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**Special Crash Investigations:
On-Site Remote Child Restraint
System/Fire Crash Investigation;
Vehicle: 2001 Chevrolet Impala;
Location: Florida;
Crash Date: May 2016**

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16. Abstract This remote investigation documents the involvement of a 20-month-old male restrained in a child restraint system (CRS) in the second row of a vehicle involved in a high-speed frontal crash with a large-diameter tree and subsequent fire. The police reported that the child was seated in an unknown-type booster seat restrained by the vehicle's 3-point lap and shoulder seat belt system. The vehicle was a 2001 Chevrolet Impala driven by a 34-year-old male with a 44-year-old female front-right passenger, the 20-month-old male in the second-row left position, an unbelted 5-year-old female in the second row adjacent to the 20-month-old, a belted 4-year-old female in the second-row center position and an unbelted 41-year-old male in the second-row right position. Seat belt use for the driver and front-right passenger are unknown. The police reported that the driver of the Chevrolet was driving under the influence of drugs on a revoked license. While traveling on a divided highway in a 113 km/h (70 mph) speed zone, the driver lost control and the Chevrolet departed the westbound lanes onto the roadside, where the front plane struck a tree. A fire broke out in the engine compartment. Passersby removed the three child passengers from the vehicle. The 20-month-old was deceased; the other child passengers sustained incapacitating injuries and were hospitalized. The three adults remained in the vehicle and were deceased. The vehicle was towed from the scene.			
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Special Crash Investigations
Remote Child Restraint System/Fire Crash Investigation
Case Number: CR19039
Vehicle: 2001 Chevrolet Impala
Location: Florida
Crash Date: My 2016

Background

This remote investigation documents the involvement of a 20-month-old male restrained in a child restraint system (CRS) in the second row of a vehicle involved in a high-speed frontal crash into a large-diameter tree and the subsequent fire (Figure 1).



Figure 1. On-scene image of the final rest position of the Chevrolet and the struck tree. (Image provided by the investigating law enforcement agency)

The police reported that the child was seated in an unknown-type booster seat and restrained by the vehicle's 3-point lap and shoulder seat belt system. The vehicle was a 2001 Chevrolet Impala driven by a 34-year-old male, with a 44-year-old female front-right passenger, the 20-month-old male in the second-row left position, a 5-year-old female unbelted in the second-row adjacent to the 20-month-old, a belted 4-year-old female in the second-row center position, and an unbelted 41-year-old male in the second-row right position. Seat belt use for the driver and front-right passenger is unknown. The police reported that the Chevrolet driver was driving under the influence of drugs on a revoked license. While traveling on a divided highway in a 113 km/h (70 mph) speed zone, the driver lost control and the Chevrolet departed the westbound lanes onto the roadside, where the front plane struck a tree. A fire ensued in the engine compartment of the Chevrolet. Passersby stopped at the crash site and used a tire iron to disintegrate the left-rear door window to open the left-rear door to remove the second-row occupants. One of the passersby used a knife to cut the seat belt webbings to remove the three children. The police reported that the second-row left child positioned in the booster seat was fatally injured at the

scene. The 4- and 5-year-old female passengers were transported to a hospital with incapacitating (A-level) injuries and transferred to a regional pediatric trauma center, where they were admitted for treatment. The three adult occupants sustained fatal injuries due to the crash severity and the ensuing fire that consumed the occupant compartment of the Chevrolet. The vehicle was towed from the scene.

This crash was identified through a search of the Fatality Analysis Reporting System (FARS) for fatal crashes involving vehicle fires and children restrained in CRSs. The police crash report (PCR) was forwarded to the SCI team at Crash Research and Analysis, Inc., in September 2019 by NHTSA's Crash Investigation Division. The SCI team initiated contact with the investigating police agency and obtained a detailed report of the crash, witness statements, and digital images. Autopsy reports and hospital medical records were requested for all occupants of the Chevrolet. Only the initial treating hospital complied with the SCI request for medical records. The injuries for the four fatalities were detailed in the traffic homicide report. All crash data were entered into the Crash Data Acquisition Network (CDAN).

Summary

Crash Site

The crash occurred during the day on a divided interstate highway. At the time of the crash, the National Weather Service reported the conditions as clear with a temperature of 29 °C (85 °F), 32 percent humidity, and westerly winds of 34 km/h (21 mph). The police reported that all environmental surfaces were dry. The crash occurred on the north roadside of the westbound travel lanes. Westbound travel consisted of two lanes and an acceleration/merge lane from an on-ramp located east of the crash site (Figure 2). Based on police documentation, the left westbound travel lane was 3.6 m (11.7 ft) in width, the right lane was 3.8 m (12.6 ft) in width, and the acceleration/merge lane was 3.3 m (10.9 ft) in width. The south (left) median shoulder was 1.4 m (4.5 ft) wide while the north shoulder was 2.4 (7.9 ft) wide. All travel lanes and shoulders were surfaced with asphalt. The travel lanes were straight and level in the vicinity of the crash site. The north roadside consisted of a sand/gravel mixture adjacent to the shoulder with cut grass that sloped to a shallow drainage ditch bordered by a heavily wooded area with small and large diameter trees (Figure 3). The posted speed limit was 113 km/h (70 mph). A crash diagram is included at the end of this report.



Figure 2. Westbound view of the travel lanes of the interstate roadway. (Image provided by the investigating law enforcement agency)



Figure 3. Westbound view of the Chevrolet's roadside departure. (Image provided by the investigating law enforcement agency)

Pre-Crash

The driver of the Chevrolet was traveling in west in the right through lane of the divided interstate at a minimum speed of 103 km/h (64 mph) as computed by the police. The Chevrolet drifted to the right for unknown reasons and traversed the acceleration lane onto the shoulder before exiting the paved surfaces onto the roadside. Rotating tracking tire marks identified the trajectory of the vehicle across the grass roadside (Figure 4). The police documented approximately 46 m (150 ft) of left- and right-side tire marks that traveled through the shallow drainage ditch. The tires furrowed into the soft soil of the ditch without altering the trajectory of the vehicle. There was no evidence to support corrective actions of braking or steering by the driver.



Figure 4. Westerly view of the off-road trajectory of the Chevrolet on the grass roadside. (Image provided by the investigating law enforcement agency)

Crash

The front plane of the Chevrolet initially contacted several trees of small diameter (Event 1) as it continued forward (Figures 5 and 6). The frontal plane then struck a large-diameter tree (Event 2) that resulted in a force direction of 12 o'clock. The impact produced severe frontal crush that appeared to have involved the windshield header of the vehicle, indicating crush extending to a collision deformation classification (CDC) zone of 6. The Chevrolet rotated counterclockwise and rebounded slightly as the back plane, left aspect contacted a small-diameter tree as it came to final rest (Event 3). Due to the severity of the crash, a fire ensued that ultimately consumed the entire vehicle (Event 4).



Figure 5. Westerly view of the Event 1 impact with small diameter trees. (Image provided by the investigating law enforcement agency)



Figure 6. Westbound view of the Events 2, 3 and 4. (Image provided by the investigating law enforcement agency)

Post-Crash

The Chevrolet rebounded slightly and came to final rest close to the large-diameter tree (Figure 7). Passersby saw the crash site, stopped, and called the emergency response system. Several approached the vehicle to offer assistance; one retrieved a tire iron and disintegrated the left-rear door window to unlock the door to gain access to the passenger compartment. Another used a knife to cut the seat belt webbing of the second-row left and center child passengers. All three child passengers were removed from the vehicle and carried to a safe distance from the Chevrolet. The second-row left male child was administered cardiopulmonary resuscitation; however, it was determined that he was deceased.



Figure 7. Northeasterly view of the final rest position of the Chevrolet. (Image provided by the investigating law enforcement agency)

Another passerby attempted to suppress the vehicle fire with a dry compound fire extinguisher; however, the fire became too intense and he had to back away from the Chevrolet and wait for the arrival of the police and firefighters. Once on-scene, the firefighters extinguished the fire; however, the fire had consumed all combustible materials of the vehicle. Emergency medical personnel attended to the injured female child passengers and prepared them for medical transport to a regional trauma center. The three adult occupants remained in the vehicle and died due to crash-related injuries. Their bodies were later removed and transported for autopsy. The Chevrolet was subsequently towed from the scene.

2001 Chevrolet Impala

Description

The vehicle was a 2001 Chevrolet Impala 4-door sedan identified by Vehicle Identification Number 2G1WF52E619xxxxxx. The powertrain was a transverse-mounted 3.4-liter, V-6, gasoline engine linked to a 4-speed automatic transmission with front-wheel drive. Based on specifications, the Chevrolet was configured with power-assisted 4-wheel disc brakes with electronic brakeforce distribution and power hydraulic rack-and-pinion steering. The manufacturer's recommended tire size was P225/60R16. The fuel system was a 17-gallon high-density polyethylene fuel tank mounted to the undercarriage aft of the rear axle. The filler tube was located on the left plane aft of the axle location and concealed by a filler door.

Based on exemplar vehicle images and images of the involved vehicle, the 2001 Chevrolet had seating of five occupants (2/3) with front-row bucket seats, a rigid center console, and a second-row bench seat. The front row had adjustable head restraints for the left and right positions while the second row was equipped with three head restraints. Safety systems consisted of five manual 3-point lap and shoulder seat belt systems. Supplemental protection was provided by dual-stage driver and passenger frontal air bags. Per the Chevrolet's VIN, the vehicle was not equipped with seat-mounted side impact air bags.

Exterior Damage

The front plane of the Chevrolet initially struck and traveled through the brush at the edge of the tree line (Event 1). Although superficial damage may have occurred, any damage was masked by the subsequent tree and fire events. A CDC of 12FDEW1 was assigned for this event.

The front plane then struck the large-diameter hardwood tree (Event 2). Although the impact was centered on the vehicle, the diameter of the tree spanned all three lateral zones (left, center and right). A police image depicting the width of the direct contact damage on the hood spanned 64 cm (25.2 in). The severity of the crash displaced the frontal structure beyond the base of the windshield. The hood folded and crushed rearward, resulting in windshield header deformation. The CDC for this impact was estimated at 12FDAW6 (Figure 8).



Figure 8. Frontal damage from the Event 2 impact with the large diameter tree. (Image provided by the investigating law enforcement agency)

As the Chevrolet crushed to maximum engagement, the vehicle rotated clockwise. The back plane struck a small-diameter tree (Event 3) prior to coming to final rest. The damage was located at the left aspect of the back plane and involved the bumper and the trunk lid. The CDC for this event was 05BLEN1.

A fire ensued in the Chevrolet as it came to final rest (Event 4). Based on the post-crash rescue attempts of passersby, the fire apparently originated in the engine compartment and spread rearward as it consumed the entire vehicle, burning all exterior combustible materials and the entire interior.

Interior Damage

The interior of the Chevrolet was reduced in size by intrusion of frontal components. The specific and extent of intrusions could not be determined from the police images. The entire occupant compartment was completely consumed by the fire (Figure 9).



Figure 9. Distant image of the interior of the Chevrolet. (Image provided by the investigating law enforcement agency)

Manual Restraint Systems

Per specifications, the Chevrolet was equipped with manual 3-point continuous loop lap and shoulder seat belts for both front-row seating positions and the three second-row positions. All 3-point systems were configured with sliding latch plates. The driver's seat belt retracted onto an emergency locking retractor (ELR) while the others retracted onto switchable ELR/automatic locking retractors. Both front left and right B-pillar-mounted retractors had pretensioners. Adjustable D-rings were present for the front-row left and right positions. Seat belt use for the driver and front-right passenger is unknown. The second-row left and center child passengers were belted. The 5-year-old and 41-year-old second-row occupants were unbelted.

Supplemental Restraint Systems

As standard equipment for this Chevrolet, the driver and right-front positions were equipped with frontal air bags. Both air bags were of advanced design for the 2001 model year with dual-stage inflators. The driver's frontal air bag was mounted with the center hub of the two-spoke steering wheel rim and concealed by I-configuration module cover flaps. The passenger's frontal air bag

was mounted in the top of the right instrument panel and concealed by a single forward-hinged cover flap. The air bags were controlled by an air bag control module mounted to the floor of the vehicle under the front-right seat. This module controlled crash sensing and diagnosed functions and had Event Data Recording (EDR) capabilities. Due to the severity of the crash-induced fire and the remote nature of this investigation, air bag deployment and pretensioner actuation could not be determined. The vehicle's EDR was not imaged by the investigating police jurisdiction.

2001 Chevrolet Impala Occupants

Driver Demographics

Age/sex: 34 years/male
 Height: Unknown
 Weight: Unknown
 Eyewear: Unknown
 Seat type: Forward-facing bucket seat
 Seat track position: Unknown
 Manual restraint usage: Unknown
 Usage source: Police crash report
 Air bags: Frontal, unknown if deployed due to fire
 Alcohol/drug data: BAC=0; positive for delta-9 carboxy THC (7.4 ng/mL), delta-9 THC (0.93 ng/mL, and cocaine (216 ng/mL)
 Egress from vehicle: Fatal prior to removal by firefighters
 Transport from scene: Medical examiner
 Type of medical treatment: None

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Ring fracture of skull base	150206.4	Tandem IPC Initial: Front – Windshield Secondary: Exterior of Occupant’s Vehicle – Hood	Possible
2	Laceration of brain, NFS	140688.3	Tandem IPC Initial: Front – Windshield Secondary: Exterior of Occupant’s Vehicle – Hood	Possible
3	Right femur fracture, NFS	853000.3	Isolated IPC Front – Left lower instrument panel (includes knee bolster)	Possible
4	Left femur fracture, NFS	853000.3	Isolated IPC Front – Left lower instrument panel (includes knee bolster)	Possible
5	Right tibia fracture, NFS	854000.2	Isolated IPC Front – Left lower instrument panel (includes knee bolster)	Possible

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
6	Left tibia fracture, NFS	854000.2	Isolated IPC Front – Left lower instrument panel (includes knee bolster)	Possible
7	Right fibula fracture, NFS	854441.2	Isolated IPC Front – Left lower instrument panel (includes knee bolster)	Possible
8	Left fibula fracture, NFS	854441.2	Isolated IPC Front – Left lower instrument panel (includes knee bolster)	Possible
9	*Thermal burns, NFS	912032.6	Isolated IPC Non-contact Injury – Fire in vehicle	Certain

Source: traffic homicide report. * On-scene police images.

Driver Kinematics

Due to the remote nature of this investigation, the limited interior images of the Chevrolet, the severity of damage to the vehicle, as well as the post-crash fire, specific factors relating to the driver’s seat position, manual and supplemental restraint use, and injury sources cannot be determined with certainty.

The police investigation could not determine if the driver was restrained by the manual seat belt system or if the supplemental frontal air bag system deployed. At impact with the tree, the frontal interior components intruded into the driver’s position and the hood folded rearward against the windshield and into the windshield header. The driver would have initiated a forward trajectory in response to the 12 o’clock direction of force and loaded the frontal air bag (if deployed) and the intruding steering assembly with his torso. His head possibly struck the windshield and deformed hood that was backed by the struck tree, causing the ring fracture of the skull and the brain lacerations. His lower extremities possibly engaged the intruding lower instrument panel. As a result of these contacts, the driver sustained bilateral fractures of the femurs and bilateral fractures of the tibia and fibulas. His body sustained extensive thermal burns from the post-crash fire.

The driver came to rest slumped against the left-front door with his head between the B-pillar and the seatback. His body was removed from the vehicle and transported to the medical examiner for autopsy. Although requested, the autopsy report was not obtained.

Front-Row Right Occupant Demographics

Age/sex: 44 year/female
 Height: Unknown
 Weight: Unknown
 Eyewear: Unknown
 Seat type: Forward-facing bucket seat
 Seat track position: Unknown
 Manual restraint usage: Unknown
 Usage source: Police crash report
 Air bags: Front available, unknown if deployed
 Alcohol/drug data: BAC=0.0; positive for cocaine, butalbital, hydrocodone
 Egress from vehicle: Fatal prior to removal by firefighters
 Transport from scene: Medical examiner
 Type of medical treatment: None

Front-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Transection of thoracic aorta	420210.5	Isolated IPC Front – Right instrument panel	Possible
2	Amputation of right leg above knee	811002.4	Isolated IPC Front – Right lower instrument panel (includes knee bolster)	Probable
3	Fragmentation of heart, NFS	441008.3	Isolated IPC Front – Right instrument panel	Probable
4	Partial avulsion of brain, NFS	140688.3	Isolated IPC Front – Right instrument panel	Possible
5	Separation of skull base from cervical spine	650208.3	Isolated IPC Front – Right instrument panel	Possible
6	Fractures to skull, NFS	150000.2	Isolated IPC Front – Right instrument panel	Possible
7	Fracture of all ribs in thoracic cage	450203.3	Isolated IPC Front – Right instrument panel	Possible

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
8	Extensive thermal burns, NFS	912032.6	Isolated IPC Non-contact Injury – Fire in vehicle	Certain
9	Thoracoabdominal blunt trauma injuries, NFS	410099.1	Isolated IPC Front – Right instrument panel	Possible
10	Thoracoabdominal blunt trauma injuries, NFS	510099.1	Isolated IPC Front – Right instrument panel	Possible

Source: traffic homicide report.

Front-Row Right Occupant Kinematics

Similar to the driver, the seat position and manual and supplemental restraint use of the front-row right occupant was reported by the police as unknown. This was compounded by the severity of the crash and the post-crash fire that consumed the vehicle.

At impact with the tree, the front-row right occupant was displaced forward in response to the frontal crash forces. If the frontal air bag deployed, she would have loaded through the air bag due to the severity of the crash and engaged the intruding instrument panel. Her possible contact with the intruding instrument panel resulted in fractures of all ribs, transected thoracic aorta, fragmentation of the heart, and thoracoabdominal blunt trauma. Her head possibly flexed forward and contacted the upper instrument panel resulting in skull fractures with a partial avulsion of the brain and separation of the skull from the cervical spine. This occupant also sustained an amputation of the right leg above the knee from possible capture and loading of the intruding lower instrument panel.

The front-row right occupant sustained extensive thermal burns from the post-crash fire. Images provided by the police indicated that the occupant came to final rest slumped forward and left of her seated position. Her body was removed from the vehicle for autopsy.

Second-Row Left Child Occupant Demographics

Age/sex: 1 year (20 months)/male
Height: Unknown
Weight: Unknown
Eyewear: Unknown
Seat type: Forward-facing bench seat
Seat track position: Fixed
Manual restraint usage: 3-point lap and shoulder seat belt in an unknown type booster CRS
Usage source: Police crash report
Air bags: None available
Alcohol/drug data: None
Egress from vehicle: Fatal prior to removal by passersby

Transport from scene: Medical examiner
 Type of medical treatment: None

Second-Row Left Child Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Left temporal lobe maceration, NFS	140688.3	Isolated IPC Interior – Other seating position seatback	Possible
2	Subdural hemorrhage, NFS	140650.3	Isolated IPC Interior – Other seating position seatback	Possible
3	Subarachnoid hemorrhage, NFS	140693.2	Isolated IPC Interior – Other seating position seatback	Possible
4	Multiple skull fractures, NFS	150000.2	Isolated IPC Interior – Other seating position seatback	Possible
5	Lung contusions, NFS	441402.3	Isolated IPC Primary: Interior – Other seating position seatback Alternate: Interior – Shoulder portion of belt restraint	Possible
6	Bladder laceration, NFS	540620.2	Isolated IPC Interior – Shoulder portion of belt restraint	Possible
7	Subgaleal hemorrhage, NFS	110402.1	Isolated IPC Interior – Other seating position seatback	Possible

Source: traffic homicide report.

Second-Row Left Child Occupant Kinematics

The second-row left child occupant was police-reported to have been seated in an unknown type booster seat and restrained by the vehicle’s manual seat belt system. The booster seat was consumed by the fire. The CRS type was conveyed to the police by passersby who removed the child passenger from the vehicle. It is also unknown how the manual 3-point lap and shoulder belt was positioned to restrain the child passenger in the vehicle.

The child occupant responded to the severe frontal crash forces by moving forward. He probably initially loaded the manual seat belt system and then slid out from the shoulder belt webbing if it was positioned across his torso. Lap belt loading possibly caused the bladder laceration. His head possibly struck the back surface of the left front seatback, causing multiple skull fractures, subarachnoid hemorrhage, and subgaleal hemorrhage. The occupant also sustained lung contusions that possibly resulted from the left front seatback and/or the shoulder belt webbing.

Passersby stopped at the crash site, opened the left-rear door, and removed the second-row left child occupant from the vehicle. He was unresponsive. EMS personnel arrived on scene and determined he was deceased. His body was transported to the medical examiner's office for autopsy.

Second-Row Other (Between Left and Center) Occupant Demographics

Age/sex: 5 years/female
 Height: Unknown
 Weight: 22 kg (48 lb)
 Eyewear: Unknown
 Seat type: Forward-facing bench seat
 Seat track position: Fixed
 Manual restraint usage: None
 Usage source: Police crash report
 Air bags: None available
 Alcohol/drug data: None
 Egress from vehicle: Removed by passersby
 Transport from scene: Ambulance to a local emergency room then transferred to a pediatric trauma center
 Type of Medical treatment: Admitted for treatment of her injuries

Second-Row Other (Between Left and Center) Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Multifocal pulmonary contusions throughout right upper, middle, and lower lobes; left lower lobe posteriorly	441412.4	Isolated IPC Interior – Other seating position seatback	Possible
2	Lacerations with secondary post-traumatic pneumatoceles noted in right upper lobe medially and posteriorly	441431.3	Isolated IPC Interior – Other seating position seatback	Possible
3	Trace right apical right pneumothorax	442202.2	Isolated IPC Interior – Other seating position seatback	Possible
4	Moderately sized anterior mediastinal hematoma	442202.2	Isolated IPC Interior – Other seating position seatback	Possible

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
5	Grade 1 hepatic laceration	541822.2	Isolated IPC Interior – Other seating position seatback	Possible
6	Minimally comminuted and nearly transverse fracture involving the distal diaphysis of the left femur	853271.3	Isolated IPC Interior – Other seating position seatback	Possible
7	Minimally comminuted and nearly transverse fracture involving the distal diaphysis of the right femur	853271.3	Isolated IPC Interior – Other seating position seatback	Possible
8	Complete and nearly transverse proximal fracture involving the mid diaphysis of the left tibia	854251.2	Isolated IPC Interior – Other seating position seatback	Possible
9	Complete and nearly transverse proximal fracture involving the mid diaphysis of the left fibula	854471.2	Isolated IPC Interior – Other seating position seatback	Possible
10	Right scalp laceration, 0.5 cm	110602.1	Isolated IPC Interior – Other seating position seatback	Possible
11	Right scalp hematoma	110402.1	Isolated IPC Interior – Other seating position seatback	Possible
12	Abrasions to right forehead	210202.1	Isolated IPC Interior – Other seating position seatback	Possible

Source: emergency room records.

Second-Row Other (Between Left and Center) Occupant Kinematics

This 5-year-old female occupant was reported by the police to have been seated in the second row between the left and center occupants. There was no seat belt available for this position. In response to the severe frontal crash forces, this child occupant initiated a forward trajectory and possibly engaged the back of the driver's seatback. As a result of her contact, she sustained

thoracic and abdominal internal injuries, bilateral femur fractures, left tibia fracture, and soft tissue injuries of the scalp and forehead.

Following the crash, passersby stopped at the crash site and forcibly opened the left-rear door as the fire began to involve the vehicle. They removed this occupant and carried her to a safe distance from the vehicle. She was transported by ambulance to the emergency room of a local hospital where she was evaluated and prepared for transfer to a pediatric trauma center where she was admitted for treatment of her injuries. Medical records from the ER hospital were obtained; however, the trauma center did not comply with the SCI request for her records at that facility.

Second-Row Center Child Occupant Demographics

Age/sex: 4 years/female
 Height: Unknown
 Weight: 17 kg (17 lb)
 Eyewear: Unknown
 Seat type: Forward-facing bench seat
 Seat track position: Fixed
 Manual restraint usage: Seat belted
 Usage source: Police crash report
 Air bags: None available
 Alcohol/drug involvement: Not reported
 Egress from vehicle: Removed by passersby
 Transport from scene: Ambulance to a local hospital emergency with transfer to a pediatric trauma center
 Type of medical treatment: Admitted for treatment of her injuries

Second-Row Center Child Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence
1	Pulmonary contusions – both left lobes	441408.3	Isolated IPC Interior – Shoulder portion of belt restraint	Possible
2	Tiny apical left pneumothorax	442202.2	Isolated IPC Interior – Shoulder portion of belt restraint	Possible
3	Open left proximal humerus fracture, metaphysis	751152.3	Isolated IPC Interior – Other seating position seatback	Possible
4	Right distal femur fracture of distal femoral metaphysis extending through physis and lateral epiphysis	853371.3	Isolated IPC Interior – Other seating position seatback	Possible

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence
5	Fracture of right inferior pubic ramus, pubic symphysis diastases, 1.9 cm	856151.2	Isolated IPC Interior – Other seating position seatback	Possible
6	Soft tissue injury involving right periurethral area	510402.1	Isolated IPC Caused by other injury – Injury #5	Possible

Source: emergency room records.

Second-Row Center Child Occupant Kinematics

The second-row center child occupant was reported by police as restrained by the manual 3-point seat belt system. This was relayed to police from the passersby who removed the child occupant from the vehicle. Based on an inspection of an exemplar vehicle, the shoulder belt was located to the right of this seat position; therefore, it would have extended over the child occupant's right shoulder had she been wearing the seat belt properly.

At impact, this child occupant would have initiated a forward trajectory and loaded the seat belt system if it was properly worn and adjusted to her stature. Her possible loading of the shoulder belt webbing caused left pulmonary contusions and a left pneumothorax. Due to the severity of the crash, this occupant possibly contacted the front seatbacks, resulting in a left humerus fracture, a right distal femur fracture, a pubic ramus fracture, and a soft tissue injury of the right periurethral area.

According to passersby, they used a tire iron to open the left-rear door of the Chevrolet and removed the child occupants. This occupant was the third of three to be removed. She was found behind the final rest position of the second-row right adult occupant who was unrestrained. This child occupant was transported by ambulance to the emergency room of a local hospital, evaluated and prepared for transfer to a pediatric trauma center.

Second-Row Right Occupant Demographics

Age/sex: 41 years/male
Height: Unknown
Weight: Unknown
Eyewear: Unknown
Seat type: Forward-facing bench seat
Seat track Position: Fixed
Manual restraint usage: None
Usage source: Police crash report
Air bags: None available
Alcohol/drug data: Not reported
Egress from vehicle: Fatal prior to removal by firefighters

Transport from scene: Medical examiner
 Type of medical treatment: None

Second-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Laceration to lungs, NFS	441414.3	Isolated IPC Interior – Other seating position seatback	Possible
2	Right hemothorax	442200.3	Isolated IPC Interior – Other seating position seatback	Possible
3	Contusion to lungs, NFS	441402.3	Isolated IPC Interior – Other seating position seatback	Possible
4	Multiple serial rib fractures, NFS	450210.2	Isolated IPC Interior – Other seating position seatback	Possible
5	Liver laceration, NFS	541820.2	Isolated IPC Interior – Other seating position seatback	Possible
6	Liver contusion, NFS	541810.2	Isolated IPC Interior – Other seating position seatback	Possible
7	Right femur fracture, NFS	853000.3	Isolated IPC Interior – Other seating position seatback	Possible
8	Left femur fracture, NFS	853000.3	Isolated IPC Interior – Other seating position seatback	Possible
9	Right tibia fracture, NFS	854000.2	Isolated IPC Interior – Other seating position seatback	Possible
10	Left tibia fracture, NFS	854000.2	Isolated IPC Interior – Other seating position seatback	Possible
11	Right fibula fracture, NFS	854441.2	Isolated IPC Interior – Other seating position seatback	Possible

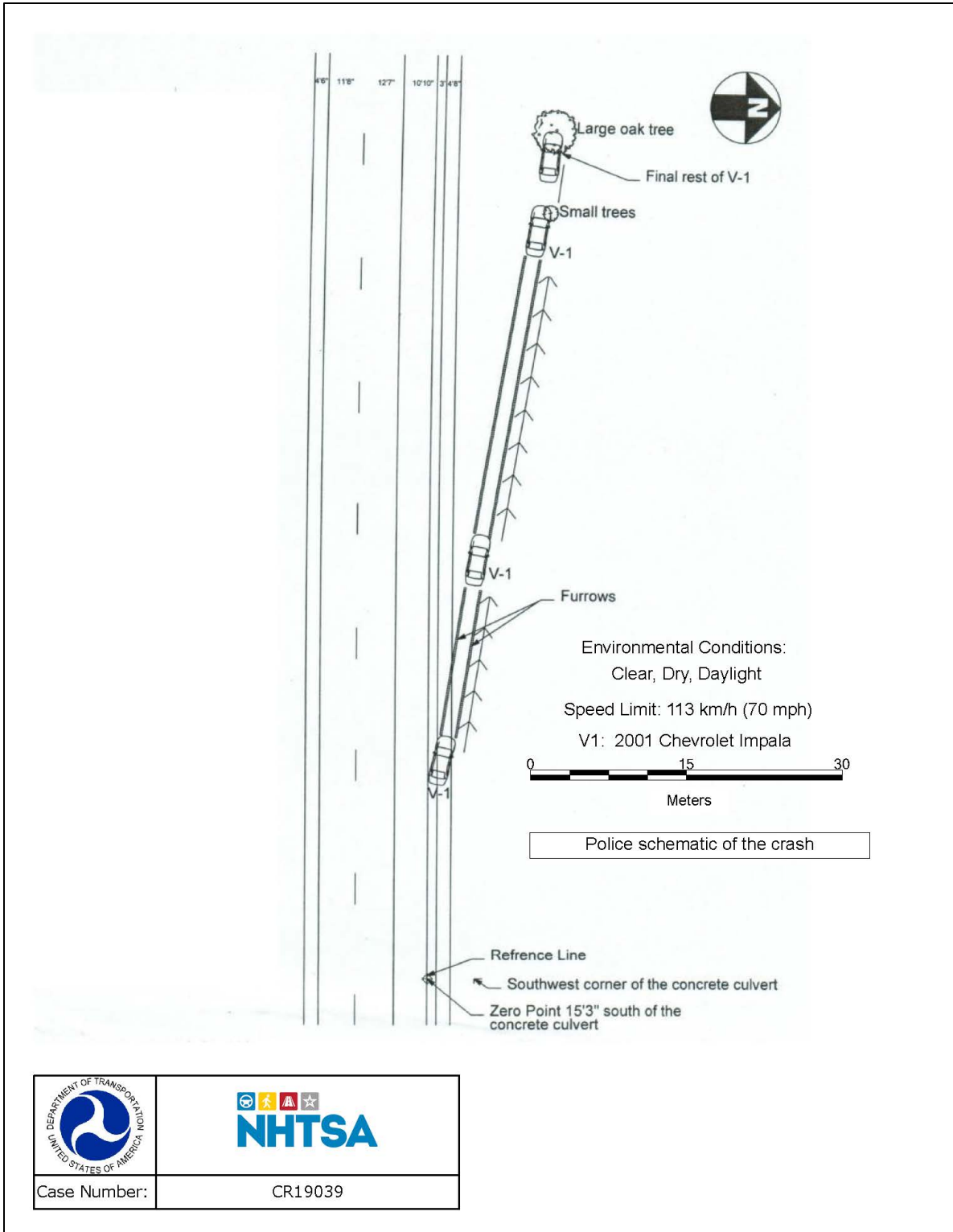
Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
12	Left fibula fracture, NFS	854441.2	Isolated IPC Interior – Other seating position seatback	Possible
13	Right humerus fracture, NFS	751100.2	Isolated IPC Interior – Other seating position seatback	Possible
14	Left humerus fracture, NFS	751100.2	Isolated IPC Interior – Other seating position seatback	Possible
15	Right radius fracture, NFS	752800.2	Isolated IPC Interior – Other seating position seatback	Possible
16	Left radius fracture, NFS	752800.2	Isolated IPC Interior – Other seating position seatback	Possible
17	Right ulna fracture, NFS	753200.2	Isolated IPC Interior – Other seating position seatback	Possible
18	Left ulna fracture, NFS	753200.2	Isolated IPC Interior – Other seating position seatback	Possible
19	Fracture of mandible, NFS	250600.1	Isolated IPC Interior – Other seating position seatback	Possible
20	Thermal burns involving head, trunk, extremities, NFS	912032.6	Isolated IPC Non-contact Injury – Fire in vehicle	

Source: traffic homicide report.

Second-Row Right Occupant Kinematics

The second-row right adult occupant was reported by police as unbelted. In response to the severe frontal crash forces, he initiated a forward trajectory and possibly loaded the right-front seatback. He sustained a fractured mandible, multiple rib fractures, lacerations and contusions of the lungs and liver, a right hemothorax, and long bone fractures of the extremities. He was unable to exit the vehicle and sustained thermal burns of the head, torso, and extremities. His body was removed from the vehicle and transported to the medical examiner for autopsy.

Crash Diagram



DOT HS 813 157
July 2021



U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**



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