



INDIANA UNIVERSITY

TRANSPORTATION RESEARCH CENTER

School of Public and Environmental Affairs

222 West Second Street

Bloomington, Indiana 47403-1501

(812) 855-3908 Fax: (812) 855-3537

ON-SITE CHILD SAFETY SEAT INVESTIGATION

CASE NUMBER - IN-05-014

LOCATION - WISCONSIN

VEHICLE - 1990 FORD THUNDERBIRD

CRASH DATE - March 2005

Submitted:

October 6, 2006

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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 child safety seat investigation involving a 1990 Ford Thunderbird equipped with front seat motorized shoulder belts with manual lap belts and back seat outboard three-point, lap-and-shoulder safety belts					
16. <i>Abstract</i> This report covers an on-site child safety seat investigation that involved a 1990 Ford Thunderbird (case vehicle) and a 1992 Dodge Dakota pickup truck (other vehicle), which were involved in a front to left side crash on a two-lane county roadway. This crash is of special interest because the case vehicle's back left passenger [2-year-old, White (non-Hispanic) female and back right passenger [1-year-old, White (non-Hispanic) male] were both restrained in child safety seats at the time of the crash. Furthermore, the back left passenger sustained a police reported "A" (incapacitating) injury while the back right passenger sustained a police-reported "C" (possible) injury as a result of the crash. The case vehicle was traveling north in the northbound lane. The driver was slowing to turn left into the driveway of her residence. The Dodge was behind the case vehicle and began to pass it as the case vehicle's driver began to turn left into the driveway. The front of the Dodge impacted the left side of the case vehicle. The case vehicle rotated clockwise and came to rest in a snow covered ditch on the east side of the roadway heading slightly northwest. The Dodge rotated clockwise and came to rest on the snow covered west shoulder heading southeast. The back left passenger was seated in a Dorel "Vista" high-back belt positioning booster seat. She sustained a left femur fracture from contact with the left side of the booster seat, which loaded into the intruding left side panel during the crash. She was transported to a hospital and admitted. The driver was restrained by her two-point, automatic, motorized safety belt. She was fatally injured. The back right passenger was restrained in an unknown type child safety seat. He sustained minor injury and was transported to a hospital and treated and released.					
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This investigation was brought to NHTSA's attention on or before March 2, 2005, by a radio news release. This crash involved a 1990 Ford Thunderbird (case vehicle) and a 1992 Dodge Dakota pickup truck (other vehicle), which were involved in a front to left side crash on a two-lane county roadway. The crash occurred in February, 2005, at 9:07 p.m., in Wisconsin and was investigated by the Wisconsin State Patrol. This crash is of special interest because the case vehicle's back left passenger [2-year-old White (non-Hispanic) female; and back right passenger [1-year-old, White (non-Hispanic) male] were both seated in child safety seats at the time of the crash. The back left passenger sustained a police reported "A" (incapacitating) injury while the back right passenger sustained a police-reported "C" (possible) injury as a result of the crash. In addition, the case vehicle's driver [22-year-old White (non-Hispanic) female] sustained fatal injuries. Case vehicle, child safety seat and scene inspections, as well as an interview with the case vehicle driver's father were all completed on April 14, 2005. This report is based on the police crash report, scene, vehicle and child safety seat inspections, occupant medical records, an interview with the case vehicle driver's father, occupant kinematic principles and this contractor's evaluation of the evidence.

SUMMARY

The case vehicle was traveling north in the northbound lane of a two-lane undivided county roadway. The driver was slowing to turn left into the driveway of her residence. The Dodge was behind the case vehicle and began to pass it as the case vehicle's driver began to turn left into the driveway. The front of the Dodge impacted the left side of the case vehicle. The case vehicle rotated clockwise and came to rest in a snow covered ditch on the east side of the roadway heading slightly northwest. The Dodge rotated clockwise and came to rest on the snow covered west shoulder heading southeast. At the time the crash, the weather was cloudy, the roadway pavement was dry and there was no other traffic on the roadway.

The CDC for the case vehicle was determined to be: **07-LZAW-4 (220 degrees)**. The case vehicle sustained residual maximum crush of 67 centimeters to its left side. The WinSMASH reconstruction program, missing vehicle algorithm, calculated the case vehicle's Total, Longitudinal, and Lateral Delta Vs respectively as: 47.0 km.p.h. (29.2 m.p.h.), 36.0 km.p.h. (22.4m.p.h.), and 30.2 km.p.h. (18.8 m.p.h.). The case vehicle was towed due to damage.

Based on the police on-scene photographs of the Dodge, the CDC was estimated to be **12-FDEW-3 (0 Degrees)**. The WinSMASH reconstruction program, missing vehicle algorithm, calculated the Dodge's Total, Longitudinal, and Lateral Delta Vs respectively as: 49.0 km.p.h. (30.4 m.p.h.), -49.0 km.p.h. (-30.4m.p.h.), and 0.0 km.p.h. (0.0 m.p.h.). The Dodge was towed due to damage.

The back left passenger [2-year-old, White (non-Hispanic) female; [81 centimeters and 12.2 kilograms (32 inches, 27 pounds)] was seated in a Dorel "Vista" high-back belt positioning booster seat. The child was restrained by the case vehicle's three-point, lap-and-shoulder safety belt. The booster seat sustained minor damage to its left side due to loading against the case vehicle's intruding left side panel during the crash. The back left passenger impacted her hip and left thigh

on the left side of the booster seat and sustained a fractured left femur. She was transported by ambulance to a local hospital and later flown to an urban children’s hospital and admitted.

The case vehicle’s driver [22-year-old, White (non-Hispanic) female; 165 centimeters and 50 kilograms (65 inches, 110 pounds) was restrained by her automatic, motorized, two-point shoulder belt. She was not using the manual two-point lap belt. She sustained a fractured skull and non anatomic brain injuries due to contact with the left roof side rail and upper left “B”-pillar. She also sustained a fractured pelvis from contact with the intruding left front door. The impact caused the driver’s door latch and striker to separate, and the driver’s door intruded into the vehicle and impacted the driver’s seat back forcing the driver forward into the steering wheel, instrument panel and windshield. She impacted her neck on the steering wheel lacerating her trachea. The driver was transported by ambulance to a hospital. She expired shortly after arrival at the hospital.

The case vehicle’s back right passenger [14-month-old, White (non-Hispanic) male; 51 centimeters and 11.3 kilograms (20 inches and 25 pounds) was restrained in an unknown type child safety seat. He sustained a small contusion on his back from contact with the back of the child safety seat. He was transported by ambulance to a hospital and was treated and released.

CRASH CIRCUMSTANCES

Crash Environment: The trafficway on which both vehicles were traveling was a two-lane, undivided, bituminous, county roadway, traversing in a northerly and southerly direction. There was one travel lane in each direction and a narrow bituminous and gravel shoulder on each side of the roadway. Each travel lane was 3.5 meters (11.5 feet) in width. Each bituminous shoulder was approximately 1 meter (3.3 feet) in width. The gravel portion of each shoulder was approximately 1.4 meters (4.6 feet) in width. Roadway pavement markings consisted of solid white edge lines and a broken yellow center line. The roadway was level and straight and the speed limit was 88 km.p.h. (55 m.p.h.). There was no regulatory speed limit sign near the crash site. At the time of the crash the light condition was dark, the atmospheric condition was cloudy and the roadway pavement was dry with an estimated coefficient of friction of 0.70. There was no other traffic present and the site of the crash was rural/agricultural. See the Crash Diagram at the end of this report.

Pre-Crash: The case vehicle was traveling north in the northbound lane (**Figure 1**) and was slowing to turn left into the driveway of her residence (**Figure 2** below). The Dodge was behind the case vehicle (**Figure 3** below) and began to pass the case vehicle. The case vehicle’s driver then began to turn left into the driveway. The case vehicle's driver made no avoidance maneuvers prior to the crash. Given the vehicle’s post-impact trajectories, the Dodge’s driver most likely steered



Figure 1: Approach of case vehicle northbound to driveway on left

right just prior to impact. The police crash report indicated the Dodge's driver was intoxicated. The crash occurred in the southbound lane of the roadway (Figure 3).

Crash: The front of the Dodge (Figure 4) impacted the left side of the case vehicle (Figure 5). The impact caused the case vehicle driver's door latch and striker to separate. The driver's door intruded into the case vehicle and was then opened as the vehicles separated from impact. The door's outer sheet metal was stuck on the Dodge's front bumper (Figure 4).



Figure 2: Overview of case vehicle's approach turning left into driveway



Figure 3: Dodge's approach to impact



Figure 4: On-scene photo of front damage to Dodge, arrow shows outer sheet metal of case vehicle's driver door stuck to bumper



Figure 5: On-scene photo of damage to left side of case vehicle due to impact with the Dodge

Post-Crash: The case vehicle rotated clockwise, separated from impact, departed the east side of the roadway (Figure 6 below) and slid down the front slope of a snow covered ditch. The case vehicle came to final rest at the bottom of the ditch heading slightly northwest (Figure 7 below), approximately 7 meters (23 feet) east of the roadway. The impact caused the Dodge to rotate clockwise and depart the west side of the roadway. The Dodge came to rest on the snow covered west shoulder facing southeast (Figure 8 below).



Figure 6: View to northeast to post-impact path of case vehicle and rest position of case vehicle (cross in ditch), red arrow show gouges from case vehicle, green arrow show gouges from Dodge

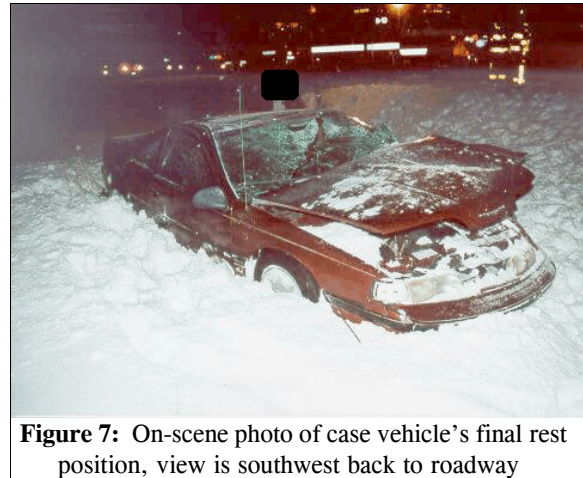


Figure 7: On-scene photo of case vehicle's final rest position, view is southwest back to roadway

CASE VEHICLE

The 1990 Ford Thunderbird was a rear wheel drive, two-door coupe (VIN: 1FAPP6040LH-----) equipped with a 3.8L, V6 engine and automatic transmission. The front seating row was equipped with bucket seats with adjustable head restraints and automatic, motorized shoulder belts with manual lap belts. The back seating row was equipped with a bench seat with three-point, lap-and-shoulder safety belt systems in the outboard seating positions and a two-point lap belt system in the center seating position. Anti-lock brakes were listed as an option, but it is not known if the case vehicle was so equipped. The case vehicle's wheelbase was 287 centimeters (113 inches). The odometer reading could not be determined due to damage to the instrument panel.

CASE VEHICLE DAMAGE

Exterior Damage: The case vehicle's contact with the Dodge involved most of the left side (**Figure 9** and **Figure 10** below). The left fender, door,



Figure 8: On-scene photo showing final rest position of Dodge, view is northeast back to roadway



Figure 9: Damage to case vehicle's left side and driver's door due to impact with the Dodge, each increment on rods is 5 cm (2 in)

windows, quarter panel, and left rear wheel were directly damaged and crushed inward. Direct damage began 45 centimeters (17.7 inches) rear of the left front axle and extended 298 centimeters (117.3 inches) rearward along the left side. The Field-L was measured as 442 centimeters (174 inches). Residual maximum crush was measured as 67 centimeters (26.4 inches) occurring midway between C₃ and C₄. The crush measurements at C₃, C₄ and the maximum crush are estimates based on the damage to the vehicle because the left front door was pulled out and displaced forward during the crash. The table below shows the case vehicle's left side crush profile.



Figure 10: Damage to case vehicle's left quarter panel due to impact with the Dodge

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	298	67	442	0	41	51	50	10	0	-53	7
in		117.3	26.4	174.0	0.0	16.1	20.1	19.7	3.9	0.0	-20.9	2.8

The case vehicle's left side wheelbase was shortened 9 centimeters (3.5 inches) while the right side wheelbase was extended 1 centimeter (0.4 inch). There was induced damage to the hood, windshield glazing, roof, trunk lid, and right quarter panel (Figure 11 below). No other obvious induced damage or remote buckling was observed to the remainder of the case vehicle's exterior.

The recommended tire size was: P205/70R15, but the case vehicle was equipped with tires sized P215/70R15. 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	186	27	207	30	5	6	None	No	No
RF	103	15	207	30	4	5	None	No	No
LR	0	0	207	30	4	5	None	No	Yes
RR	110	16	207	30	3	4	None	No	No

Vehicle Interior: Inspection of the case vehicle's interior (**Figure 12**) revealed significant evidence of driver contact to the steering wheel (**Figure 13**), windshield, driver's sun visor and lower instrument panel. The driver's door was forced significantly inward and forward into the driver's seat position during the crash displacing the driver's seat forward (**Figure 14** below) and forcing the driver into these components. There was also evidence of contact by the back left passenger's booster seat with the intruded left rear side panel, rear of the B-pillar (**Figure 15** below). Intrusions were found in the driver and left rear seat positions. Primary intrusion into the driver's occupant space involved the driver's door. However, the intrusion could not be measured due to the door being pulled outward and forward as the vehicles separated from the crash. In addition, the specific extent of the driver's seat back intrusion could not be determined due to the post-crash condition of the seat. The primary intrusions into the back left passenger's occupant space were 37 centimeters (14.6 inches) of lateral B-Pillar and rear side panel intrusion and 31 centimeters (12.2 inches) of lateral left rear seatback intrusion.

Damage Classification: Based on the vehicle inspection, the CDC for the case vehicle was determined to be: **07-LZAW-4 (220 degrees)**. The WinSMASH reconstruction program, missing vehicle algorithm, was used to reconstruct the case vehicle's Delta Vs for this impact. The Total, Longitudinal, and Lateral Delta Vs are, respectively: 47.0 km.p.h. (29.2 m.p.h.), 36.0 km.p.h. (22.4m.p.h.), and 30.2 km.p.h. (18.8 m.p.h.). This was a borderline reconstruction and the results appear reasonable. The case vehicle was towed due to damage.



Figure 11: Top back view of damage to the case vehicle



Figure 12: Overview of case vehicle's instrument panel, steering wheel and windshield



Figure 13: Left side view of deformation to the steering wheel and steering column



Figure 14: Overview of damage to driver's seat due to intrusion of driver's door during the crash

AUTOMATIC RESTRAINT SYSTEM

The case vehicle was not equipped with air bags. However, the case vehicle was equipped with automatic, motorized, two-point shoulder belts for both front seat positions. The vehicle inspection revealed that the motorized shoulder belt was worn by the driver and was broken due to the intrusion of the driver's door during the crash.

CHILD SAFETY SEAT

A high-back belt positioning booster seat (**Figure 16**) was used to restrain the case vehicle's back left passenger. It was positioned in the case vehicle in the forward facing orientation at the time of the crash. The booster seat was a Dorel "Vista", model number 22-920-LVP, manufactured by the Dorel Juvenile Group, Inc., on September 15, 2004. The booster seat was purchased new approximately five months before the crash and was used on a daily basis. It is not known if the driver had read the booster seat instruction manual or the case vehicle's owner manual regarding installation of child seats. The booster seat was designed without a shield, harness straps or LATCH system. It was designed to be used with the vehicle's lap-and-shoulder



Figure 15: Intruded left B-pillar and side panel adjacent to back left seat position



Figure 16: Front view of the high-back, belt positioning booster seat

safety belt system restraining the child. At the time of the crash, the booster seat was positioned straight up, and the child was secured with the case vehicle's lap-and-shoulder safety belt system routed through the booster seat's belt guides. It is not known if the child was wearing heavy clothing at the time of the crash.

The belt positioning booster seat consisted of a one-piece plastic shell, covered with thin [$< 1\text{cm}$ (0.4 inch) thick] foam padding. There were two shoulder belt guides on each upper side of the booster seat and two lap belt guides on each side of the seat cushion under the arm rests.

Inspection of the booster seat revealed evidence of loading to the left side (**Figure 17**) from the intruding left side panel, as well as scuffs on the left side of the booster seat (**Figure 18**) due to impact with the side panel. As the child and booster seat were moving leftward due to the impact, the side panel behind the left B-pillar was being intruded into the child seat. This, along with the restraining force of the case vehicle's lap and shoulder belt, deformed the left side of the child seat inward and resulted in white stress marks along the outside and inside of the left side of the booster seat. Abrasions were also found on the child seat's left lap belt guide (**Figure 19**) due to loading of the lap belt against the guide during the crash.

There were manufacturer's information and warning labels affixed to the right side of the booster seat giving the seat's weight, height, and age limitations in addition to illustrations depicting proper usage. The recommended weight and height range were indicated as 14 to 36 kilograms (30 to 80 pounds) and 73 to 132 centimeters (29 to 52 inches). **Figure 20** below shows the information label addressing proper booster seat usage, as well as child weight and height limitations for the seat.



Figure 17: White stress marks in plastic shell of booster seat from deformation of the left side of seat during the crash

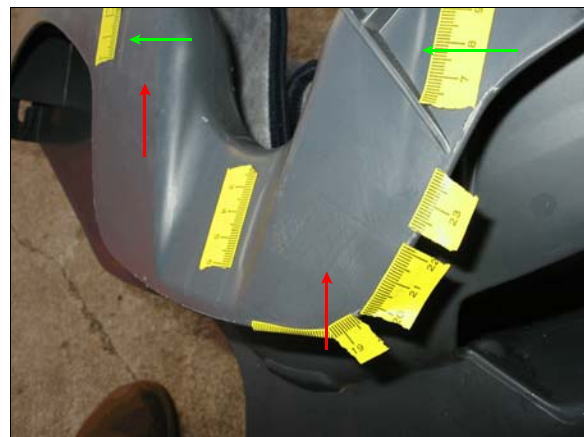


Figure 18: Scuffs and abrasions (arrows) on the left side of the booster seat due to impact with the intruding left side panel, green arrows show white stress marks in plastic

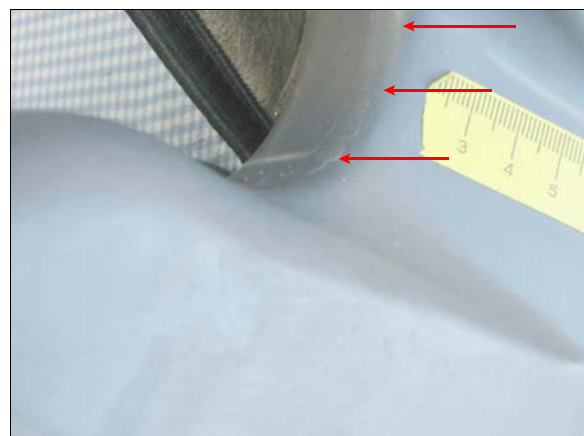


Figure 19: Arrows show safety belt abrasion in booster seat's left lap belt guide

The back right passenger was restrained by a child safety seat, but the seat could not be located. It was not retained after the crash. The make, model, date of manufacture, and type of child seat are unknown.

CASE VEHICLE BACK LEFT PASSENGER KINEMATICS

Immediately prior to the crash the case vehicle's back left passenger [2-year-old, White (non-Hispanic) female; [81 centimeters and 12.2 kilograms (32 inches, 27 pounds)] was seated in an upright posture in her booster seat with her back against the booster seat's seat back and her feet dangling over the front edge of the seat's cushion. The position of her hands is not known. The case vehicle had no back seat track, and the seat back was not adjustable.

Based on this contractor's vehicle inspection, booster seat inspection and interview data, the case vehicle's back left passenger (i.e., driver's daughter) was restrained in the booster seat by the manual, three-point, lap-and-shoulder safety belt system. There was no mention by the interviewee of belt pattern bruising and/or abrasions to the child's body, but inspection of the safety belt webbing, "D"-ring, latch plate, and the booster seat's left lap belt guide showed evidence of loading. The safety belt webbing appeared to be stretched (**Figure 21** below) and there was an abrasion on the lap belt guide (**Figure 19** above).

The case vehicle's impact with the Dodge caused the case vehicle's back left passenger to move leftward and backward along a path opposite the case vehicle's 220 degree direction of principal force as the case vehicle was accelerated forward and to the right from the impact. The intruding left side panel, rear of the B-pillar, (**Figure 21**) impacted the left side of the booster seat deforming the booster seat and pushing the booster seat to the right. The child's left thigh and hip loaded into the left side of her booster seat fracturing her left femur. The child most likely moved rightward and slightly forward as the case vehicle rotated clockwise, departed the right side of the roadway and plowed through deep snow as it traveled down into a ditch to final rest. The child remained restrained in her booster seat and was removed from the case vehicle by a witness.



Figure 20: Manufacturer's booster seat information and warning label



Figure 21: Case vehicle's back left safety belt appeared stretched, arrows show intrusion of seat back and left side panel rear of the B-pillar, view front to rear

The case vehicle’s back left passenger sustained a police reported “A” (incapacitating injury) and was transported by ambulance to a local hospital and later flown to an urban children’s hospital. She was hospitalized for 10 days. The table below shows the back left passenger’s injuries and injury mechanisms.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Fracture, closed, left femur, subtrochanteric (i.e., at junction of proximal and middle thirds of femur) with displacement and overriding of fragments	serious 851818.3,2	Child safety seat’s side surface; Note: seat intruded upon by left rear door’s interior surface	Certain	Hospitalization records
2	Abrasion, small, above left eye	minor 290202.1,7	Left side interior surface, excluding hardware or armrests	Probable	Emergency room records

CASE VEHICLE DRIVER KINEMATICS

Immediately prior to the crash, the case vehicle's driver [22-year-old, White (non-Hispanic) female; 165 centimeters and 50 kilograms (65 inches, 110 pounds) and mother of both occupants] was most likely seated in a nominal upright driving posture. She was in the process of executing a left turn into her driveway and most likely had both hands on the steering wheel and her right foot on the brake. Due to intrusion by the driver’s door, which damaged the driver’ seat, the position of the her seat track and seat back could not be determined. The position of the tilt steering column also could not be determined due to damage it sustained as a result of the driver loading and deforming it during the crash.

The case vehicle’s driver was restrained by her automatic, motorized, two-point shoulder safety belt. The case vehicle inspection revealed that the buckle was still retained within the lockbox on the left B-pillar and the latch plate was still buckled (**Figure 22** below). In addition, the shoulder belt webbing was broken due to loading as the driver’s door intruded and pushed the driver’s seat back and the driver forward. There was no evidence of usage of the driver’s manual lap belt.

The case vehicle's impact with the Dodge caused the case vehicle’s driver to move leftward and backward along a path opposite the case vehicle’s 220 degree direction of principal force as the case vehicle was accelerated forward and to the right from the impact. She impacted her head on the left roof side rail and upper “B”-pillar fracturing her skull and causing a nonanatomic brain injury. She also impacted her left hip on the intruding left front door fracturing her pelvis. The impact caused the driver’s door latch and striker to separate, and the driver’s door intruded into the vehicle and impacted the driver’s seat back forcing the driver forward into the steering wheel,

instrument panel and windshield. She impacted her neck on the steering wheel lacerating her trachea. Her feet were impinged in the foot well and both of her lower legs were fractured as she was forced forward and rightward. She also sustained multiple lacerations, contusions and The driver remained in the vehicle during the crash, and the police crash report indicated she was not entrapped. The driver was removed from the vehicle by rescue personnel. She was found laying across the front seat with her head resting on the open glove box door.



Figure 22: Driver's buckle in B-pillar lock box, automatic shoulder belt in restrained position

CASE VEHICLE DRIVER INJURIES

The police crash report indicated that the driver sustained a fatal injury and was transported from the crash scene. She expired shortly after arrival at the hospital. The table below shows the driver injuries and injury mechanisms.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Nonanatomic brain injury with unconsciousness, unresponsive, pupils fixed and dilated, GCS = 3, no pulse, no blood pressure	critical 160824.5,0	Roof, left rear side rail and upper left "B"-pillar	Certain	Emergency room records
2	Laceration {rupture} trachea (i.e., blood from pharynx), not further specified, with probable large vessel rupture, suspected pneumothorax, and chest wall crepitus	serious 442604.3,4	Steering wheel hub and/or spokes and rim	Probable	Emergency room records
3	Fracture skull (most likely basilar based on blood in both ears and all other orifices), not further specified	serious 150200.3,8	Roof, left rear side rail and upper left "B"-pillar	Probable	Emergency room records
4	Fracture pelvis {unstable, irregular}, not further specified	moderate 852600.2,9	Left side interior surface, excluding hardware and/or armrest	Probable	Emergency room records

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
5 6	Fracture bilateral (lower) legs, not further specified, with feet turned leftward	moderate 852002.2,1 852002.2,2	Noncontact injury: impact forces (i.e., feet impinged in foot well while body driven rightward)	Probable	Emergency room records
7	Abrasion, large, forehead, not further specified	minor 290202.1,7	Front left windshield's glazing	Certain	Emergency room records
8	Laceration {puncture wound} above right eye	minor 290602.1,7	Front left windshield's glazing	Certain	EMS treatment record
9	Contusions {bruising} left eye, not further specified	minor 297402.1,2	Windshield roof header, driver's	Certain	Emergency room records
10	Lacerations with swelling right eye, not further specified	minor 297602.1,1	Front left windshield's glazing	Certain	Emergency room records
11	Contusion {bruising} on right side of face, not further specified	minor 290402.1,1	Windshield roof header, driver's	Certain	EMS treatment record
12	Laceration from right ear to right corner of mouth along jaw, not further specified	minor 290600.1,1	Front left windshield's glazing	Certain	Emergency room records

CASE VEHICLE BACK RIGHT PASSENGER KINEMATICS

Immediately prior to the crash, the case vehicle's back right passenger [14-month-old, White (non-Hispanic) male; 51 centimeters and 11.3 kilograms (20 inches and 25 pounds) and son of the driver] was seated in an unknown position in an unknown type child safety seat. It is also unknown if the child seat was properly secured in the vehicle and whether the child was properly restrained in the child seat. The case vehicle's back seat was not adjustable.

The case vehicle's impact with the Dodge caused the back right passenger to move leftward and backward along a path opposite the case vehicle's 220 degree direction of principal force as the case vehicle was accelerated forward and to the right from the impact. The child loaded into the back of his child safety seat causing a small contusion to his lower middle back. The child most likely moved rightward and slightly forward as the case vehicle rotated clockwise, departed the right side of the roadway and plowed through deep snow as it traveled down into a ditch to final rest. The back right passenger remained in the vehicle during the crash and was removed from the vehicle by a witness.

The back right passenger sustained a police reported “C” (possible) injury and was transported by ambulance to a hospital and was treated and released. The table below shows the back right passenger’s injuries and injury mechanisms.

Injury Number	Injury Description (including Aspect)	NASS Injury Code & AIS 90	Injury Source (Mechanism)	Source Confidence	Source of Injury Data
1	Contusion {bruise}, small, lower middle back, not further specified ¹	minor 690402.1,8	Child safety seat's back surface	Probable	Interviewee (relative)

OTHER VEHICLE

The 1992 Dodge Dakota was a four wheel drive, two-door pickup truck (VIN: 1B7GG23X1NS-----) equipped with a 3.9L, V6 engine. The Dodge was not equipped with air bags or anti-lock brakes. The Dodge’s wheelbase was 333 centimeters (131 inches). The Dodge’s odometer reading is not known because the vehicle was not inspected.

Exterior Damage: Based on the police on-scene photographs, the Dodge’s impact with the Ford involved the front of the vehicle. The front bumper and hood were directly damaged and crushed rearward. Induced damage involved the hood, right fender and right front door.

Damage Classification: Based on the police on-scene photographs of the Dodge, the CDC was estimated to be **12-FDEW-3 (0 Degrees)**. The WinSMASH reconstruction program, missing vehicle algorithm, was used to reconstruct the Dodge’s Delta Vs. The Total, Longitudinal, and Lateral Delta Vs are, respectively: 49.0 km.p.h. (30.4 m.p.h.), -49.0 km.p.h. (-30.4m.p.h.), and 0.0 km.p.h. (0.0 m.p.h.). This was a borderline reconstruction and the results appear reasonable. The Dodge was towed due to damage.

Dodge’s Occupant: According to the police crash report, the Dodge's driver [40-year-old, (unknown race and/or ethnic origin) male]; was restrained by his manual, three-point, lap-and-shoulder safety belt system. The driver sustained a police reported “B” (non-incapacitating) injury as a result of this crash and was not transported from the scene for treatment. The police crash report indicated that the driver’s ability was impaired due to alcohol. The police crash report also indicated he was arrested for “homicide by intoxicated use of a motor vehicle”.

¹ According to this child’s medical records, he had an old bruise underneath the right side of his chin, nonacute abrasions on his body, and glass shards and dirt about his face but no cuts.

