Source*
Left chest wall contusion	Minor (490402.1,2)	Door panel
Left scapular (shoulder) contusion	Minor (690402.1,2)	Ground
Minor left elbow laceration, 0.3 cm (0.1) piece of glass found in laceration	Minor (790602.1,2)	Ground
Left elbow abrasion	Minor (790202.1,2)	Ground
Left elbow contusion	Minor (790402.1,2)	Ground

Source: Medical records

DRIVER KINEMATICS

The 52-year-old male driver of the Chevrolet was seated in the front left seat and was not restrained by the manual lap and shoulder safety belt system. At impact with the Chevrolet Cobalt, the driver's frontal air bag deployed. The driver responded to the 11 o'clock direction of the impact force by initiating a forward trajectory. The driver contacted and loaded the deployed air bag evidenced by the deployment scuffs on the back side of the bag. The loading of the air bag allowed the driver to ride down the frontal impact force.

The vehicle rotated CW and subsequently rolled over three-quarter turns as it traveled to final rest. During the first-quarter turn, the left side of the vehicle contacted the ground disintegrating the left front glazing. The driver responded to the crash force by initiating a left trajectory. The driver contact and loaded the left door panel with his chest resulting in a contusion. His shoulder and left arm were partially ejected through the disintegrated glazing and contacted the ground resulting in soft tissue injuries. The vehicle then completed two additional quarter turns coming to rest on its right side. The driver was displaced from the driver seat to the front right interior as evidenced by the scuff mark directed toward the right sun visor. The driver was able to exit the vehicle unassisted. He was transported to a local hospital, treated and released.

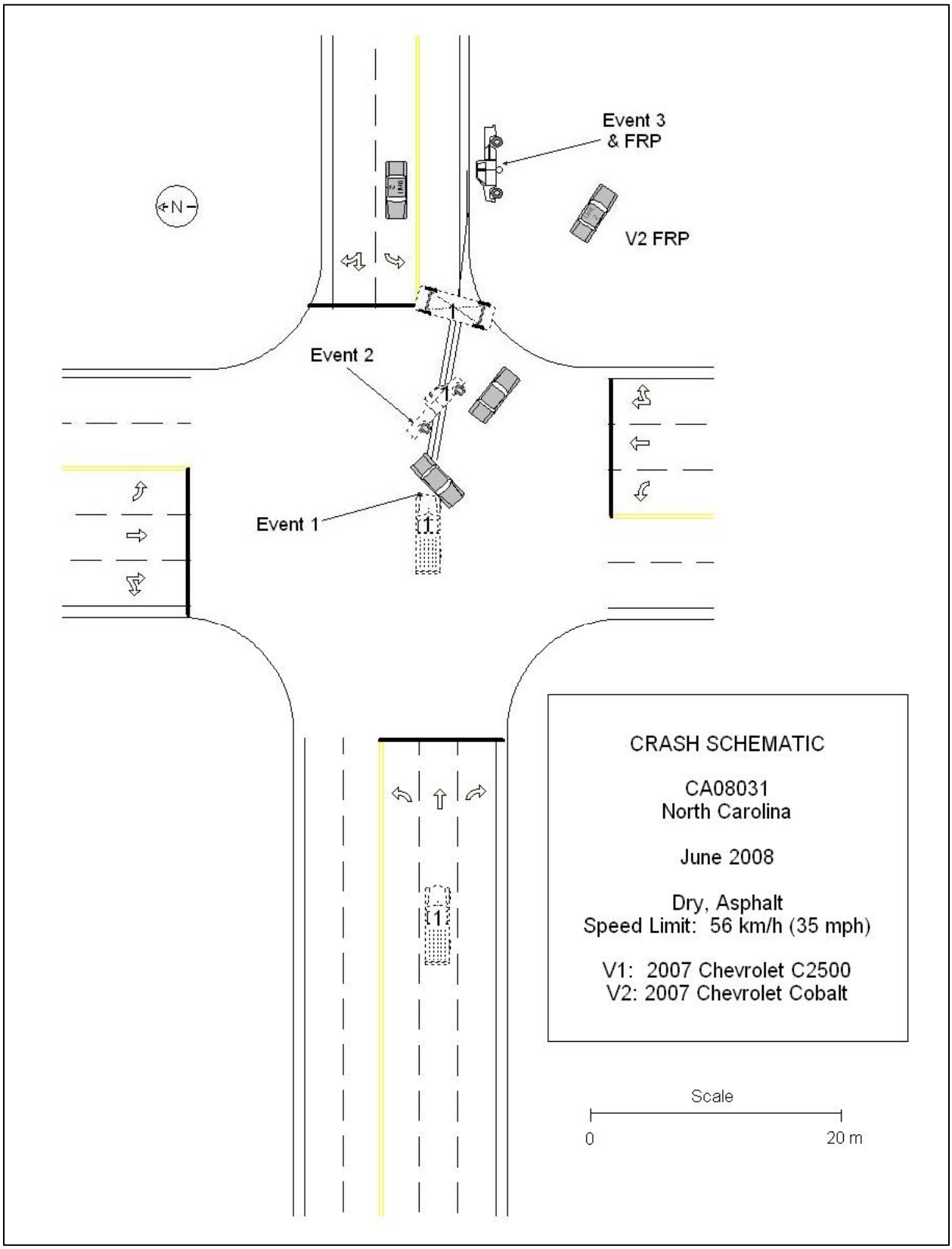


Figure 11: Scene Schematic

ATTACHMENT A

EDR DATA

CDR File Information

Vehicle Identification Number	1GCHC29U07E******
Investigator	
Case Number	
Investigation Date	
Crash Date	
Filename	CA08031 CDR.CDR
Saved on	Thursday, August 14 2008 at 10:26:03 AM
Collected with CDR version	Crash Data Retrieval Tool 2.900
Collecting program verification number	36C71675
Reported with CDR version	Crash Data Retrieval Tool 2.8045
Reporting program verification number	E9B7C0A4
Interface used to collected data	Block number: 00 Interface version: 53 Date: 12-11-06 Checksum: CA00
Event(s) recovered	Deployment Non-Deployment

SDM Data Limitations

SDM Recorded Crash Events:
There are two types of SDM recorded crash events. The first is the Non-Deployment Event. A Non-Deployment Event is an event severe enough to "wake up" the sensing algorithm but not severe enough to deploy the air bag(s). It contains Pre-Crash and Crash data. The SDM can store up to one Non-Deployment Event. This event can be overwritten by an event that has a greater SDM recorded vehicle forward velocity change. This event will be cleared by the SDM after the ignition has been cycled 250 times.
The second type of SDM recorded crash event is the Deployment Event. It also contains Pre-Crash and Crash data. The SDM can store up to two different Deployment Events, if they occur within 25.4 seconds of one another. Deployment Events cannot be overwritten or cleared from the SDM. Once the SDM has deployed the air bag, the SDM must be replaced.
The data in the Non-Deployment Event file will be locked after a Deployment Event, if the Non-Deployment Event occurred within 5 seconds before the Deployment Event. If multiple Non-Deployment Events occur within 5 seconds prior to a Deployment Event, then the most severe Non-Deployment Event will be recorded and locked. If multiple Non-Deployment Events precede a Deployment Event, and multiple Non-Deployment Events occur within 5 seconds of each other (but not necessarily all within 5 seconds of the Deployment Event), and subsequent Non-Deployment Events are less severe than prior Non-Deployment Events, and the last of the multiple Non-Deployment Events occurs within 5 seconds of a Deployment Event, then the most severe of the Non-Deployment Events (which may have occurred more than 5 seconds prior to the Deployment Event) will be recorded and locked.

SDM Data Limitations:
-SDM Recorded Vehicle Forward Velocity Change reflects the change in forward velocity that the sensing system experienced during the recorded portion of the event. SDM Recorded Vehicle Forward Velocity Change is the change in velocity during the recording time and is not the speed the vehicle was traveling before the event, and is also not the Barrier Equivalent Velocity. This data should be examined in conjunction with other available physical evidence from the vehicle and scene when assessing occupant or vehicle forward velocity change. For Deployment Events and Deployment Level Events, the SDM will record 100 milliseconds of data after deployment criteria is met and up to 50 milliseconds before deployment criteria is met. For Non-Deployment Events, the SDM will record the first 150 milliseconds of data after algorithm enable.
-Event Recording Complete will indicate if data from the recorded event has been fully written to the SDM memory or if it has been interrupted and not fully written.
-SDM Recorded Vehicle Speed accuracy can be affected if the vehicle has had the tire size or the final drive axle ratio changed from the factory build specifications.
-Brake Switch Circuit Status indicates the status of the brake switch circuit.
-Pre-Crash Electronic Data Validity Check Status indicates "Data Invalid" if the SDM receive an invalid message from the module sending the pre-crash data.
-Driver's and Passenger's Belt Switch Circuit Status indicates the status of the seat belt switch circuit. If the vehicle's electrical system is compromised during a crash, the state of the Belt Switch Circuit may be reported other than the actual state.
-The Time Between Non-Deployment and Deployment Events is displayed in seconds. If the time between the two events is greater than 25.4 seconds, "N/A" is displayed in place of the time.
-If power to the SDM is lost during a crash event, all or part of the crash record may not be recorded.
-Multiple Events Associated with this Record: This parameter will indicate whether one or more associated events preceded the recorded event.
-One or More Associated Events Not Recorded: If a single event is recorded, this parameter will indicate whether one or more associated events, prior to the recorded event, was not recorded.
If two associated events are recorded, this parameter for the first event will indicate whether one or more associated events, prior to the first event, was not recorded.

If two associated events are recorded, this parameter, for the second event, will indicate whether one or more associated events, between the first and second events, was not recorded.

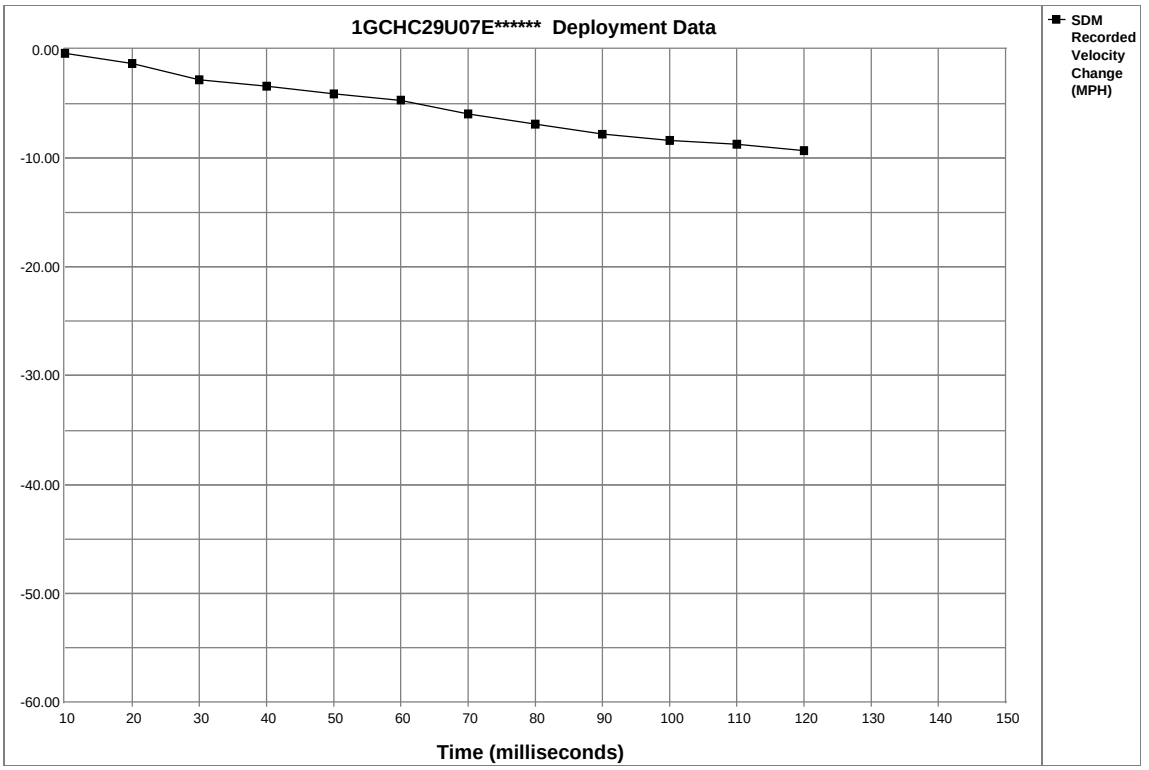
SDM Data Source:
All SDM recorded data is measured, calculated, and stored internally, except for the following:
-Vehicle Speed, Engine Speed, and Percent Throttle data are transmitted once a second by the Powertrain Control Module (PCM), via the vehicle's communication network, to the SDM.
-Brake Switch Circuit Status data is transmitted once a second by either the ABS module or the PCM, via the vehicle's communication network, to the SDM.
-The SDM may obtain Belt Switch Circuit Status data a number of different ways, depending on the vehicle architecture. Some switches are wired directly to the SDM, while others may obtain the data from various vehicle control modules, via the vehicle's communication network.

System Status At Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	UNBUCKLED
Ignition Cycles At Deployment	2537
Ignition Cycles At Investigation	2544
Maximum SDM Recorded Velocity Change (MPH)	-10.69
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	202.5
Driver 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	25
Driver 2nd Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	N/A
Passenger 1st Stage Time From Algorithm Enable to Deployment Command Criteria Met (msec)	Suppressed
Passenger 2nd Stage Time From Algorithm Enable 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

Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle
-5	48	1664	4
-4	47	1600	4
-3	46	1600	10
-2	46	1600	15
-1	45	1600	15

Seconds Before AE	Brake Switch Circuit Status
-8	OFF
-7	OFF
-6	OFF
-5	OFF
-4	OFF
-3	OFF
-2	OFF
-1	OFF



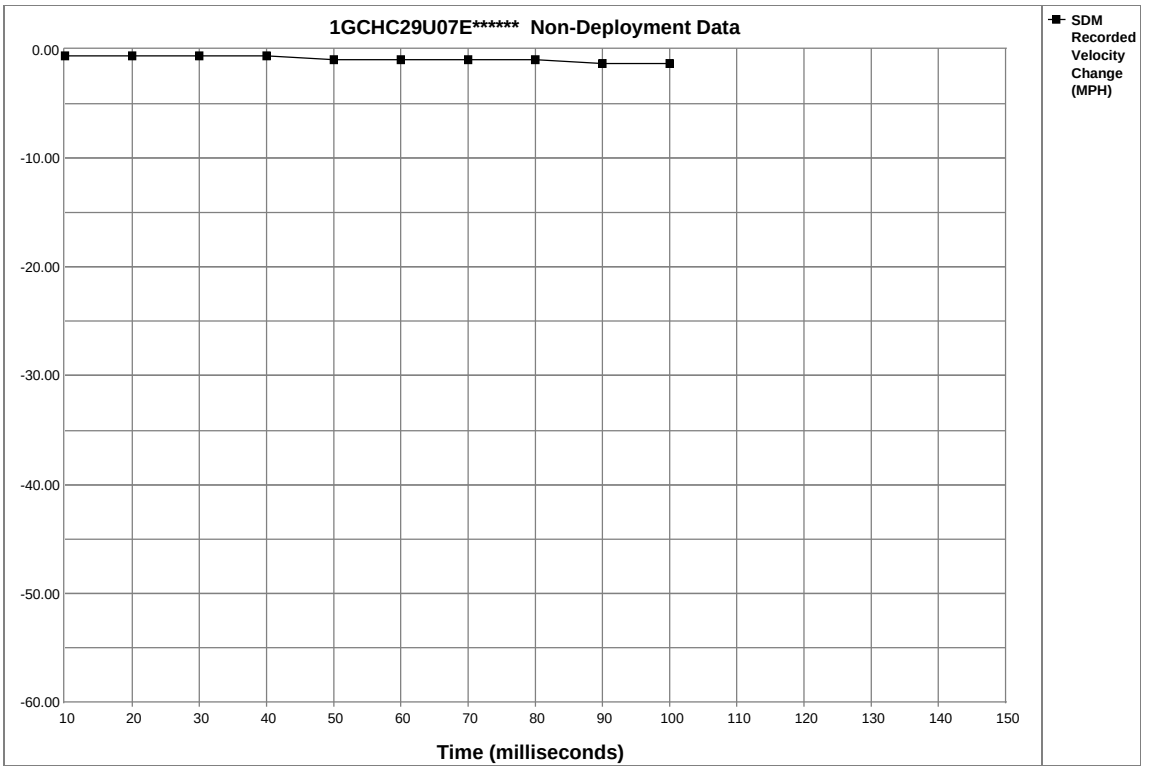
Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.31	-1.24	-2.79	-3.41	-4.03	-4.65	-5.89	-6.82	-7.75	-8.37	-8.68	-9.30	N/A	N/A	N/A

System Status At Non-Deployment

SIR Warning Lamp Status	ON
Driver's Belt Switch Circuit Status	UNBUCKLED
Ignition Cycles At Non-Deployment	2537
Ignition Cycles At Investigation	2544
Maximum SDM Recorded Velocity Change (MPH)	-1.30
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	92.5
Crash Record Locked	No
Event Recording Complete	Yes
Multiple Events Associated With This Record	No
One Or More Associated Events Not Recorded	No

Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle
-5	48	1664	4
-4	47	1600	4
-3	46	1600	10
-2	46	1600	15
-1	45	1600	15

Seconds Before AE	Brake Switch Circuit Status
-8	OFF
-7	OFF
-6	OFF
-5	OFF
-4	OFF
-3	OFF
-2	OFF
-1	OFF



Time (milliseconds)	10	20	30	40	50	60	70	80	90	100	110	120	130	140	150
Recorded Velocity Change (MPH)	-0.62	-0.62	-0.62	-0.62	-0.93	-0.93	-0.93	-0.93	-1.24	-1.24	N/A	N/A	N/A	N/A	N/A

Hexadecimal Data

$01	F0	3C	E3	42	B1	D5
$02	00	F9	00	00	00	00
$03	41	53	36	32	38	33
$04	4B	4E	30	53	44	31
$05	00	00	00	00	00	00
$06	15	81	47	82	00	00
$07	00	00	00	00	00	00
$08	00	00	00	00	00	00
$09	00	00	00	00	00	00
$0A	41	44	01	50	58	62
$0B	35	4A	36	37	55	54
$0C	00	00	00	00	00	00
$0D	00	00	00	00	00	00
$0E	00	00	00	00	00	00
$0F	00	00	00	00	00	00
$10	FE	C1	FF	00	00	00
$11	85	84	85	7E	7E	7E
$12	9E	00	00	51	51	10
$13	FF	02	00	00	00	00
$14	00	1D	00	00	00	3E
$15	FA	FA	FA	FA	FA	FA
$16	FA	FA	FA	FA	FA	FA
$17	FA	FA	00	00	00	00
$18	00	03	04	AC	01	00
$19	10	00	02	00	00	00
$1A	00	00	00	00	00	00
$1B	00	00	00	00	00	00
$1C	00	00	00	00	00	00
$1D	00	00	00	00	00	00
$1F	FE	00	00	00	00	00
$20	52	FD	00	00	FF	FF
$21	FF	F7	FF	FF	FF	FF
$22	FF	FF	FF	FF	FF	FF
$23	FF	FF	FF	FF	FF	F7
$24	00	00	43	00	25	0B
$25	08	00	00	10	00	00
$26	02	02	02	02	03	03
$27	03	03	04	04	00	00
$28	00	00	00	0A	FE	C2
$29	FE	A5	FF	FF	FF	FF
$2A	FF	FF	FF	FF	FF	FF
$2B	FF	FF	FF	FF	FF	FF
$2C	FF	FF	FF	FF	FF	FF
$2D	FF	FF	00	00	00	00
$30	B2	FE	00	00	FF	FF
$31	FF	FF	FF	FF	FF	FF
$32	FF	FF	FF	FF	FF	FF
$33	FF	FF	FF	FF	FF	FF
$34	00	00	03	11	0A	03
$35	00	00	00	00	00	00
$36	00	00	00	00	00	00
$37	00	00	00	02	27	00
$38	51	0B	36	25	00	00
$39	01	00	00	10	00	00
$3A	01	04	09	0B	0D	0F
$3B	13	16	19	1B	1C	1E
$3C	00	00	00	0C	FE	C2
$3D	FE	A5	00	00	00	00
$40	49	4A	4A	4C	4D	00
$41	00	00	26	26	19	0B
$42	0B	00	19	19	19	19
$43	1A	00	7D	80	00	00
$44	49	4A	4A	4C	4D	00

$45	00	00	26	26	19	0B
$46	0B	00	19	19	19	19
$47	1A	00	80	FE	00	00
$48	00	00	00	00	00	00
$49	00	00	00	00	00	00
$4A	00	00	00	00	00	00
$4B	00	00	80	FE	00	00
$4C	FF	FF	FF	FF	FF	FF
$4D	FF	FF	FF	FF	FF	FF
$4E	FF	FF	FF	FF	FF	FF
$4F	FF	FF	FF	FF	00	00
$50	FF	FF	FF	FF	FF	FF
$51	FF	FF	FF	FF	FF	FF
$52	FF	FF	FF	FF	FF	FF
$53	FF	FF	FF	FF	FF	FF
$54	FF	FF	FF	FF	FF	FF