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ON-SITE CERTIFIED ADVANCED 208- COMPLIANT VEHICLE INVESTIGATION

CASE NUMBER - IN-04-033
LOCATION - Texas
VEHICLE - 2003 CHEVROLET SILVERADO
CRASH DATE - September 2004

Submitted:

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

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

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15. <i>Supplementary Notes</i> On-site air bag investigation involving a 2003 Chevrolet Silverado, extended cab pickup truck with manual safety belts and dual front advanced air bag system.					
16. <i>Abstract</i> This report covers an on-site investigation of an air bag deployment crash that involved a 2003 Chevrolet Silverado (case vehicle) that was impacted by an unknown make/model tractor semi-trailer (other vehicle), ran-off-road into a median, and impacted the back slope of a ditch. This crash is of special interest because the case vehicle is certified by the manufacturer to be compliant to the Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS) No. 208 and was equipped with multiple Advanced Occupant Protection System (AOPS) features, as well as an Event Data Recorder (EDR) and the case vehicle's driver (22 year-old, female) did not sustain any police reported injuries as a result of the crash. The case vehicle was traveling east in the inside lane of an eight-lane divided interstate highway. A tractor semi-trailer was traveling eastbound in the inside middle lane and entered the case vehicle's lane. The case vehicle's driver applied the brakes and steered left in an attempt to avoid a crash. The semi-trailer's left rear wheel impacted the right rear corner of the case vehicle. The case vehicle rotated counterclockwise and departed the roadway. The right front and right rear wheels were damaged possibly by contact to the lip of the paved shoulder as the vehicle yawed counterclockwise and departed the shoulder. The front then impacted the back slope of a ditch causing a first stage deployment of the driver's air bag. The case vehicle traveled up the back slope of the ditch and came to rest near the concrete median barrier facing northeast. The driver and back left passenger (3-year-old, male) were restrained by their three-point safety belt systems and were not injured in the crash.					
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This investigation was brought to NHTSA's attention on or before October 7, 2004 by NASS CDS/GES sampling activities. This crash involved a 2003 Chevrolet C1500 Silverado pickup truck (case vehicle) that was impacted by a tractor semi-trailer (other vehicle), ran-off-road into a median, and impacted the back slope of a ditch. The crash occurred in September 2004, at 8:41 p.m., in Texas and was investigated by the applicable city police department. This crash is of special interest because the case vehicle is certified by the manufacturer to be compliant to the Advanced Air Bag portion of Federal Motor Vehicle Safety Standard (FMVSS) No. 208 and was equipped with multiple Advance Occupant Protection System (AOPS) features, as well as an Event Data Recorder (EDR) and the case vehicle's driver [22-year-old, White (unknown if Hispanic) female] did not sustain any injuries as a result of this crash. This contractor inspected the case vehicle on October 8, 2004 and downloaded the data from the onboard EDR. The scene inspection was completed October 11, 2004. No interview was conducted with the case vehicle's driver. This contractor was unable to contact her. This report is based on the police crash report, scene and vehicle inspections, occupant kinematic principles, and this contractor's evaluation of the evidence.

SUMMARY

The case vehicle was traveling east in the inside lane of an eight-lane divided interstate highway. A tractor semi-trailer was traveling eastbound in the inside middle lane. The tractor semi-trailer entered the case vehicle's lane, and the case vehicle's driver applied the brakes and steered left in an attempt to avoid a crash. The semi-trailer's left rear wheel impacted the right rear corner of the case vehicle. The case vehicle rotated counterclockwise due to the left steer and departed the roadway. The right front and right rear wheel rims were damaged possibly by contact to the lip of the shoulder as the vehicle yawed counterclockwise and departed the shoulder. The front then impacted the back slope of a ditch causing a first stage deployment of the driver's air bag. Deployment of the front right air bag was suppressed by the case vehicle's AOPs system because there was no front right passenger in the vehicle. The case vehicle traveled up the back slope of the ditch and came to rest near the concrete median barrier facing northeast. There was no evidence on the case vehicle's front bumper that it impacted the concrete median barrier. The weather at the time of the crash was clear, the roadway pavement was dry and traffic density was moderate.

The CDCs for the case vehicle were determined to be: **03-RBEE-2 (80 degrees)** for the impact with the tractor semi-trailer, **02-RFWN-1 (60 degrees)** and **02-RBWN-1 (60 degrees)** for the two right side wheel impacts, and **12-FDLW-1 (10 degrees)** for the impact with the back slope of the ditch. No TDC for the tractor semi-trailer could be determined because it did not stop following the crash and was not identified.

The WinSMASH reconstruction program, barrier algorithm, calculated the case vehicle's Total, Longitudinal and Lateral Delta Vs for the impact with the back slope of the ditch respectively as: 16.0 km.p.h (9.9 m.p.h.), -15.8 km.p.h. (9.8 m.p.h.) and -2.8 km.p.h. (1.7 m.p.h.). The EDR recorded a maximum longitudinal Delta-V of -21.85 km.p.h. (-13.58 m.p.h.) for this impact.

Immediately prior to the crash, the case vehicle's driver was seated in an unknown posture. She likely had both hands on the steering wheel, and the EDR data indicated she was applying the brakes. The driver's seat track was located between its middle and rearmost positions, the seat back was slightly reclined, the tilt steering wheel was located between its center and full up positions, and the driver was restrained by her integral, lap-and-shoulder safety belt system.

The case vehicle's driver applied the brakes and steered to the left to avoid an impact with the tractor semi-trailer. It is likely that the driver's safety belt retractor locked and she moved slightly forward and to the right due to these avoidance maneuvers. The case vehicle's impact with the semi-trailer's left rear wheel most likely caused the driver to move to the right opposite the case vehicle's 80 degree direction of principal force. The driver most likely moved forward and to the right as the case vehicle yawed counterclockwise and departed the roadway. The case vehicle's front impact with the back slope of the ditch caused the driver to continue forward and to the right along a path opposite the case vehicle's 10 degree direction of principal force as the case vehicle decelerated. In addition, the driver most likely moved down and then up in her seat due to the bottoming action of the impact. The driver loaded her safety belt and her face and chest most likely contacted her deployed air bag. The driver then most likely rebounded back into her seat. The driver remained restrained in her seat as the case vehicle came to final rest. The driver was most likely able to exit the case vehicle under her own power. The driver was not injured in this crash. The driver's use of her safety belt system and the deployment of her air bag mitigated her interaction with the case vehicle's interior frontal components and prevented her from being injured.

Immediately prior to the crash, the case vehicle's back left passenger (3-year-old male) was seated in an unknown posture. His seat track was not adjustable, and he was restrained by his lap-and-shoulder safety belt system..

The back left passenger's safety belt retractor most likely locked and he moved slightly forward and to the right due to the driver's braking and left steer avoidance maneuvers. The case vehicle's impact with the semi-trailer's left rear wheel caused the back left passenger to move primarily to the right opposite the case vehicle's 80 degree direction of principal force. The back left passenger then most likely moved forward and to the right as the case vehicle yawed counterclockwise and departed the roadway. The case vehicle's front impact with the back slope of the ditch caused the back left passenger to continue forward and to the right along a path opposite the case vehicle's 10 degree direction of principal force as the case vehicle decelerated. In addition, the passenger moved down and then up in his seat due to the bottoming action of the impact. The passenger loaded his seatbelt and most likely rebounded back into his seat. The passenger remained restrained in his seat as the case vehicle came to final rest, and he was most likely able to exit the case vehicle under his own power. The back left passenger was not injured in this crash. His use of the safety belt system kept him restrained in his seat and mitigated his interaction with the case vehicle's interior back components and prevented him from being injured.

Crash Environment: The trafficway on which the case vehicle was traveling was an eight-lane, divided, Interstate highway, traversing in an east-west direction. Each travel direction contained four travel lanes, and the trafficway was divided by a grass median with a concrete median barrier adjacent to the inside shoulder of the westbound lanes. Each travel lane was approximately 3.7 meters (12 feet) wide, and the travel lanes were bordered by improved shoulders with a steel W-beam guardrail adjacent to both outside shoulders. The inside shoulder was approximately 3 meters wide (9.8 feet). The outside shoulder width is unknown. Roadway pavement markings consisted of solid yellow median edge lines, broken white lane lines and solid white outside edge lines. The case vehicle's approach to the crash location was uncontrolled and the speed limit was 105 km.p.h. (65 m.p.h.). At the time of the crash the light condition was dark, the atmospheric condition was clear, and the roadway pavement was dry, travel polished bituminous with an estimated friction coefficient of 0.65 and an approximate 2% negative grade in the case vehicle's direction of travel. Traffic density was moderate, and the site of the crash was primarily urban commercial. See the Crash Diagram at the end of this report.

Pre-Crash: The case vehicle was traveling east in the inside lane, and the driver was intending to continue straight ahead (**Figure 1**). A tractor semi-trailer entered the case vehicle's lane from the inside middle lane. The case vehicle's driver braked and steered left in an attempt to avoid a crash. The initial impact occurred in the case vehicle's travel lane.

Crash: The tractor semi-trailer impacted the case vehicle's right rear corner (**Figure 2**). The tractor semi-trailer was not inspected, but it appears likely that the left rear wheel of the semi-trailer contacted the case vehicle's back right bumper corner, and possibly the mud flap contacted the right rear corner of the truck bed and taillight assembly. The case vehicle rotated counterclockwise, departed the roadway, and the front of the vehicle (**Figure 3** below) impacted the back slope of a ditch located in the middle of the median causing a first stage deployment of the case vehicle's driver air bag. In addition to the frontal impact, the case vehicle sustained an



Figure 1: Approach of case vehicle eastbound in the inside lane



Figure 2: Damage to case vehicle's back right bumper corner and right rear corner of truck bed

impact to the right front and right rear wheels (Figures 4 and 5 below) that damaged the rims of both wheels and abraded the sidewall of the right rear tire. However, the source of this damage could not be determined. Due to heavy traffic, a thorough inspection of the scene could not be conducted, and the specific location of the crash could not be identified. It appeared likely that the damage to the right side wheels was associated with this crash, and may have resulted from contact with the lip of the paved shoulder as the case vehicle yawed counterclockwise and departed the roadway.

Post-Crash: Following the impact with the back slope of the ditch, the case vehicle traveled up the back slope and came to rest in the median facing northeast with the front of the vehicle near the concrete median barrier. The damage to the front bumper did not support an impact with the median barrier.

CASE VEHICLE

The 2003 Chevrolet C1500 Silverado was an extended cab, rear wheel drive, four-door pickup truck (VIN: 1GCEC19V83Z-----) equipped with a 4.8L, V8 engine; four-speed, automatic transmission with overdrive and four wheel, anti-lock brakes. The front seating row was equipped with a split bench seat with adjustable head restraints; integrated, three-point, lap-and-shoulder safety belt systems with belt usage sensors in the driver and front right seats, a lap belt in the center seat position, dual stage driver and front right passenger air bags, front right air bag suppression switch and an occupant detection system in the front right seat. The back seating row was equipped with a bench seat with adjustable head restraints and three-point, lap-and-shoulder safety belt systems in the outboard seat positions and a lap belt in the center position. The case vehicle was also equipped with an EDR contained within the vehicle's Sensing and Diagnostic Module (SDM), and a LATCH system



Figure 3: Overview of damage to front of case vehicle from impact with back slope of ditch, each stripe on rods in 5 cm (2 in)



Figure 4: Damage to case vehicle's right front wheel rim



Figure 5: Damage to case vehicle's right rear wheel rim and tire

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. Lastly, the case vehicle's wheelbase was 364 centimeters (143.3 inches), and the mileage at the time of the crash is unknown because the case vehicle was equipped with an electronic odometer.

The various sensors in the case vehicle's advanced occupant restraint system analyze a combination of factors including the predicted crash severity and driver and front right passenger safety belt usage to determine the front air bag inflation level appropriate for the severity of the crash. For the front right seat, an occupant pressure sensor and a seat belt tension sensor provide data to the electronic control module. The electronic control module (a) compares the seat pressure and seat belt tension data to threshold values, (b) determines if the front right air bag should be suppressed or enabled, and (c) communicates the decision to the air bag control module. The air bag will be suppressed when the seat pressure is at or below the established threshold or there is above normal tension on the safety belt (e.g., a secured child seat). The air bag will be enabled if the pressure is above the threshold and the seat belt tension is normal (e.g., a restrained adult occupant) or below (e.g., unrestrained occupant).

CASE VEHICLE DAMAGE

Exterior Damage: The case vehicle's impact with the semi-trailer's left rear wheel and mud flap involved the right corner of the back bumper and the right rear corner of the truck bed. There was direct damage with black transfer on the right corner of the back bumper, a black scuff on the right rear corner of the truck bed just above the taillight and scratches on the taillight assembly. There were also direct damage abrasions on the right front and right rear wheel rims and right rear tire sidewall. The case vehicle's contact with the back slope of the ditch involved the full width of the front bumper. The front bumper was off the vehicle, so the Field L was taken on the bumper/radiator support beam. Direct damage was measured on the displaced front bumper (**Figure 6**). It began 3.0 centimeters (1.2 inches) left of the front right bumper corner and extended 174 centimeters (69.7 inches) along the bumper. Residual maximum crush to the front was determined to be 14 centimeters (5.5 inches) occurring at C₁. The table below shows the case vehicle's front crush profile.



Figure 6: Overview of damage to case vehicle's front bumper

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	174	14	161	14	9	3	6	4	8	0	0
in		68.5	5.5	63.4	5.5	3.5	1.2	2.4	1.6	3.2	0.0	0.0

The wheelbase on the case vehicle’s left side was shortened 1.0 centimeter (0.4 inches) while the right side wheelbase was extended 7.0 centimeters (2.8 inches). Grass was jammed in the bottom of the front right center bumper support, and the case vehicle’s front end was displaced vertically (**Figure 7**). The front frame members were displaced vertically less than 13 centimeters (13.0 centimeters). Induced damage involved the grille, hood, both headlamp/turn lamp assemblies and both front fenders. In addition, there was induced contact between the back of the cab and the front of the truck bed that damaged the back of the cab.



Figure 7: Vertical displacement of case vehicle’s front end due to impact with back slope of ditch

The recommended tire size was: P235/75R16. However, the case vehicle was equipped with Goodyear Eagle GT II tires, size: P275/45R20. These tires were mounted at the right front, right rear, and left rear positions. The left front wheel had been removed at some point following the crash and an old wheel was mounted in its place. The post-crash condition of the original left front wheel and why it was removed is not known. The case vehicle’s tire data are shown in the table below.

Tire	Measured Pressure		Recommend Pressure		Tread Depth		Damage	Restricted	Deflated
	kpa	psi	kpa	psi	milli-meters	32 nd of an inch			
LF	Unk	Unk	241	35	Unk	Unk	Unknown, not original	Unk	Unk
RF	138	20	241	35	4	5	Minor rim abrasion	No	No
LR	207	30	241	35	3	4	None	No	No
RR	165	24	241	35	3	4	Heavy localized rim abrasion, abrasion tire sidewall	No	No

Vehicle Interior: Inspection of the case vehicle's interior revealed no obvious evidence of occupant contact on the interior surfaces. No occupant compartment intrusions were observed, and there was no compression of the energy absorbing steering column or deformation of the steering wheel (**Figure 8**).



Figure 8: Case vehicle's steering wheel and column showing lack of deformation

Damage Classification: Based on the vehicle inspection, the CDCs for the case vehicle were determined to be: **03-RBEE-2** (80 degrees) for the impact with the tractor semi-trailer, **02-RFWN-1** (60 degrees) and **02-RBWN-1** (60 degrees) for the two right side wheel impacts, and **12-FDLW-1** (10 degrees) for the impact with the back slope of the ditch.

The WinSMASH reconstruction program, barrier algorithm, was used to reconstruct the Delta V for the case vehicle's impact with the back slope of the ditch. The Total, Longitudinal and Lateral Delta Vs are, respectively: 16.0 km.p.h (9.9 m.p.h.), -15.8 km.p.h. (-9.8 m.p.h.) and -2.8 km.p.h. (-1.7 m.p.h.). The EDR recorded a maximum longitudinal Delta V of -21.85 km.p.h. (-13.58 m.p.h.) for this impact. WinSMASH was not run on the right rear corner impact because an impact with a tractor semi-trailer is out of scope for the program. The case vehicle was towed due to damage.

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with certified advanced 208-compliant air bags at the driver and front right passenger positions. The first stage of the driver's air bag deployed as a result of the impact with the back slope of the ditch. The front right air bag did not deploy because no front right passenger was present in the case vehicle at the time of the crash. The case vehicle's advanced occupant restraint system properly determined the absence of a front right passenger and suppressed the deployment of the front right air bag.

The case vehicle's driver air bag was located in the steering wheel hub. An inspection of the air bag module cover flaps and the air bag fabric revealed that the cover flaps opened at the designated tear points. There was no evidence of damage during the deployment to the air bag module cover flaps or the air bag. However, for some unknown reason, the air bag had been cut out of the module following the crash. The deployed driver's air bag (**Figure 9**) was round with a diameter of 70 centimeters (27.6 inches). The air bag was designed with two tethers, each

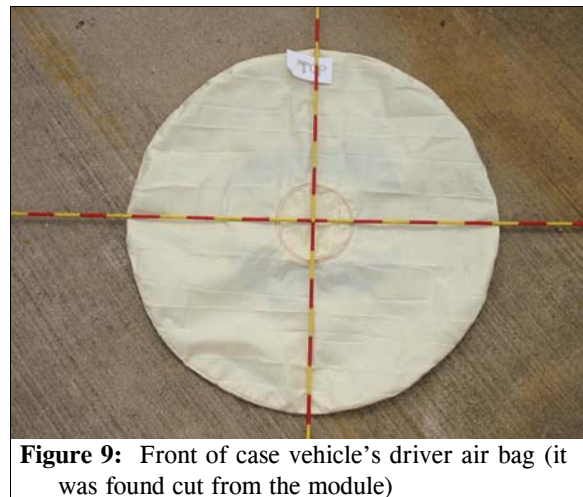


Figure 9: Front of case vehicle's driver air bag (it was found cut from the module)

approximately 10 centimeters (3.9 inches) in width, and had two vent ports, each approximately 3 centimeters (1.2 inches) in diameter, located at the 10 and 2 o'clock positions (**Figure 10**). The air bag module cover consisted of symmetrical “I” configuration cover flaps (**Figure 11**) made of pliable vinyl. Each cover flap was approximately 7.3 centimeters (2.9 inches) in width at the top, 5.3 centimeters (2.1 inches) in width at the bottom and about 12 centimeters in height at the center tear seam. There was no evidence of any occupant contact on the air bag fabric.

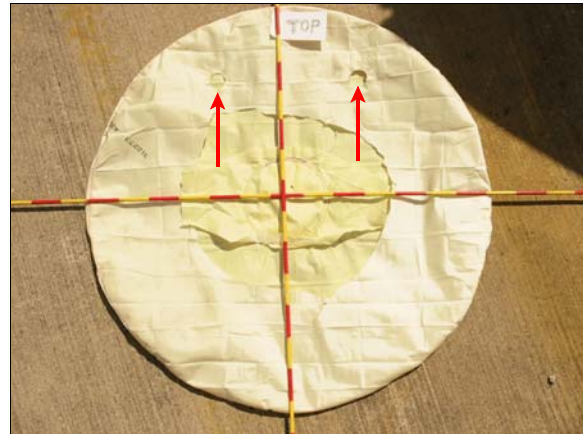


Figure 10: Back of case vehicle’s driver air bag, arrows show vent ports

The front right passenger’s air bag was located in the middle of the instrument panel (**Figure 12** below). This air bag properly did not deploy. The case vehicle’s front right occupant detection system correctly determined the absence of a front right occupant and suppressed deployment of the air bag. The case vehicle was also equipped with a suppression switch for this air bag, which was set to the “Auto” position (**Figure 13** below).



Figure 11: Case vehicle’s driver air bag module flaps

CRASH DATA RECORDING

The download of the case vehicle’s EDR was done during the vehicle inspection through direct connection to the SDM. 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 system status reports show that the SIR warning lamp was recorded as off, the driver’s safety belt switch circuit status was recorded as buckled and the front right passenger air bag was suppressed. The system status report for the deployment event indicates only a first stage deployment of the driver’s air bag was required, and the event recording was complete. The first stage deployment criteria was met at 5.0 milliseconds after algorithm enable (AE), and maximum recorded longitudinal velocity change was -21.85 km.p.h. (-13.58 m.p.h.) occurring 155 milliseconds after AE. The system status report for the non-deployment event indicates the maximum recorded longitudinal velocity change was -4.59 km.p.h. (-2.85 m.p.h.) occurring 72.5



Figure 12: Overview of front right air bag location in middle of instrument panel above glove box

milliseconds after algorithm enable, and the recording of this event was also complete.

The EDR pre-crash data indicate the non-deployment event occurred prior to the deployment event. The damage to the right rear corner of the case vehicle and the EDR data supports the likelihood that the non-deployment event was associated with an impact by the tractor semi-trailer as it encroached into the case vehicle's lane. The pre-crash data indicate that the case vehicle was traveling 113 km.p.h. (70 mph) five seconds prior to the impact with the tractor semi-trailer, and the case vehicle's driver had removed



Figure 13: Front right passenger air bag suppression switch set to "AUTO"

her foot from the throttle and applied the brake. The pre-crash data also indicate that the case vehicle had slowed to 64 km.p.h. (40 m.p.h.) one second prior to the deployment impact (i.e., impact with the back slope of the ditch), and the driver was not applying the brake at that point.

CASE VEHICLE DRIVER KINEMATICS

Immediately prior to the crash, the case vehicle's driver [22-year-old, White (unknown if Hispanic) female; unknown height and weight] was seated in an unknown posture. It is likely the driver had both hands on the steering wheel. In addition, the driver was applying the brake. This observation is supported by the EDR pre-crash data. Based on the inspection of the case vehicle, the driver's seat track was located between its middle and rearmost positions, the seat back was slightly reclined, and the tilt steering wheel was located between its center and full up positions.

Based on this contractor's vehicle inspection and supported by the EDR data, the case vehicle's driver was restrained by her integral, three-point, lap-and-shoulder, safety belt system (**Figure 14**). Inspection of the driver's seat belt webbing, shoulder belt guide, and latch plate showed some trace evidence of loading.



Figure 14: Overview of driver's safety belt.

The case vehicle's driver applied the brake and steered to the left to avoid an impact with the tractor semi-trailer. It is likely that the driver's safety belt retractor locked and she moved slightly forward and to the right due to these avoidance maneuvers. The case vehicle's impact with the semi-trailer's left rear wheel most likely caused the driver to move to the right opposite the case vehicle's 80 degree direction of principal force. The driver most likely moved forward and to the right as the case vehicle yawed counterclockwise and departed the roadway. The case vehicle's front impact with the back slope of the ditch caused the driver to continue forward and to the right along a path opposite the case vehicle's 10 degree

direction of principal force as the case vehicle decelerated. In addition, the driver moved down and then up in her seat due to the bottoming action of the impact. The driver loaded her safety belt and her face and chest most likely contacted her deployed air bag. The driver then most likely rebounded back into her seat. The driver remained restrained in her seat as the case vehicle came to final rest. The driver was most likely able to exit the case vehicle under her own power. The driver's use of her safety belt system and the deployment of her air bag mitigated her interaction with the case vehicle's interior frontal components and prevented her from being injured.

CASE VEHICLE DRIVER INJURIES

The police crash report indicated the driver was not injured, and no ambulance was called to the scene.

CASE VEHICLE BACK LEFT PASSENGER KINEMATICS

Immediately prior to the crash, the case vehicle's back left passenger [3-year-old, (unknown race and ethnic origin) male; unknown height and weight] was seated in an unknown posture. The passenger's seat track and seat back were not adjustable.

Based on the police crash report, the case vehicle's back left passenger was restrained by his manual, three-point, lap-and-shoulder, safety belt system (**Figure 15**). Inspection of the passenger's seat belt webbing, "D"-ring and latch plate showed trace evidence of usage.



Figure 15: Overview of back left passenger's safety belt.

The back left passenger's safety belt retractor most likely locked and he moved slightly forward and to the right due to the driver's braking and left steer avoidance maneuvers. The case vehicle's impact with the semi-trailer's left rear wheel caused the back left passenger to move primarily to the right opposite the case vehicle's 80 degree direction of principal force. The back left passenger then most likely moved forward and to the right as the case vehicle yawed counterclockwise and departed the roadway. The case vehicle's front impact with the back slope of the ditch caused the back left passenger to continue forward and to the right along a path opposite the case vehicle's 10 degree direction of principal force as the case vehicle decelerated. In addition, the passenger moved down and then up in his seat due to the bottoming action of the impact. The passenger loaded his safetybelt and most likely rebounded back into his seat. The passenger remained restrained in his seat as the case vehicle came to final rest, and he was most likely able to exit the case vehicle under his own power. His use of the safety belt system kept him restrained in his seat and mitigated his interaction with the case vehicle's interior back components and prevented him from being injured.

CASE VEHICLE BACK LEFT PASSENGER INJURIES

IN-04-033

The police crash report indicated the back left passenger was not injured, and no ambulance was called to the scene.

OTHER VEHICLE

The make and model of the tractor semi-trailer is unknown. It did not stop following the crash.

EVENT DATA RECORDER DATA

IN-04-033

1GCEC19V83Zxxxxxx System Status At Deployment															
SIR Warning Lamp Status	OFF														
Driver's Belt Switch Circuit Status	BUCKLED														
Ignition Cycles At Deployment	5317														
Ignition Cycles At Investigation	5328														
Maximum SDM Recorded Velocity Change (MPH)	-13.58														
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	155														
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	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)	Suppressed														
Passenger Second Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	N/A														
Time Between Non-Deployment And Deployment Events (sec)	.4														
Frontal Deployment Level Event Counter	1														
Event Recording Complete	Yes														
Multiple Events Associated With This Record	Yes														
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)	-2.17	-4.65	-6.51	-7.75	-9.61	-10.54	-10.85	-11.47	-12.09	-12.71	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	59	1600	0	ON											
-4	56	1472	0	ON											
-3	57	1536	0	OFF											
-2	50	1344	0	OFF											
-1	40	1024	13	OFF											

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

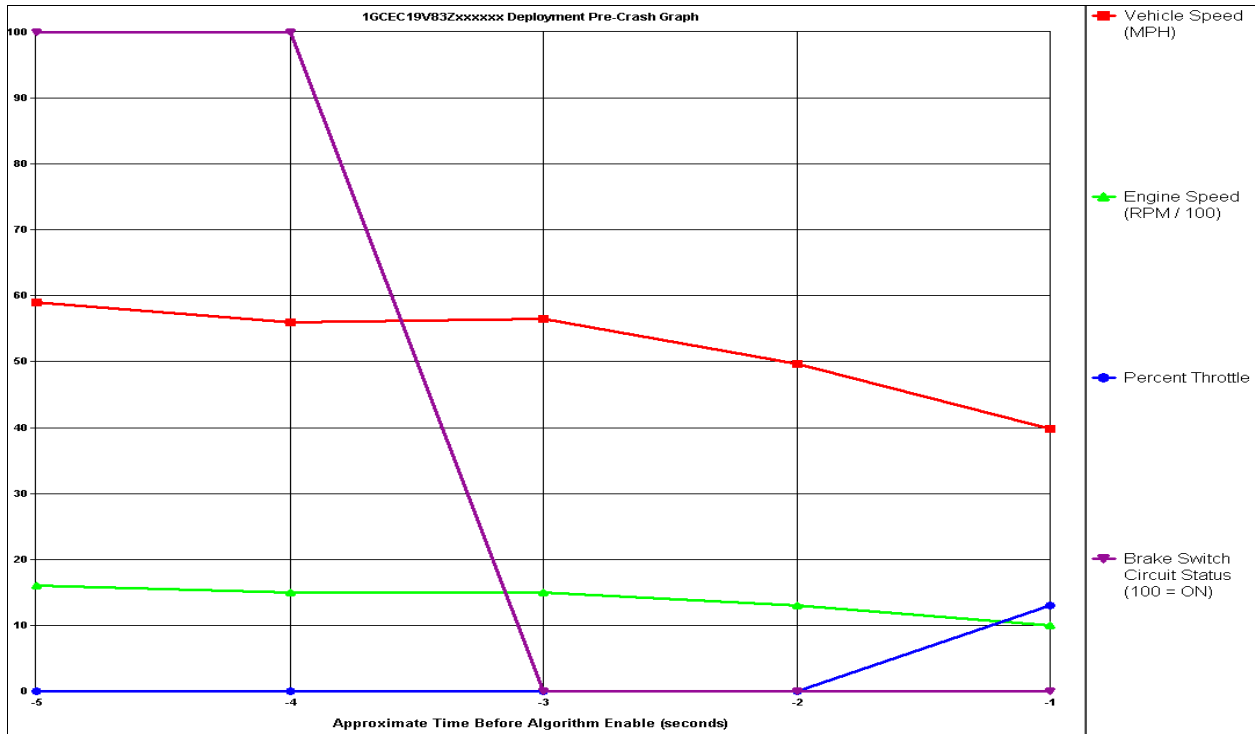


Figure 17: Case vehicle's Deployment Pre-Crash Graph

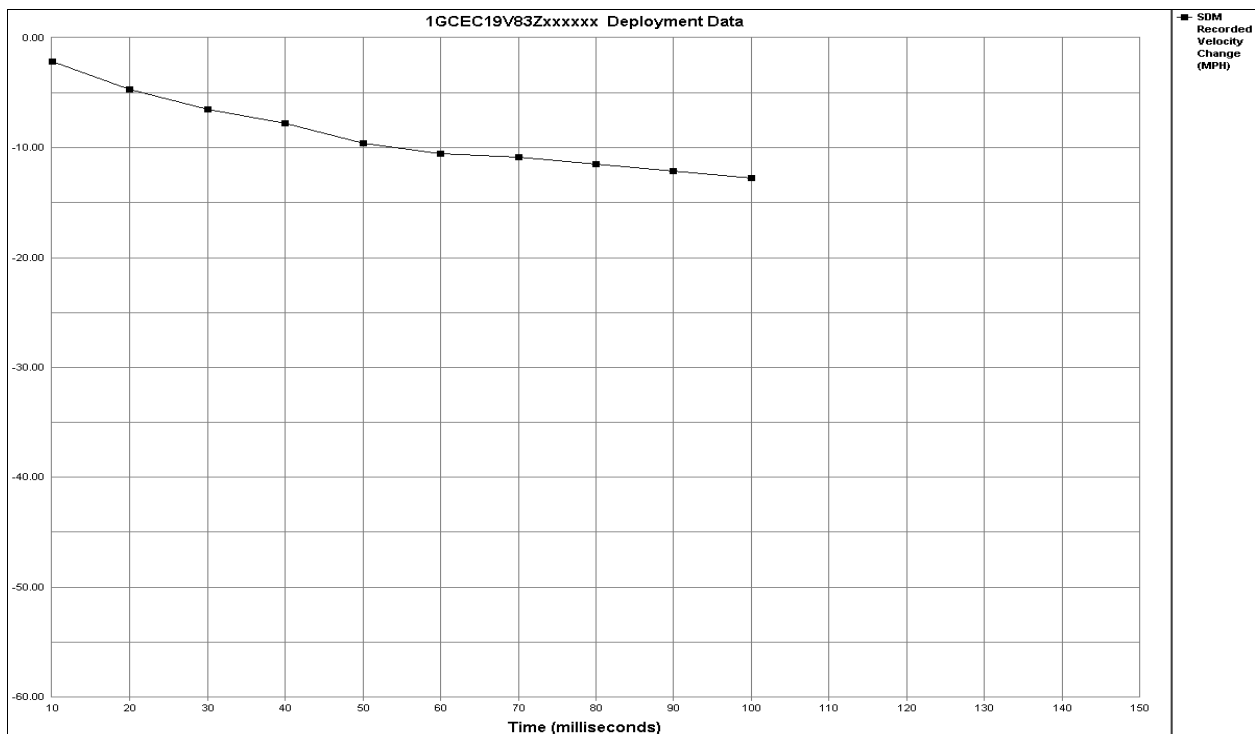


Figure 18: Case vehicle's deployment SDM Reported Velocity Change Graph

EVENT DATA RECORDER DATA (CONTINUED)

IN-04-033

1GCEC19V83Zxxxxxx System Status At Non-Deployment															
SIR Warning Lamp Status	OFF														
Driver's Belt Switch Circuit Status	BUCKLED														
Ignition Cycles At Non-Deployment	5317														
Ignition Cycles At Investigation	5328														
Maximum SDM Recorded Velocity Change (MPH)	-2.85														
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	72.5														
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)	-0.31	-0.93	-1.55	-2.17	-2.48	-2.48	-2.79	-2.79	-2.79	-2.79	-2.79	-2.79	-2.48	-2.48	-2.48
PRE-CRASH DATA															
Seconds Before AE	Vehicle Speed (MPH)	Engine Speed (RPM)	Percent Throttle	Brake Switch Circuit Status											
-5	70	1856	0	ON											
-4	59	1600	0	ON											
-3	56	1472	0	ON											
-2	57	1536	0	OFF											
-1	50	1344	0	OFF											

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

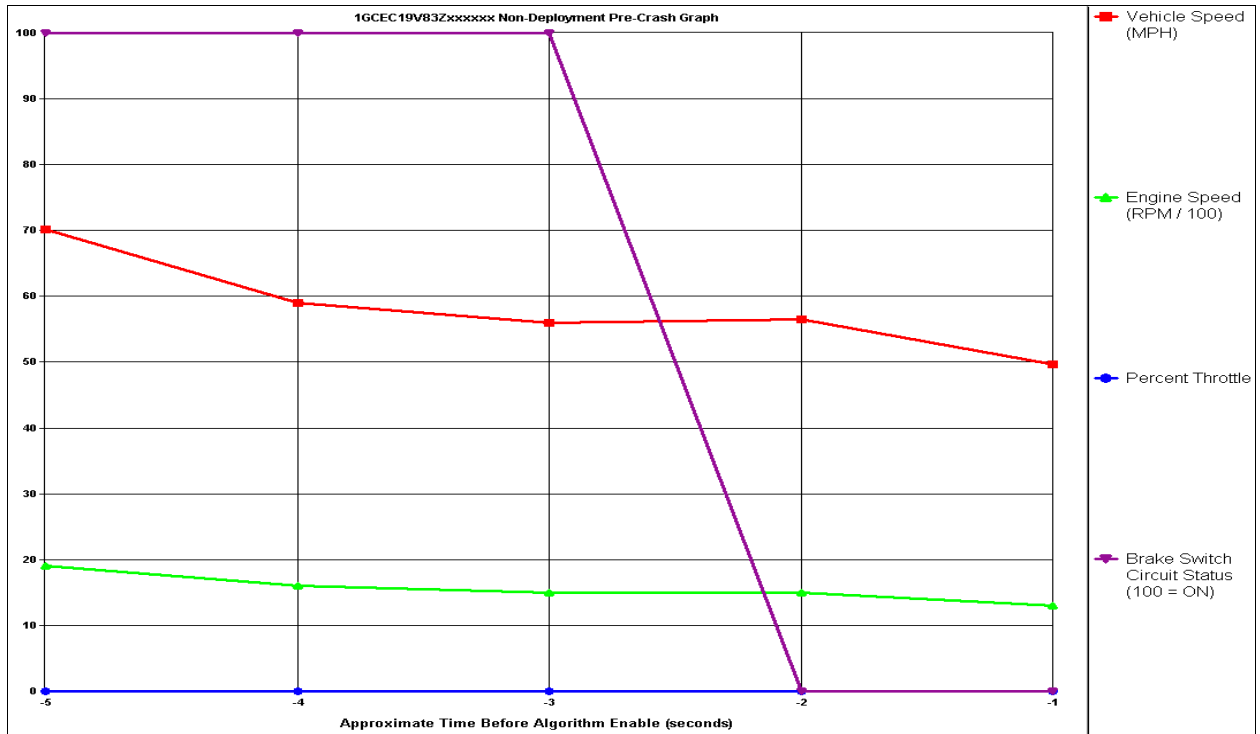


Figure 20: Case vehicle's Non-Deployment Pre-Crash Graph

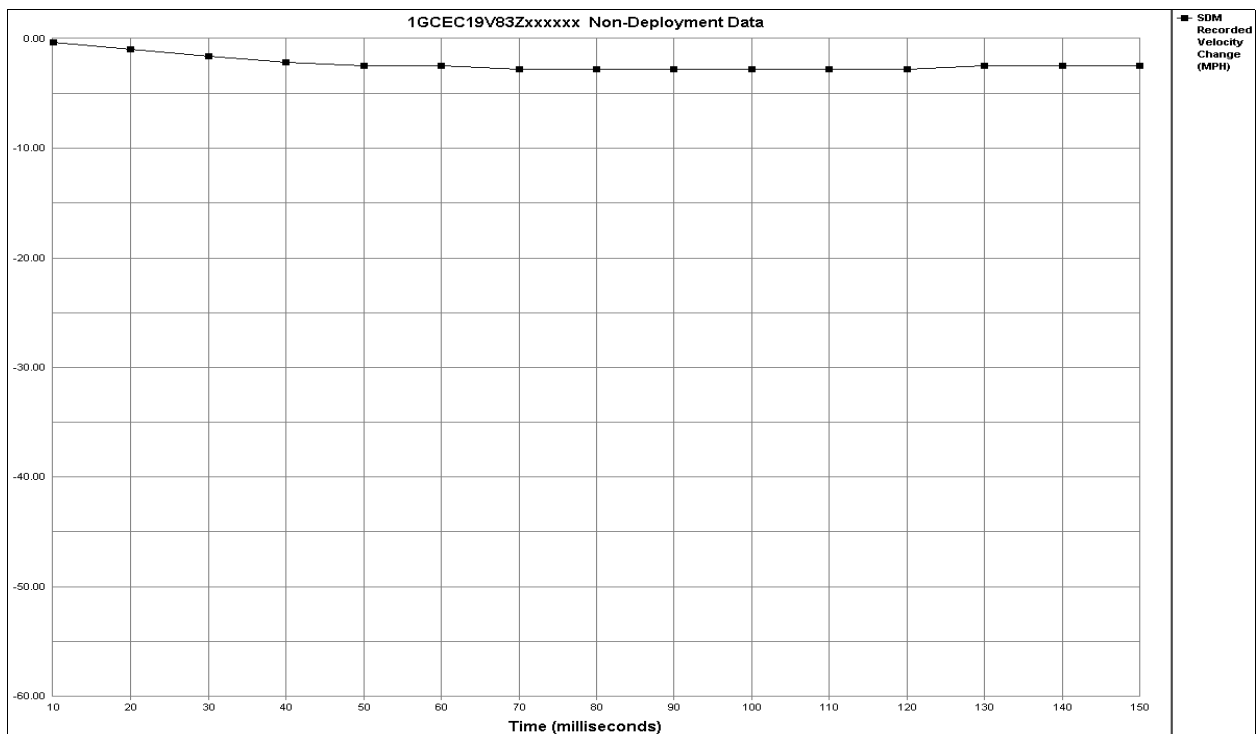


Figure 21: Case vehicle's Non-Deployment SDM Recorded Velocity Change Graph

