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DISCLAIMER

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15. Supplementary Notes

Each crash represents a unique sequence of events, and generalized conclusions cannot be made concerning the crashworthiness performance of the involved vehicle(s) or their safety systems. This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.

16. Abstract

This report documents the remote vehicle fire/child restraint system investigation of a post-crash fire in a 1998 Nissan Altima involved in a single-vehicle crash and the child occupant seated in a CRS. The Nissan was being driven by a 32-year-old male. The front-row right seat was occupied by a 25-year-old female. The second-row left seat was occupied by a 3-year-old male in a CRS. The second-row right seat was occupied by a 9-year-old female. The Nissan was traveling westbound in the second lane from the right at a police-estimated speed of 113 km/h (70 mph). The driver made a turning maneuver and lost control of the vehicle. The vehicle rotated counterclockwise, entered the center median, and struck a metal guardrail with its right plane. After the driver and the second-row occupants were extricated, the vehicle became fully engulfed in flames. The driver and the front-row passenger were fatally injured. The 3-year-old second-row left occupant sustained "B" (other visible) injuries. He was transported by an ambulance to a local hospital. It is not known if he was hospitalized. The 9-year-old second-row right occupant sustained "A" (severe) injuries. She was transported by an ambulance to a local hospital. It is not known if she was hospitalized.

17. Key Words	18. Distribution Statement
Vehicle fire, child restraint system, fatality	Document is available to the public from the National Technical Information Service, www.ntis.gov.

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Remote Vehicle Fire/Child Restraint System Investigation
Case Number: DS19016
Vehicle: 1998 Nissan Altima
Location: California
Crash Date: July 2016

BACKGROUND

This report documents the remote vehicle fire/child restraint system (CRS) investigation of a post-crash fire in a 1998 Nissan Altima (**Figure 1**) involved in a single-vehicle crash and the child occupant of the Nissan who was seated in a CRS. The investigation was intended to determine the events leading to the fire, how quickly the fire spread to the occupant compartment, the magnitude of the fire, how quickly EMS and other responders arrived on scene, occupant restraint usage, demographics, injury data, and CRS data. The crash was identified during a review of Fatality Analysis Reporting System (FARS) crash reports. The criteria for the crash type include an impact not involving the rear plane, fire which spreads to the occupant compartment, and at least one occupant seated in a CRS. The Special Crash Investigations (SCI) team obtained the on-scene images.[1] The case was initiated by the SCI group of the National Highway Traffic Safety Administration in July 2019.

Figure 1. The 1998 Nissan Altima (police photo).

The crash occurred during the afternoon hours in July 2016 in an unincorporated area of California. The crash site was a two-lane divided east/west state highway. At the crash location, the roadway was oriented north/south. The curved roadway consisted of two lanes in both directions that were initially separated by a paved asphalt median. To the west, the median was separated by a metal guardrail. The posted speed limit was 89 km/h (55 mph). The Nissan was being driven by a 32-year-old male. The front-row right seat was occupied by a 25-year-old female. The second-row left seat was occupied by a 3-year-old male seated in a CRS. The second-row right seat was occupied by a 9-year-old female. The Nissan was traveling westbound in the second lane from the right at a police-estimated speed of 113 km/h (70 mph). The driver made a turning maneuver for unknown reasons and lost control. The vehicle began a counterclockwise rotation, entered the center median, and struck the metal guardrail with its right plane. A few minutes after the crash, the vehicle caught fire. After the driver and the second-row occupants were extricated, the vehicle became fully engulfed in flames. The driver and the front row passenger were fatally injured. The 3-year-old second-row left occupant sustained “B” (other visible) injuries that included minor lacerations to the face and head. He was transported by an ambulance to a local hospital. It is not known if he was hospitalized. The 9-year-old

[1] Obtained 23 out of 38 images from the police. The remaining image files were corrupted and not available.

second-row right occupant sustained “A” (severe) injuries that included C6/C7 fractures, bilateral pelvic fractures, and multiple lacerations. She was transported by an ambulance to a local hospital.

SUMMARY

Crash Site

This single-vehicle crash occurred in July 2016 in an unincorporated area of California. The crash site was a two-lane, divided, east/west State highway (**Figure 2**). The roadway was oriented north/south at the crash location. The curved asphalt roadway consisted of two lanes in both directions that were initially separated by a paved asphalt median. As the roadway approached the overpass, the concrete overpass structure was protected by a bullnose style metal guardrail end terminal. All the travel lanes were approximately 3.8 m (12.5 ft) wide. The southbound lanes were bordered to the left by solid double yellow lines and to the right by a solid white fog line and a paved 2.4 m (7.9 ft) asphalt shoulder. At the crash location, the roadway was straight and mostly level. There were no rumble strips present. The roadway transitioned from a right curve to the straight section 143.5 m (470.8 ft) north of the impact area. The speed limit was 89 km/h (55 mph).

Figure 2. Southbound approach (Google Earth image).

The weather at the nearest reporting station was 26.6 C° (80 F°), 30 percent humidity, clear visibility, and winds were out of the north at 16 km/h (10 mph). A crash diagram is included at the end of this report.

Pre-Crash

This Nissan was traveling northbound at an SCI-calculated speed of 123 km/h (77 mph).[2] The driver was operating under the influence of alcohol, amphetamines, and THC. After negotiating the curve, it appears that the vehicle traveled first to the left and then back to the right before the driver overcorrected again to the left and lost control. The vehicle began a counterclockwise rotation, crossed the adjacent travel lane, rotated past 90 degrees, and entered the center median. It traveled approximately 63 m (208 ft) while skidding and rotating. The speed loss from rotation was approximately 82 km/h (51 mph).

Crash

After entering the center median, the vehicle traveled approximately 31 m (101 ft) before impacting the end terminal with its right plane. The end terminal displaced the right doors and intruded into the passenger compartment.

[2] Calculated using 186 m (612 ft) radius of skid mark and 0.65 coefficient of friction.

Post-Crash
The front-row passenger was mechanically restrained in the vehicle. The driver and the second-row occupants were extricated by passersby. In a few minutes after the crash, the vehicle caught fire. The driver and the front-row passenger were fatally injured. The medical examiner reported that the front-row passenger sustained burns but they were post-mortem. The 3-year-old second-row left occupant sustained "B" (other visible) injuries that included minor lacerations to the face and head. He was transported by an ambulance to a local hospital. It is unknown if he was hospitalized. The 9-year-old second-row right occupant sustained "A" (severe) injuries that included C6/C7 fractures, bilateral pelvic fractures, and multiple lacerations. She was transported by an ambulance to a local hospital.

Multiple witnesses and passersby responded to the crash. One of them was able to remove the driver but noted that the right-front passenger was unresponsive and pinned in the vehicle. He began CPR on the driver. Shortly after extricating the driver, the vehicle began burning. Others arrived and extricated the second-row child occupants.

Vehicle Fire Discussion
SCI obtained a fire incident report that documented dispatch, arrival, and departure times for fire personnel. Three fire units and seven personnel were assigned to this incident. The alarm came in one minute after the crash and responders arrived on scene 10 minutes later. They found the Nissan to be fully involved in fire. One engine unit was assigned to the fire and extinguished it shortly after arrival. The other unit was assigned to medical duty and assisted in prepping the child occupants for transport. All the units departed the scene approximately one hour after arrival.

1998 NISSAN ALTIMA

Description
The 1998 Nissan Altima was a 4-door, 5-passenger sedan. The vehicle was identified by the Vehicle Identification Number 1N4DL01D0WCxxxxxx. The vehicle was equipped with a 4-cylinder, 2.4-liter, gasoline engine, 5-speed manual transmission, front disc/rear drum brakes, and front-wheel drive.

Figure 3. The 1998 Nissan Altima, right plane damage (news photo).

Exterior Damage
The Nissan sustained severe right plane damage from the impact with the end terminal (**Figure 3**). The direct damage included the entire right passenger compartment area. The estimated Collision Deformation Classification was 03RPEW7. The exterior and interior were extensively damaged by fire. The police attempted to conduct a mechanical evaluation but determined that the tire, braking system, electrical system, and steering wheel were either destroyed or compromised beyond inspection/test requirements.

NHTSA Recalls and Investigations
There were no related recalls or investigations for this vehicle. The most recent database query occurred in April 2020.

Interior Damage
The Nissan sustained severe damage from guardrail intrusion and the post-collision fire.

Manual Restraint Systems
The Nissan was equipped with manual lap and shoulder seat belts for all five seat positions. The police reported that the front-row and second-row right occupants were using their seat belts. The second-row left occupant was using a CRS.

Supplemental Restraint Systems
The Nissan was equipped with frontal air bags. According to the police report, there were no air bag deployments in this crash.

Child Restraint System
The 3-year-old male child in the second-row left side was seated in an unknown type CRS. It is not known if the child met the age, height, and weight parameters for this occupant or if the CRS was used correctly.

1998 NISSAN ALTIMA OCCUPANTS

Driver Demographics

Age/sex:	32 years/male
Height:	163 cm (64 in)
Weight:	78 kg (171 lbs)
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Air bags:	Frontal air bag available, did not deploy
Alcohol/drug data:	BAC = .244 g/dL BAC, positive for amphetamine, methamphetamine, THC
Egress from vehicle:	Removed by passerby
Transport from scene:	Transferred to coroner's office
Type of medical treatment:	CPR on scene. Pronounced deceased at 1703 hours on site. Reported as 1641 hours in autopsy report.

Driver Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Severe, complicated fracture of the neck with several inches of gap between bottom of head and top of cervical column	610228.5	Right front door, unknown quadrant	Possible

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
2	Complex fractures, right of center of anterior chest with a 12 cm (5 in) diameter area of concavity	450210.2	Right front door, unknown quadrant	Possible
3	Fracture, right upper arm	751100.2	Right front door, unknown quadrant Occupant 2	Possible Possible
4 5	Fracture, right tibia/fibula	854000.2 854441.2	Center console	Possible
6	Abrasion, tip and left of chin consistent with impact point caused by rapid hyperextension	210202.1	Right front door, unknown quadrant	Possible
7	Abrasion, chest	410202.1	Shoulder belt	Certain
8	Abrasion, right flank and right back	510202.1	Shoulder belt	Certain
9	Abrasion, right elbow	710202.1	Right front door, unknown quadrant	Probable
10	Contusions, left upper arm and left forearm	710402.1	Unknown	Unknown
11	Abrasions, right lower leg	810202.1	Center console	Probable
12	Abrasions, left lower leg	810202.1	Unknown	Unknown
	Soot on body but no signs of burn			

Source: autopsy report.

Driver Kinematics

The 32-year-old male driver was belted and seated in an unknown posture. Prior to the crash, he was actively braking and steering. As the vehicle rotated counterclockwise he was displaced to the right. At impact, he was displaced sharply to the right. He likely contacted the right door and probably the intruding guardrail.

Front-Row Right Occupant Demographics

Age/sex:	25 years/female
Height:	147 cm (58 in)[3]
Weight:	77 kg (170 lbs)
Eyewear:	Unknown
Seat type:	Bucket
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Air bags:	Frontal air bag available, did not deploy
Egress from vehicle:	Extricated due to fatal injuries/entrapped
Transport from scene:	Transferred to coroner's office
Type of medical treatment:	None. Pronounced deceased on scene at 1652 hours

Front-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Severe and immediately lethal crushing type injuries to the body, mainly to the right shoulder and most of the chest area	413000.6	Right front door, unknown quadrant	Probable

Source: autopsy report.

Front-Row Right Occupant Kinematics

The 25-year-old female front-row right occupant of the Nissan was seated in an unknown posture. According to the police report, she was using the manual lap and shoulder seat belt. Prior to impact, she would have been displaced to the right in response to the vehicle rotation. At impact, she likely engaged the intruding door and guardrail.

Second-Row Left Occupant Demographics

Age/sex:	3 year/male
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Bench with folding back
Manual restraint usage:	Unknown/CRS used
Usage source:	Passersby, police
Egress from vehicle:	Removed by passersby
Transport from scene:	Ambulance
Type of medical treatment:	Unknown

[3] Height and weight are obtained from the autopsy report. Both were markedly altered by fire.

Second-Row Left Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1 2	Minor lacerations to face and head	210600.1 110600.1	Flying glass	Probable
	Concussion	Not codeable		

Source: police report.

Second-Row Left Occupant Kinematics

The 3-month-old male second-row left occupant was seated in an unknown type CRS. It is not known how or if the CRS was anchored to the vehicle. At impact with the guardrail, he was displaced to the right. Based on available information, it would appear that the CRS stayed in place as the vehicle came to rest.

Second-Row Right Occupant Demographics

Age/sex:	9 year/female
Height:	Unknown
Weight:	Unknown
Eyewear:	Unknown
Seat type:	Bench with folding back
Manual restraint usage:	Lap and shoulder belt used
Usage source:	Police report
Egress from vehicle:	Removed by passersby
Transport from scene:	Ambulance
Type of medical treatment:	Transported, unknown if hospitalized

Second-Row Right Occupant Injuries

Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1 2	Cervical fracture, C6/C7	650216.2	Second row right door panel, unknown quadrant	Possible
3	Bilateral pelvic fractures	856100.2	Second row right door panel, unknown quadrant	Possible
4	Facial lacerations	210600.1	Flying glass	Possible

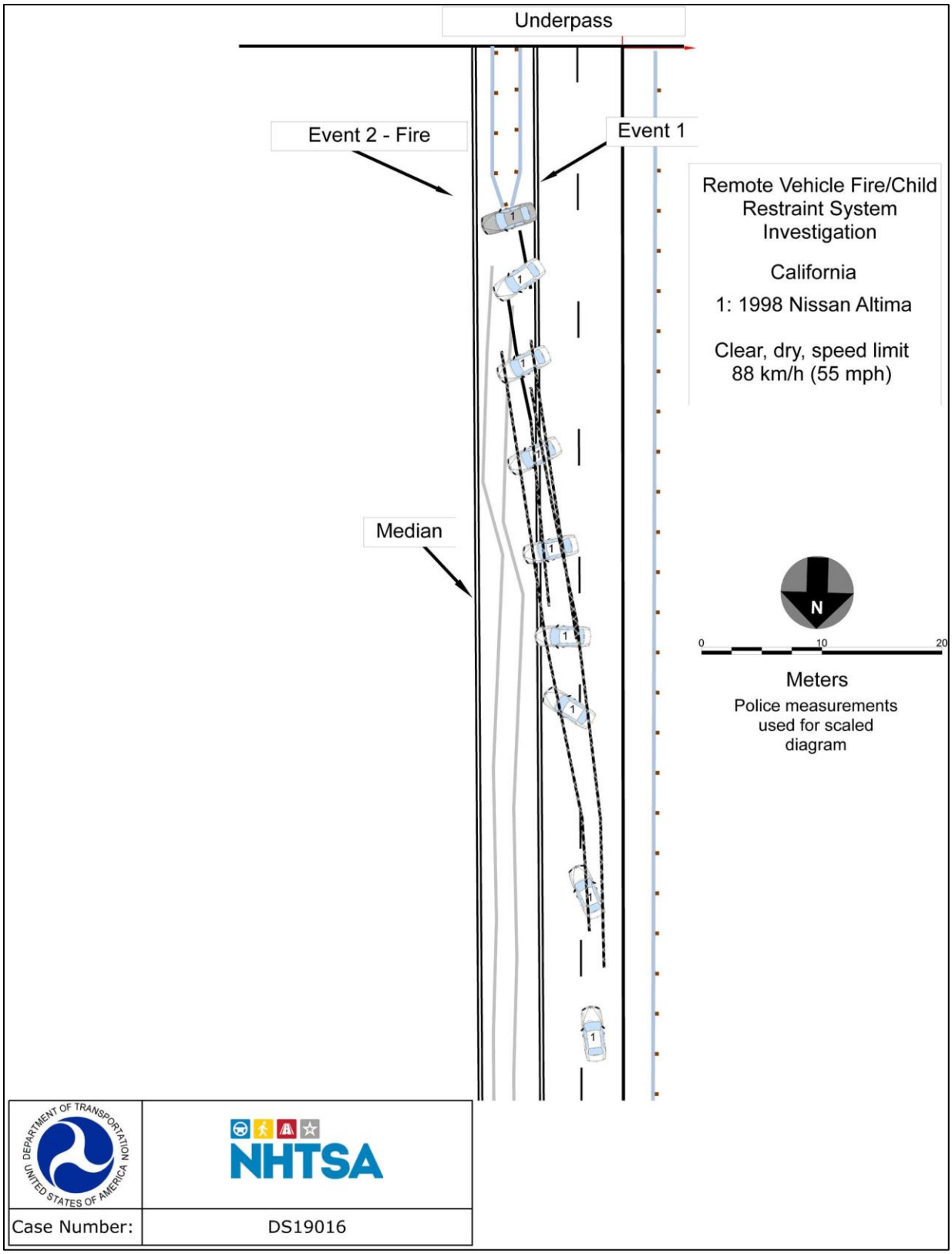
Injury No.	Injury	Injury Severity AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
5	Teeth fracture	251404.1	Second row right door panel, unknown quadrant	Possible
6	Gum laceration	243204.1	Second row right door panel, unknown quadrant	Possible

Source: police report.

Second-Row Right Occupant Kinematics

The 9-year-old female second-row right occupant of the Nissan was seated in an unknown posture. According to the police report, she was using the manual lap and shoulder seat belt. Prior to impact, she would have been displaced to the right in response to the vehicle rotation. At impact, she likely engaged the intruding doors and guardrail.

CRASH DIAGRAM



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