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SCI/NASS COMBINATION CERTIFIED ADVANCED 208-COMPLIANT VEHICLE INVESTIGATION

CASE NUMBER - NASS-2003-49-135C
LOCATION - Texas
VEHICLE - 2003 CHEVROLET TAHOE
CRASH DATE - June 2003

Submitted:
April 1, 2004
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Contract Number: DTNH22-01-C-07002

Prepared for:

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

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

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

Technical Report Documentation Page

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15. *Supplementary Notes*
SCI/NASS combination investigation involving a 2003 Chevrolet Tahoe, equipped with Certified Advanced 208-Compliant Safety features, that impacted the back of a 1999 Freightliner straight truck

16. *Abstract*
This report covers a SCI/NASS combination investigation of an air bag deployment crash involving a 2003 Chevrolet Tahoe SUV (case vehicle) and a 1999 Freightliner FL60 straight truck. This case is of special interest because the manufacturer of the case vehicle has certified that it meets the advanced air bag requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. In addition, the case vehicle was equipped with an Event Data Recorder that was successfully downloaded. The unrestrained case vehicle driver (21-year-old male) sustained moderate injuries and the restrained front right passenger (23-year-old male) was not injured. There were four other passengers in the case vehicle, all unrestrained, all males in their early twenties, all of whom sustained moderate or minor injuries. The case vehicle was traveling west at high speed in the westbound travel lane of a two-lane residential city street, and was entering a curve to the left. The Freightliner was legally parked and unoccupied, heading west in the westbound parking lane of the same street. The case vehicle driver failed to negotiate the curve and drifted to the right from the travel lane into the parking lane. The front of the case vehicle impacted the back of the Freightliner vehicle causing the case vehicle's driver and front right passenger air bags to deploy. The case vehicle also sustained front and rear wheel impacts on the right side from impacting the curb as it came to rest. The Freightliner was pushed forward and impacted the back of a second legally parked and unoccupied vehicle. The case vehicle was towed due to disabling damage, the Freightliner and the other parked vehicle were not towed. The driver and one of the passengers were transported via ambulance, treated at an emergency room and released. Two of the passengers were transported and hospitalized overnight. The other two passengers were not transported, with one never seeking medical treatment and the other going to his private physician later.

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This SCI/NASS combination investigation was brought to the NHTSA's attention in late June 2003 by NASS/CDS sampling activities and was assigned as a combination case on August 8, 2003. The crash occurred in June 2003, at 2:10 a.m., in Texas, and was investigated by the applicable municipal police. This crash involved a 2003 Chevrolet Tahoe sport utility vehicle wagon (case vehicle), a 1999 Freightliner FL60 straight truck (first other vehicle) and a 1997 Chevrolet Suburban utility station wagon (second other vehicle). This case is of special interest because the manufacturer of the case vehicle has certified that it meets the advanced air bag requirements of Federal Motor Vehicle Safety Standard (FMVSS) No. 208. In addition, the case vehicle was equipped with an Event Data Recorder (EDR) that was successfully downloaded. The unrestrained case vehicle driver (21-year-old male, white, non-Hispanic) sustained moderate injuries and the restrained front right passenger (23-year-old male, white, non-Hispanic) was not injured. There were four other passengers in the case vehicle, all unrestrained, all males in their early twenties, all of whom sustained moderate or minor injuries. The finished NASS case was received in March 2004. This report is based on the coded NASS case, the downloaded EDR data, occupant kinematic principles and this contractor's evaluation of the evidence.

CRASH CIRCUMSTANCES

Figure 1: Case vehicle's westbound approach

The case vehicle was traveling west at high speed in the westbound travel lane of a two-lane residential city street, and was entering a curve to the left (**Figure 1**). The Freightliner and the Suburban were both legally parked and unoccupied, heading west in the westbound parking lane of the same street. The weather was clear, the asphalt road surface was dry and free of defects, it was dark but lighted and the posted speed limit was 48 km.p.h. [30 m.p.h.]. The case vehicle driver failed to negotiate the curve and drifted to the right from the travel lane into the parking lane. The crash occurred in the parking lane along the north edge of the street.

The front of the case vehicle impacted the back of the Freightliner causing the case vehicle's driver and front right passenger frontal air bags to deploy (event #1). The case vehicle's right front wheel impacted and ran up and over the curb (event #2) and then its right rear wheel also impacted the curb (event #3) as the case vehicle came to rest. The Freightliner was pushed forward by the impact and the front of the Freightliner impacted the back of the Suburban. All three vehicles came to rest near the point of impact.

CASE VEHICLE

The case vehicle was a 2003 Chevrolet Tahoe 1500, 4 x 4, four-door, seven-passenger, sport utility vehicle (VIN: 1GNEK13Z53R------), equipped with a 5.3 liter flexible fuel V8 engine and an automatic transmission with a column-mounted selector lever. Four-wheel anti-lock brakes

were standard for this model. According to the published specifications, the case vehicle was equipped with dual-stage frontal air bags, occupant sensors, and an Event Data Recorder (EDR). Its wheelbase was 295 centimeters [116.0 inches]. The odometer reading was estimated by the driver as 3,219 kilometers [2,000 miles]. The case vehicle was towed due to disabling damage.

The case vehicle sustained heavy direct damage across the entire front (**Figure 2**). The damage exhibits the classic heavy truck rear underride pattern, with maximum bumper-level crush 46 centimeters [18.1 inches] at the front left corner where the case vehicle's bumper impacted the Freightliner's left rear wheel/tire assembly. The engine was hood heavily scraped and crushed rearward from sliding under the Freightliner's cargo deck (**Figures 3** and **4**), but maximum crash for the above-bumper damage was not measured. The rear edge of the hood was pushed into the windshield, causing extensive cracking across the entire width of the windshield glazing, the left front (driver's) door window glazing disintegrated due to the impact, and there was no other glazing damage. The left front wheel was pushed rearward and the left wheel base was shortened by 14 centimeters [5.5 inches] while the right wheelbase was lengthened by 2 centimeters [0.8 inches]. The right front wheel was deformed and the right rear wheel had minor damage due to striking the curb, and both right tires were deflated (**Figure 4**).

The case vehicle's most severe impact was event #1. This contractor estimates that the CDC is **12-FDEW-4 (0 degrees)**. (The coded NASS case data contain a different extent zone for this CDC. SCI changed the extent zone because the bumper-level only crush profile does not fully represent the underride configuration of this impact.) This impact is out of scope for the WinSMASH reconstruction program (heavy truck impact with underride). The crash severity for the

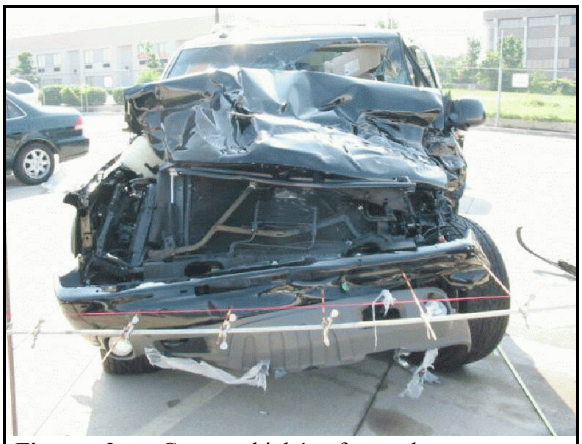


Figure 2: Case vehicle's front damage; note, overhanging structure engagement on hood

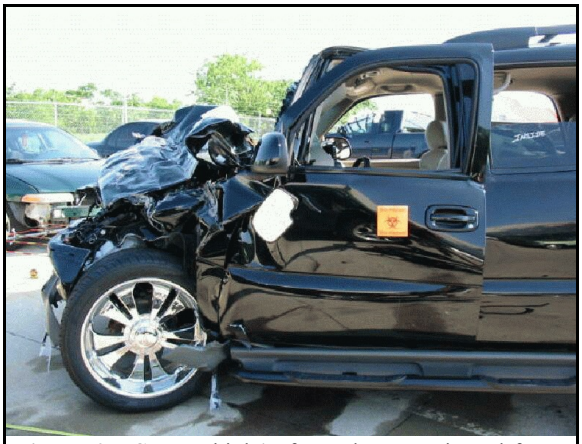


Figure 3: Case vehicle's front damage viewed from left; note, overhanging structure engagement on hood and front left wheel displaced rearward

Figure 4: Case vehicle's front damage viewed from front-right; note, right front wheel damage, right rear wheel damage not visible

case vehicle's most severe impact was moderate (25-40 km.p.h. [15-25 m.p.h.]). The CDCs for the right front (event #2) and right rear (event #3) wheel impacts are **12-FRWN-3 (0)** and **12-FRWN-9 (0)**, respectively. These impacts are out of scope for the WinSMASH reconstruction program. The crash severity for both wheel impacts was minor (1-13 km.p.h. [1-8 m.p.h.]).

The case vehicle's interior had two bucket seats in the front row, fitted with integrated manual, three-point safety belts. The second row also had two bucket seats, with conventional (i.e., not integrated) manual, three-point safety belts. The third seat row consisted of a 50/50 split bench seat with separate, folding backs, fitted with integrated, manual, three-point safety belts at the two outboard positions and a lap-only safety belt at the center position. The six outboard seats each had adjustable head restraints, all of which were in the full-down position. Inspection of the case vehicle's interior revealed substantial intrusion in the left front area and numerous points of occupant contact evidence. The left A-pillar moved 23 centimeters [9.1 inches] rearward and the left portion of the instrument panel moved 21 centimeters [8.3 inches] rearward. Both of the front bucket seat backs were impacted by second seat row occupants, causing deformation of the seat backs such that the two front seating positions sustained back-to-front intrusion, 18 centimeters [7.1 inches] on the right and 5 centimeters [2.0 inches] on the left. In addition, the two second row bucket seat backs were impacted by third row occupants, causing deformation of the seat backs such that the two second row seating positions sustained back-to-front intrusion, 14 centimeters [5.5 inches] on the left and 10 centimeters [3.9 inches] on the right. The upper half of the steering wheel rim was bent forward 12 centimeters [4.7 inches] and there were knee contact skin transfers on the driver's knee bolster.

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was equipped with dual-stage frontal air bags at the two front seat positions. Both air bags deployed as a result of the collision events. Seat back-mounted side impact air bags were an option for this model, but the case vehicle was not so equipped.

The driver's air bag was mounted in the steering wheel hub, with the module cover flaps in the I-configuration. Each cover flap measured 7 centimeters [2.8 inches] horizontally and 11 centimeters [4.3 inches] vertically. There was no evidence of damage to the cover flaps or the adjacent structures. The deployed driver's air bag was round, with a diameter of 60 centimeters [23.6 inches]. There were two vent ports of unknown diameter, located on the back of the air bag at the 9:30 and 2:30 o'clock positions. The front of the air bag showed scattered drops and smears of blood (**Figure 5**). There was no evidence of contact on the back of the air bag, and there was no evidence that the air bag was damaged.

Figure 5: Front of driver's air bag

The front right passenger's air bag was mounted in the mid-instrument panel location, with a single cover flap hinged on the top edge. The cover flap measured 39 centimeters [15.4 inches] horizontally and 14 centimeters [5.5 inches] vertically. There was no evidence of damage to the cover flap or the adjacent structures. The deployed front right passenger's air bag was rectangular, measuring 61 centimeters [24 inches] horizontally and 58 centimeters [22.8 inches] vertically (**Figure 6**). There were two vent ports of unknown diameter located on the left and

Figure 6: Front of passenger's air bag

Figure 7: Top of passenger's air bag

right side panels, respectively, of the air bag fabric. There was a small amount of blood on the left edge of the front of the air bag fabric extending onto the left side, and extensive blood stains on the top panel of the air bag's fabric (**Figure 7**).

EVENT DATA RECORDER

The case vehicle was equipped with an Event Data Recorder (EDR) that was successfully downloaded. The EDR recorded a deployment event and a non-deployment event. The Sensing and Diagnostic Module (SDM) reports are included as **Figures 14 - 19**.

The case vehicle sustained a major impact with the back of a Freightliner straight truck and the case vehicle exhibited a classic heavy truck rear underride damage profile. This collision event involved a sustained impact pulse as the front of the case vehicle engaged the rearmost structures on the back of the Freightliner, penetrated under the rear overhang while the engine hood snagged against the cargo deck, and then encountered the left rear wheel/tire assembly. The Systems Status Report at Deployment (**Figure 14**) indicates that there was not a non-deployment event prior to the deployment (Time Between Non-Deployment and Deployment Events = N/A). In addition, the Pre-Crash Data for the Deployment and the Non-Deployment events (**Figures 14** and **17**) coincide exactly. Accordingly, this contractor concludes that the SDM's recording of the non-deployment event is an artifact of the prolonged impact pulse associated with the underride dynamics of this single event, although it could also be associated with one of the wheel impacts. The non-deployment event (**Figures 17 - 19**) is not discussed further.

The System Status Report at Deployment report (**Figure 14**) indicates that the SIR Warning Lamp was off. The deployment event occurred during ignition cycle 540 and the EDR was downloaded on cycle 541. The Pre-Crash data (**Figures 14** and **15**) indicate that the case vehicle was traveling 97 km.p.h. [60 m.p.h.] five seconds prior to algorithm enable (AE). The driver applied 100 percent throttle input at four seconds prior and accelerated to 100 km.p.h. [62 m.p.h.] at three seconds prior. The driver braked at two seconds prior and the case vehicle slowed to 66 km.p.h. [42 m.p.h.] at one second prior to AE. The driver's seat belt is reported as unbuckled. The command for first stage deployment of the driver's and front right passenger's air bags was issued 22.5 milliseconds after AE, and second stage deployment was not commanded. The SDM recorded a maximum longitudinal velocity change of -47.1 km.p.h. [-29.24 m.p.h.] at 172.5 milliseconds after algorithm enable (**Figure 14**). The Deployment Velocity Change graph (**Figure 16**) shows a gradual (i.e., not steep) slope to -42.9 km.p.h. [-26.66 m.p.h.] at 120 milliseconds, after which the SDM stopped recording.

CASE VEHICLE DRIVER'S KINEMATICS

The case vehicle's driver (21-year-old male, white, non-Hispanic, 185 centimeters, 88 kilograms [73 inches, 194 pounds]) was not restrained by the available, integrated, manual, three-point, lap-and-shoulder safety belt system. He was in a normal, upright driving posture, with his back against the seat back, his left foot on the floor, his right foot operating the foot controls and both hands on the steering wheel. His seat track was adjusted between the middle and rearmost positions, his seat back was slightly reclined and the tilt steering wheel was adjusted at an unknown position (**Figure 8**).

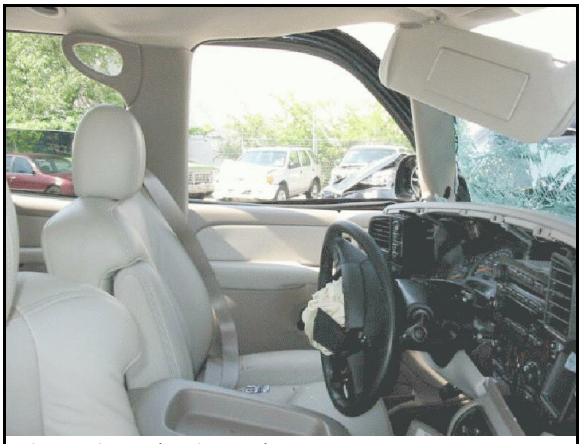


Figure 8: Driver's seating area

The driver braked in an unsuccessful attempt to avoid the collision. He moved forward in response to the braking deceleration. The front of the case vehicle impacted the back of the parked Freightliner, causing the case vehicle's driver and front right passenger air bags to deploy and causing the driver to move further forward and slightly upward, toward the 12 o'clock direction of force. He encountered the deployed air bag, but continued forward because he was not using any safety belt. The second row left passenger impacted the back of the driver's seat, causing the seat back to tilt forward slightly and this contributed to the driver's forward motion. The driver deflated the air bag and his head impacted the windshield header, resulting in a short episode of unconsciousness. His right arm impacted the center of the instrument panel, causing an abrasion on his right elbow. His left knee impacted the knee bolster, causing a contusion on his knee, and his left thigh impacted the steering wheel rim, causing a contusion on his left thigh. His left ankle was forced against the floor/toe pan, causing a contusion. He was removed from the vehicle while he was unconscious and his position at final rest is not known.

The driver was transported via ambulance to a hospital, where he was treated and released.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Unconsciousness, less than one hour	moderate[1] 160202.2,0	Windshield header	Certain	Emergency Room
2	Abrasion, right elbow	minor 790202.1,1	Center instrument panel[2]	Certain	Emergency Room
3	Contusion, left thigh	minor 890402.1,2	Steering wheel rim[3]	Certain	Interview
4	Contusion, left knee	minor 890402.1,2	Knee bolster	Certain	Interview
5	Contusion, left ankle	minor 890402.1,2	Floor	Certain	Interview

FRONT RIGHT PASSENGER'S KINEMATICS

The case vehicle's front right passenger (23-year-old male, white, non-Hispanic, 178 centimeters, 91 kilograms [70 inches, 201 pounds]) was restrained by the available, integrated, manual, three-point, lap-and-shoulder safety belt system. He was in a normal, upright seated posture, with his back against the seat back, his feet on the floor and his hands in an unknown position (**Figure 9**).

Figure 9: Front row right passenger's seating area

The driver braked in an unsuccessful attempt to avoid the collision. The front right passenger moved forward in response to the braking deceleration and his safety belt retractor locked. The front of the case vehicle impacted the back of the Freightliner, causing the front right passenger's air bag to deploy and causing him to move further forward and slightly upward,

[1]The Abbreviated Injury Scale code entered in the NASS injury table is 160414.2,0, but this is not correct under the protocols in use when this case was coded in 2003.

[2]The Injury Source code entered in the NASS injury table indicates the left portion of the instrument panel, but the contact was to the center portion of the instrument panel.

[3]The Injury Source code entered in the NASS injury table indicates the entire steering wheel, but only the steering wheel rim was involved in the thigh contusion.

toward the 12 o'clock direction of force. Because he was restrained by the safety belt, he did not impact the deployed air bag with the full force of his inertia, and because he was cushioned by the air bag, he did not load heavily against the safety belt webbing. The occupant in the second row right position pitched forward and impacted the front right seat back, causing it to bend forward with residual deformation of 18 centimeters [7.1 inches]. The front right passenger's position at final rest in not known. He was police-reported as not injured, was not treated at a medical facility and there were no interview-reported injuries for this occupant.

SECOND ROW LEFT PASSENGER'S KINEMATICS

The case vehicle's second row left passenger (25-year-old male, white, non-Hispanic, 180 centimeters, 77 kilograms [71 inches, 170 pounds]) was not restrained by the available, manual, three-point, lap-and-shoulder safety belt system. He was in a normal, upright seated posture, with his back against the seat back, his feet on the floor and his hands in an unknown position. His seat track and seat back incline were not adjustable (**Figure 10**).

Figure 10: Second row left passenger's seating area

The case vehicle driver braked in an unsuccessful attempt top avoid the collision. The second row left passenger moved forward in response to the braking deceleration. The front of the case vehicle impacted the back of the Freightliner, causing the second row left passenger to move further forward and slightly upward, toward the 12 o'clock direction of force. He may have lifted his arms in an attempt to brace/protect himself. He impacted the back of the driver's seat, causing a fracture of his left forearm. Simultaneously, the third row left passenger pitched forward and impacted the back of the second row seat, causing it to bend forward with residual deformation of 14 centimeters [5.5 inches]. His position at final rest is not known.

CASE VEHICLE SECOND ROW LEFT PASSENGER'S INJURIES

The second row left passenger was transported via ambulance to a hospital. He was hospitalized for one day, for treatment and observation.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Fracture left forearm, NFS	moderate 751900.2,2	Back of driver’ s seat	Certain	Interviewee

The case vehicle's second row right passenger (22-year-old male, white, non-Hispanic, 183 centimeters, 95 kilograms [72 inches, 209 pounds]) was not restrained by the available, manual, three-point, lap-and-shoulder safety belt system. He was in a normal, upright, seated posture, with his back against the seat back, his feet on the floor and his hands in an unknown position. His seat track and seat back incline were not adjustable (**Figure 11**).

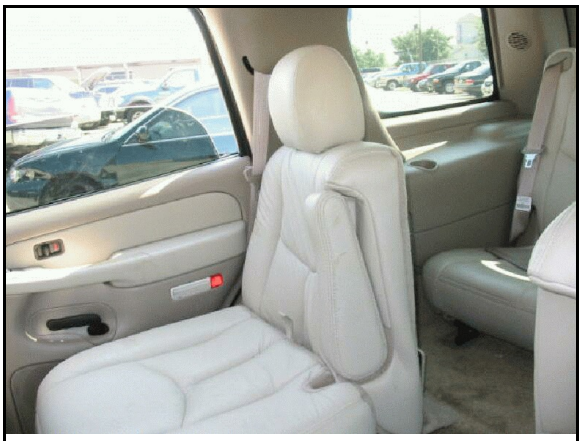


Figure 11: Second row right passenger's seating area

The case vehicle driver braked in an unsuccessful attempt top avoid the collision. The second row right passenger moved forward in response to the braking deceleration. The front of the case vehicle impacted the back of the Freightliner, causing the second row right passenger to move further forward and slightly upward, toward the 12 o'clock direction of force. He impacted the back of the front right passenger's seat, causing a laceration on his forehead. Simultaneously, the third row right passenger pitched forward and impacted the back of the second row seat, causing it to bend forward with residual deformation of 10 centimeters [3.9 inches]. His position at final rest is not known.

CASE VEHICLE SECOND ROW RIGHT PASSENGER'S INJURIES

The second row right passenger was not transported and did not seek any treatment for his injuries.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Laceration, mid forehead, 7.6 cm [3 inches]	minor 290602.1,7	Back of front right seat back	Certain	Interviewee

THIRD ROW LEFT PASSENGER'S KINEMATICS

The case vehicle's third row left passenger (22-year-old male, white, non-Hispanic, 185 centimeters, 77 kilograms [73 inches, 170 pounds]) was not restrained by the available, integrated, manual, three-point, lap-and-shoulder safety belt system. He was in a normal, upright, seated posture, with his back against the seat back, his feet on the floor and his hands in an unknown position. His seat track and seat back incline were not adjustable (**Figure 12**).

The case vehicle driver braked in an unsuccessful attempt top avoid the collision. The third row left passenger moved forward in response to the braking deceleration. The front of the case vehicle impacted the back of the Freightliner, causing the third row left passenger to move further forward and slightly upward, toward the 12 o'clock direction of force. He impacted the back of the second row left seat, resulting in a herniation of an intervertebral disc in his lumbar spine. His position at final rest is not known.

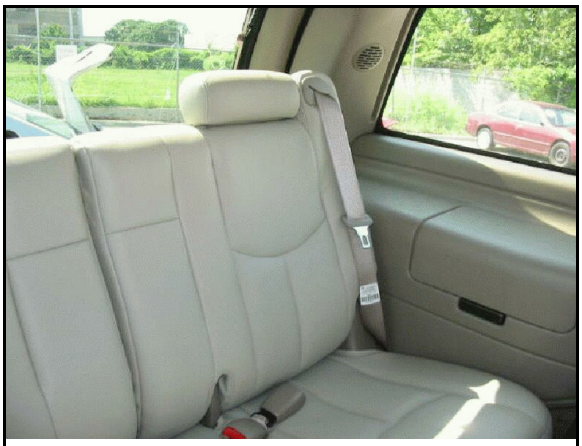


Figure 12: Third row left passenger's seating area

CASE VEHICLE THIRD ROW LEFT PASSENGER'S INJURIES

The third row left passenger was not transported via ambulance, but subsequently sought treatment through his private physician.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Lumbar spine disc herniation NFS	moderate 650600.2,8	Second row left seat back	Certain	Interviewee

THIRD ROW RIGHT PASSENGER'S KINEMATICS

The case vehicle's third row right passenger (24-year-old male, white, non-Hispanic, 188 centimeters, 84 kilograms [74 inches, 185 pounds]) was not restrained by the available, integrated, manual, three-point, lap-and-shoulder safety belt system. He was in a normal, upright, seated posture, with his back against the seat back, his feet on the floor and his hands in an unknown position. His seat track and seat back incline were not adjustable (**Figure 13**).

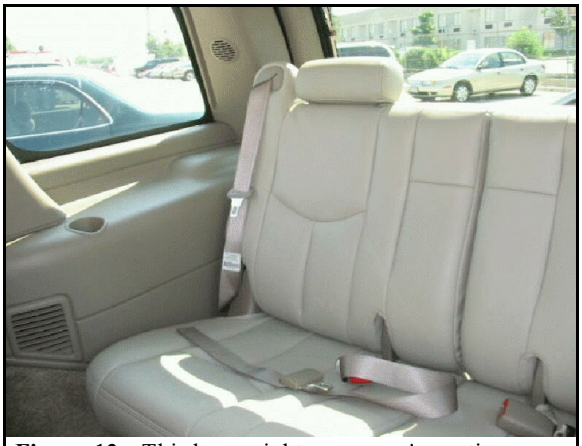


Figure 13: Third row right passenger's seating area

The case vehicle driver braked in an unsuccessful attempt top avoid the collision. The third row right passenger moved forward in response to the braking deceleration. The front of the case vehicle impacted the back of the Freightliner, causing the third row right passenger to move further forward and slightly upward,

toward the 12 o'clock direction of force. His right knee impacted the back of the second row right seat, causing a dislocation of his right hip. His position at final rest is not known.

CASE VEHICLE THIRD ROW RIGHT PASSENGER'S INJURIES

The third row right passenger was transported via ambulance to a hospital, where he was hospitalized for one day, for treatment of his injuries and observation.

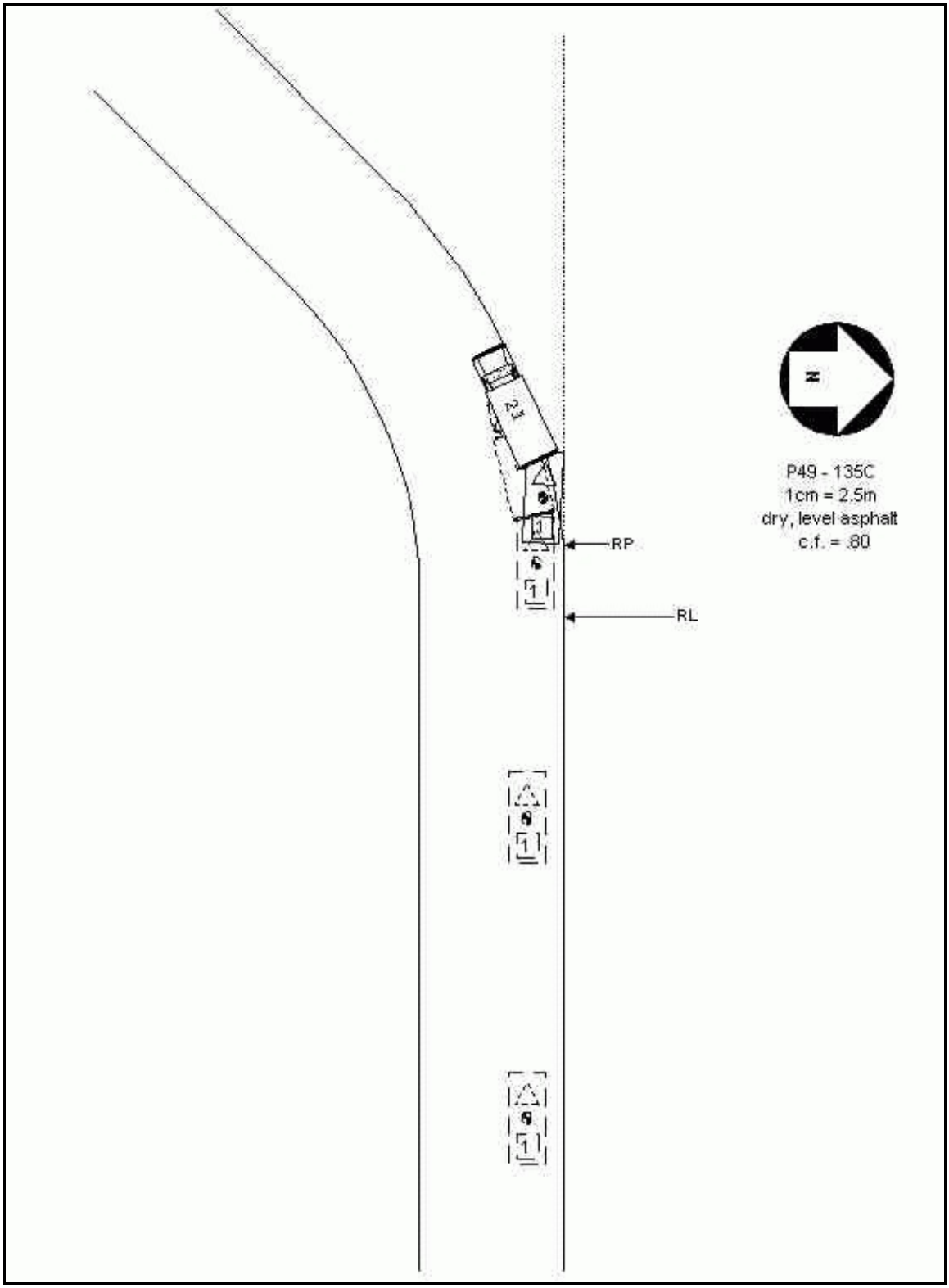
Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Hip, dislocation, right	moderate 850610.2,1	Second row right seat back	Certain	Interviewee

FIRST OTHER VEHICLE

The first other vehicle was a 1999 Freightliner FL60, conventional cab, 4 x 2 straight truck (VIN: 1FV3GJACXXH------), equipped with a 7.2 liter 6 cylinder diesel engine and hydraulic brakes, with GVWR 8,845 - 11,794 kilograms [19,501 - 26,000 pounds]. The VIN indicates that the Freightliner left the factory as an incomplete vehicle. The police crash report indicates that it was finished as a " Ryder" truck. The Freightliner was not towed. The Freightliner is identified as an " other non-fixed object" in the NASS case (i.e., there is no coded vehicle record), because this vehicle was legally parked, unoccupied and not in transport at the time of the crash.

SECOND OTHER VEHICLE

The second other vehicle was a 1997 Chevrolet Suburban 1500, 4 x 2, four-door utility station wagon (VIN: 1GNEC13R1VJ------), equipped with a 5.7 liter V8 gasoline engine. Four-wheel anti-lock brakes were standard for this model. The Suburban was not towed. The Suburban is not included in the NASS case because it was parked, unoccupied and not in transport at the time of the crash and was not involved in an impact with an in-transport vehicle (i.e., the impact between the Freightliner and the Suburban is not an " event" in the coded NASS case).


N
P49 - 135C
1cm = 2.5m
dry, level asphalt
c.f. = .80
RP
RL

1GNEK13Z53R2[redacted] System Status At Deployment	
SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	UNBUCKLED
Ignition Cycles At Deployment	540
Ignition Cycles At Investigation	541
Maximum SDM Recorded Velocity Change (MPH)	-29.24
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	172.5
Driver First Stage Time Algorithm Enabled to Deployment Command Criteria Met (msec)	22.5
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)	22.5
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)	-0.31	-0.62	-2.48	-5.27	-8.68	-12.40	-15.50	-19.22	-21.70	-23.56	-25.42	-26.66	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	60	1600	0	OFF
-4	59	2816	100	OFF
-3	62	3968	66	OFF
-2	58	1984	0	ON
-1	42	1152	0	ON

Figure 14: System Status at Deployment

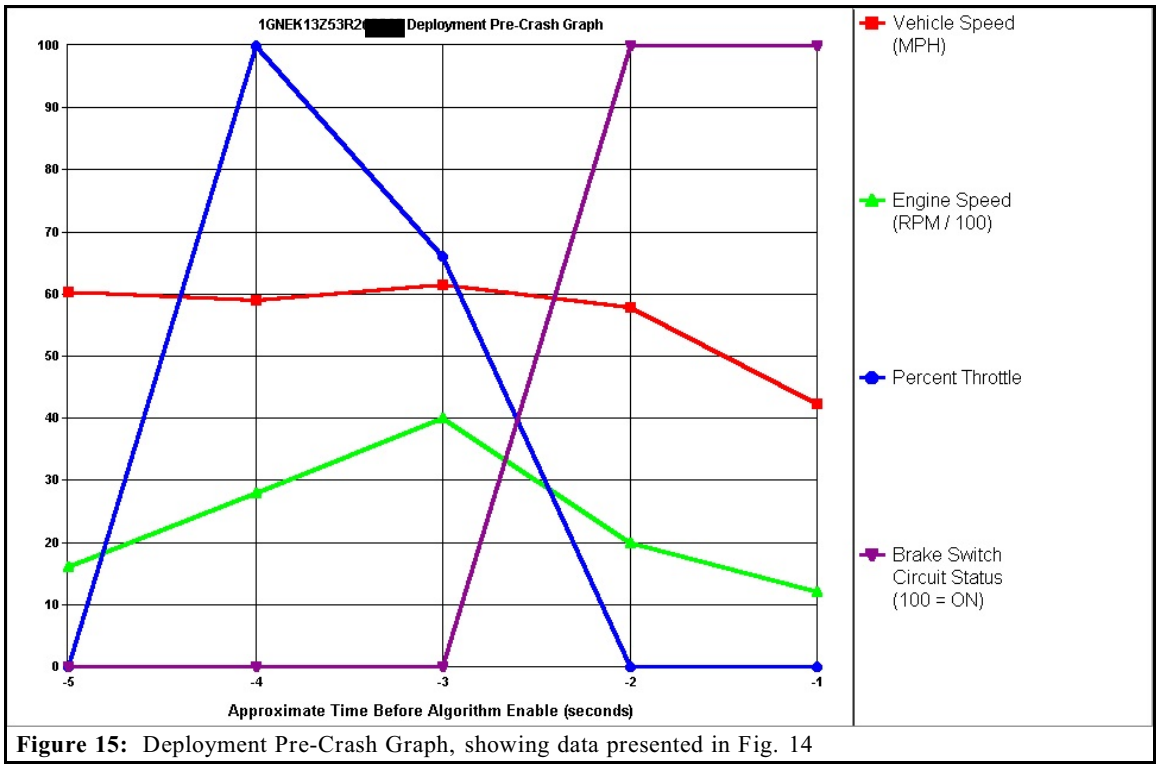


Figure 15: Deployment Pre-Crash Graph, showing data presented in Fig. 14

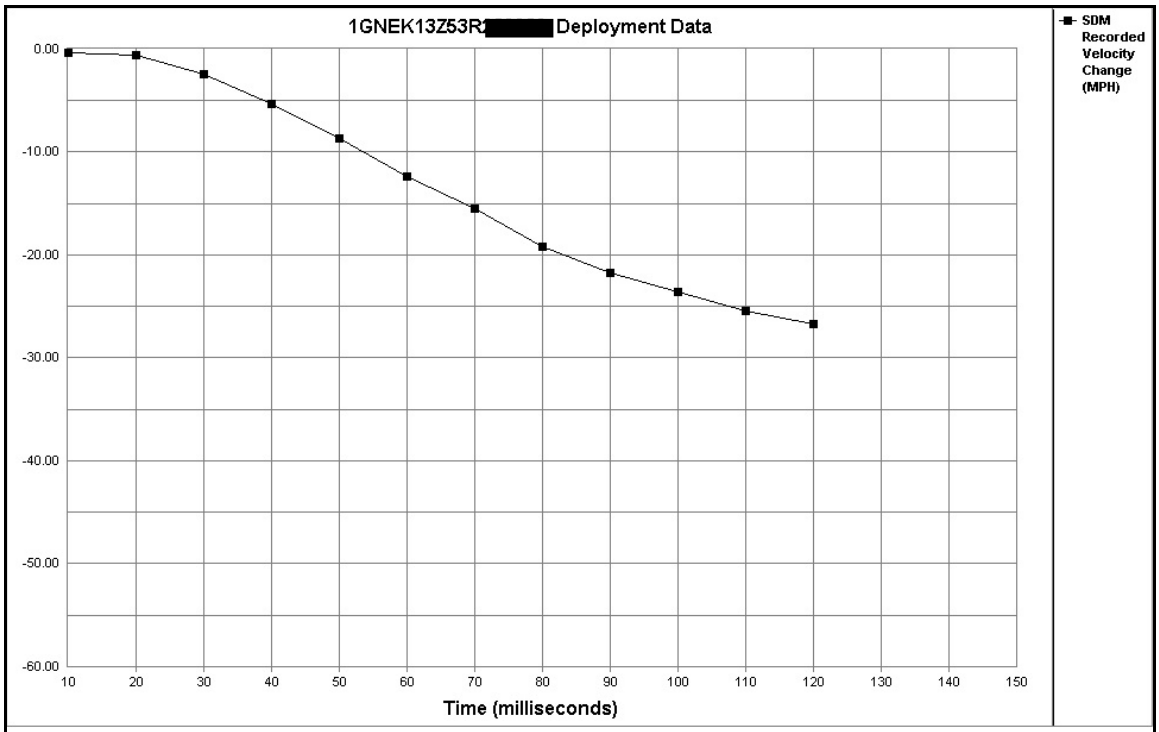


Figure 16: Velocity Change Graph for Deployment Event, showing data presented in Fig. 14

1GNEK13Z53R[redacted] System Status At Non-Deployment

SIR Warning Lamp Status	OFF
Driver's Belt Switch Circuit Status	UNBUCKLED
Ignition Cycles At Non-Deployment	540
Ignition Cycles At Investigation	541
Maximum SDM Recorded Velocity Change (MPH)	-0.23
Algorithm Enable to Maximum SDM Recorded Velocity Change (msec)	7.5
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	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	60	1600	0	OFF
-4	59	2816	100	OFF
-3	62	3968	66	OFF
-2	58	1984	0	ON
-1	42	1152	0	ON

Figure 17: System Status at Non-Deployment

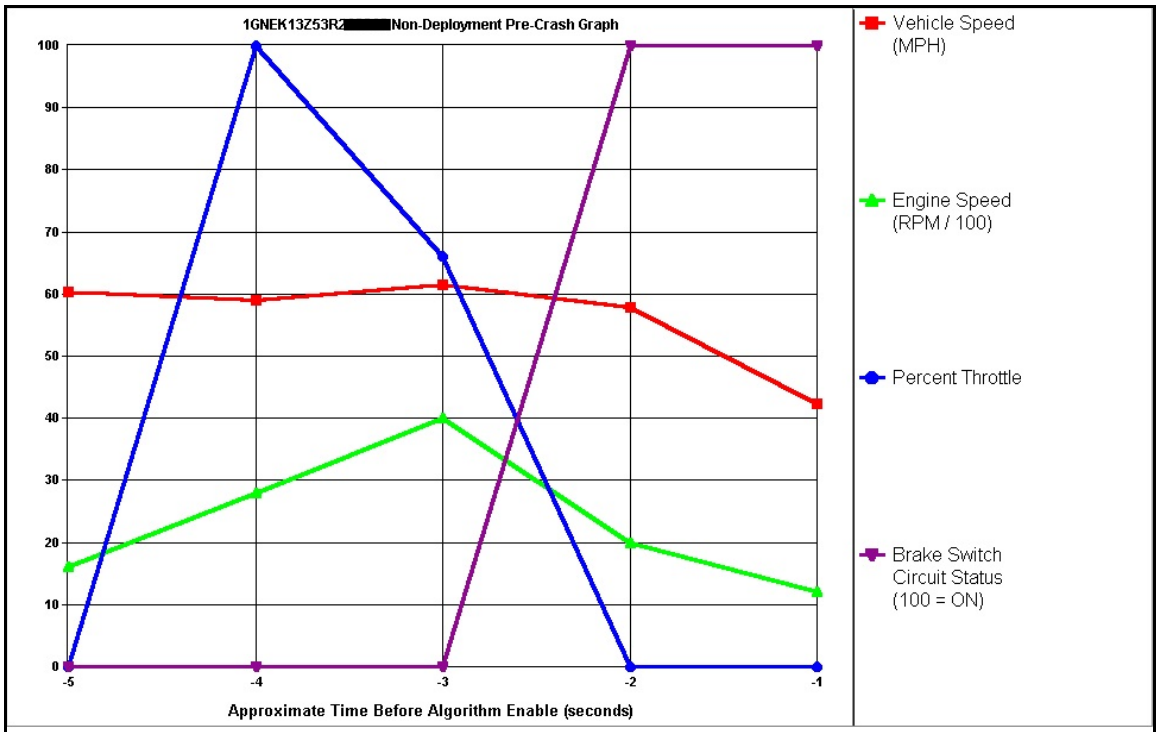


Figure 18: Non-Deployment Pre-Crash Graph, showing data presented in Fig. 17

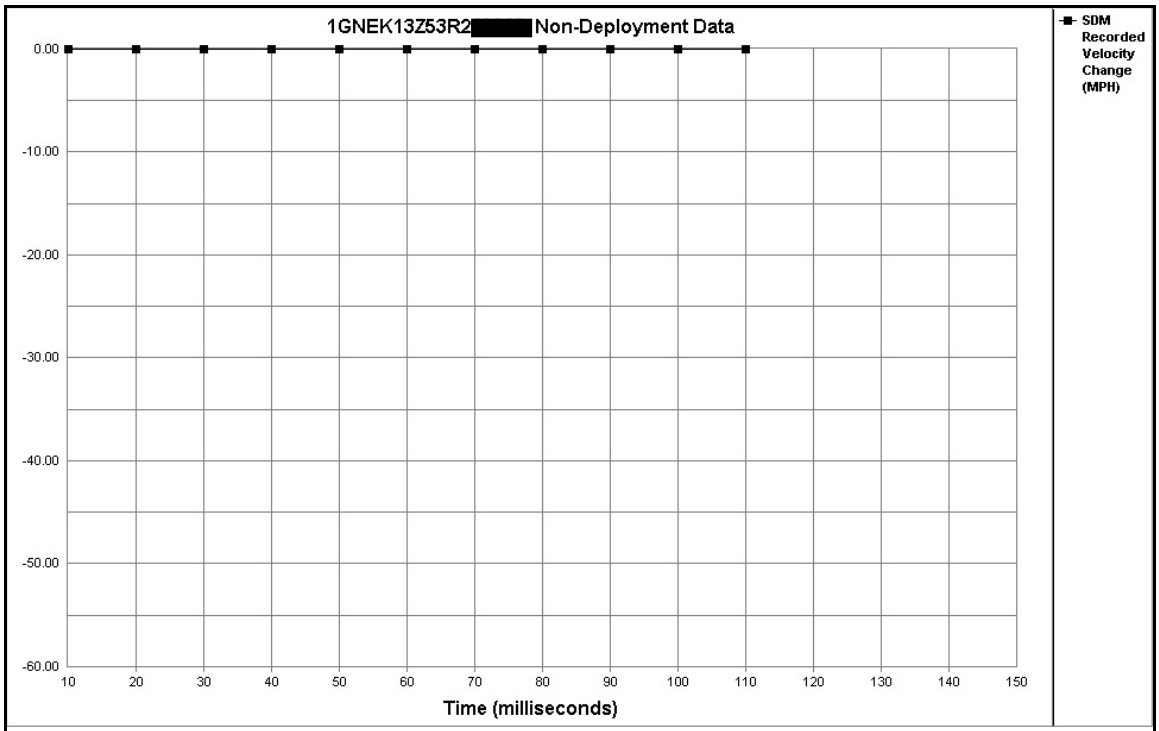


Figure 19: Velocity Change Graph for Non-Deployment event, showing data presented in Fig. 17