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Special Crash Investigations On-Site Child Restraint System Crash Investigation Vehicle: 2006 Nissan Pathfinder Location: Oregon Crash Date: January 2016

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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.

This report and associated case data are based on information available to the Special Crash Investigation team on the date this report was published.

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16. Abstract The crash occurred one evening in January 2016 on a two-lane, undivided, east/west highway in Oregon. Conditions at the time of the crash were dark and wet with snow falling. The 12-month-old occupant was seated in a rear-facing infant safety seat (ISS) in the second row right position. The Nissan was being driven westbound by a belted 42-year-old male. Other occupants in the vehicle included a belted 44-year-old female seated in the front right position and an unbelted 11-year-old female seated in the second row left position. The 2004 Ford F-250 was being driven eastbound by a belted 42-year-old male. For unknown reasons, the Ford crossed the centerline and entered the westbound lane where the two vehicles struck head-on in a narrow engagement frontal configuration. The Nissan rotated counterclockwise, overturned, and came to rest on its left side. The Ford came to rest in an upright orientation. The driver of the Nissan sustained fatal injuries and was pronounced deceased on-scene. The 11-year-old female occupant sustained serious injuries and was transported by air to a hospital. The front right occupant sustained minor injuries and the 12-month-old occupant was not injured. They were both transported by ambulance to a local hospital. The driver of the Ford sustained minor injuries and was transported by ambulance to a local hospital. Both vehicles were towed due to damage.					
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On-Site Child Restraint System Crash Investigation

SCI Case Number: DS16002

Vehicle: 2006 Nissan Pathfinder

Location: Oregon

Crash Date: January 2016

BACKGROUND

This report documents the on-site investigation of a child restraint system (CRS) used by a 12-month-old female occupant who was not injured while traveling in a 2006 Nissan Pathfinder (**Figure 1**) in which other occupants were seriously injured in a vehicle-to-vehicle crash with a 2004 Ford F-250. This crash was identified by a Dynamic Science, Inc., investigator from an online news article. The article and images of the Nissan were forwarded to the Special Crash Investigations (SCI) group of the National Highway Traffic Safety Administration in February, 2016, and the case was assigned in February, 2016. SCI inspected the Nissan and the CRS, which were located at an auto auction facility, in February, 2016. A copy of the police report and other documentation was obtained later.



Figure 1. 2006 Nissan Pathfinder

The crash occurred during an evening in January 2016 on a two-lane, undivided, east/west highway in Oregon. Conditions at the time of the crash were dark and wet with snow falling. The Nissan was being driven westbound by a belted 42-year-old male. Other occupants in the vehicle included a belted 44-year-old female seated in the front right seat position, an unbelted 11-year-old female seated in the second row left position, and a 12-month-old female using a rear-facing infant safety seat (ISS) in the second row right position. The 2004 Ford F-250 was being driven eastbound by a belted 42-year-old male.

For unknown reasons, the Ford crossed the centerline and the two vehicles struck one another head-on in a narrow engagement frontal configuration. The Nissan rotated counterclockwise, overturned, and came to rest on its left side. It was equipped with frontal air bags and seat-mounted side air bags for the front row, and combination roll-sensing/side impact inflatable curtain (IC) air bags for both rows. During the crash, both frontal air bags, both IC air bags, and the driver's seat-mounted side air bag deployed. The driver of the Nissan sustained fatal injuries and was pronounced deceased on-scene. The 11-year-old female occupant of the Nissan sustained serious injuries and was transported by air to a hospital. The front right occupant of the Nissan sustained minor injuries and the 12-month-old occupant was not injured. They were transported by ambulance to a local hospital. The driver of the Ford sustained minor injuries and was transported by ambulance to a local hospital. Both vehicles were towed due to damage.

SUMMARY

Crash Site

The crash occurred on a two-lane, undivided, east/west U.S. highway in a rural area in Oregon (**Figure 2**). The roadway was asphalt surfaced and configured with one lane for each direction of travel. The travel lanes each measured 3.7 m (12.0 ft) wide and were separated by a double solid/dashed painted stripe configured with a centerline rumble strip. The roadway was bordered by solid white painted fog lines, paved shoulders and gravel shoulders. The paved shoulders each measured 1.0 m (3.3 ft) wide and the gravel shoulders each measured 2.7 m (9.0 ft) wide. This roadway was straight with a descending negative slope of 3.5 percent in the westbound direction. The posted speed limit was 89 km/h (55 mph).



Figure 2. Crash site, looking west

The roadside consisted of unpaved ground and desert vegetation that descended slightly away from the shoulders. Scene evidence from the crash included police paint markings identifying gouge and scrape marks, tire furrow marks and the two vehicles' final rest positions. Other evidence from the crash included vehicle fluid residue on the north shoulder and a debris field consisting of parts from the Nissan. Conditions at the time of the crash as reported by the nearest weather station were temperature -0.6 °C (30.9 °F), winds south at 5.6 km/h (3.5 mph), visibility 16.0 km (10.0 mi) and partly cloudy skies. However, news reports and on-scene images indicated conditions included snow fall with accumulation on the ground. The area was dark without street lamp illumination and the rural location excluded any significant artificial ambient lighting. A crash diagram is included at the end of this report.

Pre-Crash

The Nissan was traveling westbound and the Ford was traveling eastbound. Police did not calculate or report speed for either vehicle but stated they did not suspect excessive speed for either vehicle. This conclusion was based partially on video camera recordings obtained from a non-contact vehicle following the Nissan prior to the crash. For unknown reasons, the Ford crossed over the center line and entered the westbound lane. The investigation revealed no evidence that either driver attempted evasive maneuvers such as steering or braking prior to impact.

Crash

The left front plane of the Nissan struck the left front plane of the Ford in a narrow offset configuration. The point of impact (POI) was determined to be located at the leading edge of a gouge mark documented in the westbound lane measuring 1.2 m (3.9 ft) long and 2.0 m (6.6 ft) north of the center line. Following the initial impact, the Nissan was displaced to the right and it initiated a counterclockwise rotation. The vehicle departed the roadway on the right edge and its

right side tires and rims engaged the ground with sufficient opposing lateral force to cause a right side leading trip rollover (Event 2). Gravel lodged between the right rear rim and tire suggested the trip point was on the gravel shoulder. The Nissan rolled three quarter-turns and came to rest facing south on its left side on the north shoulder of the roadway (**Figure 3**).

The Nissan came to rest 20.0 m (66.0 ft) northwest of the initial POI. The trip point was not documented and the estimated rollover distance was 14 m (46 ft).



Figure 3. 2006 Nissan Pathfinder on-scene (news image)

The Ford initiated a counterclockwise rotation and deposited two linear gouge marks in the westbound lane measuring 1.7 m (5.6 ft) and 2.8 m (9.2 ft) long, respectively. Traveling in a northeast trajectory, it departed the roadway on the north edge and came to rest facing north on the shoulder. Tire furrow marks in the gravel shoulder were determined to be the area of rest, which was located 40.0 m (131.0 ft) northeast of the POI.

For the Nissan in Event 1, the WinSMASH CDC only algorithm calculated a total delta-V of 14 km/h (9 mph) with longitudinal and lateral components of -14 km/h (-9 mph) and 0 km/h, respectively, and a barrier equivalent speed (BES) of 15 km/h (10 mph).

For the Ford in Event 1, WinSMASH calculated a total delta-V of 13 km/h (8 mph) with longitudinal and lateral components of -13 km/h (-8 mph) and 0 km/h, respectively, and a barrier equivalent speed (BES) of 12 km/h (8 mph). The reconstruction was considered to be borderline because the curb weight and CDC for the Ford were estimated.

For the Nissan in Event 2, the rollover crash type precluded a reconstruction.

Post-Crash

Police were notified a few minutes after the crash. Passersby arrived on-scene prior to emergency responders. Passersby entered the overturned Nissan through the rear hatch and removed the 12-month-old female from the CRS. They carried this occupant from the vehicle through the rear hatch. They observed the 11-year-old female occupant sustained serious injuries and did not attempt to remove her from the second row. The front right occupant of the Nissan unbuckled her seat belt and was assisted by passersby as she climbed through the front right window opening and descended to the ground. The driver of the Nissan was unresponsive and remained in his belted position until being removed later by emergency responders. He was pronounced deceased at the scene. The 11-year-old occupant was transported by helicopter to a hospital. The two remaining occupants were transported by ambulance to a local hospital. The driver of the Ford sustained minor injuries, was transported by ambulance and released. Both vehicles were towed due to damage.

2006 NISSAN PATHFINDER

Description

The 2006 Nissan Pathfinder LE was manufactured in January 2006 and identified by the Vehicle Identification Number (VIN) 5N1AR18W96Cxxxxxx. The vehicle was configured with an electronic odometer and the mileage is unknown. The Nissan was an all-wheel drive vehicle configured with a 6-cylinder 4.0-liter gasoline engine, automatic transmission, power steering, power brakes, ABS, tilt steering, and moon roof.

The vehicle manufacturer's recommended tire size was P265/65R17 with recommended cold tire pressures of 241 kPa (35 psi) front and rear. The Nissan was equipped with Wild Country Radial XTX tires of the recommended size. The front right wheel and tire were missing and not inspected. Partial data for that tire was obtained from the police report. Specific tire data was as follows:

Position	Measured Pressure	Measured Tread Depth	Restricted	Damage
LF	Unknown	Unknown	Unknown	Unknown
LR	200 kPa (29 psi)	8 mm (10/32 in)	No	None
RR	Tire flat	8 mm (10/32 in)	No	De-beaded
RF	165 kPa (24 psi)	8 mm (10/32 in)	No	None

The Nissan's interior was equipped with three rows of seating for seven occupants. The front row was configured with two bucket seats with adjustable, active head restraints. According to the manufacturer, those active head restraints move forward utilizing the force that the seat back receives from the occupant in a rear end collision. After a collision, the head restraints return to their original position. The active head restraints were likely not actuated in this crash, which included a frontal impact and rollover. The driver's seat cushion was adjusted to the mid-track position and the head restraint was adjusted to 6.0 cm (2.4 in) above the seat back. The front passenger's seat track was adjusted to the mid-track position and the head restraint was adjusted to the lowest setting.

The second row was configured with a three-position split bench seat with reclining and folding backs and adjustable head restraints. All three head restraints were in the lowest setting. The third row was configured with a two-position split bench seat folding backs and adjustable head restraints. The head restraints were in the lowest setting.

Exterior Damage

The Nissan sustained direct and induced damage to the front plane and left planes caused by the impact with the Ford. Direct damage began at the front left bumper corner and extended 60.0 cm (23.6 in) to the right. The left aspect of the bumper fascia was fractured and missing beginning at the left edge and extending 33.0 cm (13.0 in) to the right. The field L was distributed from

bumper corner to bumper corner and measured 137.0 cm (53.9 in). Direct and induced damage to the left plane began at the front left bumper corner and extended down the left side ending between the windshield header and B-pillar. Six crush measurements were taken at bumper level as follows: $C_1 = 18.0$ cm (7.0 in), $C_2 = 0$ cm, $C_3 = 1.0$ cm (0.4 in), $C_4 = 1.0$ cm (0.4 in), $C_5 = 0$ cm, $C_6 = 0$ cm. Maximum crush was located at C_1 and the Collision Deformation Classification (CDC) for the Nissan in Event 1 was 12FYAW7.

The vehicle sustained moderate severity damage to the top and left planes caused during the rollover event (**Figure 4**). Direct damage extended from roof side rail to roof side rail and measured 120.0 cm (47.2 in). The damage to the top plane extended longitudinally beginning at the leading edge of the hood and ending at the rear aspect of the roof rack. Maximum lateral crush was located at the left B-pillar and measured 12.0 cm (4.7 in). Maximum vertical crush was located on the left roof and measured 26.0 cm (10.2 in). The CDC for the Nissan in Event 2 was 00TDDO3. The OEM roof rack was fractured and displaced during the rollover. The hood was crumpled.



Figure 4. Exterior damage, 2006 Nissan Pathfinder

The front grille, front right fender and brake assembly were missing along with the wheel and tire. Both side view mirrors were displaced from the doors and the sheet metal was separated from the left front door panel. Direct damage was present on the left, top and right planes caused by the rollover. Damage to the right plane of the vehicle was relatively minor compared to front, left and top planes. The roof, left A-pillar and left B-pillar had been cut through during extrication efforts. Additionally, the windshield header and forward roof section was bent downward into the front row occupant compartment during post-crash activities.

Interior Damage

The Nissan's interior revealed damage from impact forces, deployed air bags and actuated seat belt pretensioners, occupant contacts and post-crash activities. The windshield glazing was fractured during the crash and removed during post-crash activities. The left and right side glazing for the front and third rows was disintegrated, as was the glazing at the second row left position. The moon roof was disintegrated and the metal frame was displaced and found at the crash site along with other debris which was displaced from the vehicle. The left side doors would not close following post-crash activities.

Both frontal air bags, the left seat-mounted side air bag, and both IC air bags deployed. Both front row seat belt pretensioners actuated. Occupant loading evidence was present on the seat belts for the driver, front right occupant and second row right occupant. Damage and possible occupant contact evidence was documented on the left aspect of the steering wheel rim. Blood deposits were present on the driver's frontal air bag, left seat-mounted side air bag, left IC air bag, driver's seat back and head restraint, roof and left B-pillar. The IP was fractured in the left and center sectors and the driver's door panel was fractured in multiple areas.

Vertical intrusion into the front row was documented at the left roof header (18.0 cm [7.1 in]) and middle roof header (13.0 cm [5.1 in]). Lateral intrusion was documented at the left roof side rail (9.0 cm [3.5 in]) and side panel forward of the A-pillar (23.0 cm [9.1 in]). Longitudinal intrusion was documented at the left IP (17.0 cm [6.7 in]) and left toe pan (5.0 cm [2.0 in]).

Vertical intrusion into the second row was documented at the left roof (13.0 cm [5.1 in]) (**Figure 5**), middle roof (22.0 cm [8.7 in]) and right roof (6.0 cm [2.4 in]). Lateral intrusion was documented at the left roof side rail (5.0 cm [2.0 in]) and left B-pillar (10.0 cm [3.9 in]).

Longitudinal intrusion was documented at the driver's seat back which was displaced rearward (25.0 cm [9.8 in]). Vertical intrusion into the third row was documented at the left backlight header (5.0 cm [2.0 in]).



Figure 5. Vertical intrusion of roof, 2006 Nissan Pathfinder

Manual Restraint Systems

The Nissan's interior was equipped with forward seating for seven occupants and all seats were configured with three-point lap and shoulder seat belts. The front row belts were equipped with retractor pretensioners, sliding latch plates and adjustable D-rings. The driver's belt was configured with an emergency locking retractor (ELR) and the front right occupant's belt was configured with an ELR/automatic locking retractor (ALR). The driver's D-ring was adjusted to full down and the front right occupant's D-ring was adjusted to full up. Both seat belts showed evidence of historical usage. The driver's lap and shoulder belt was used during the crash. The pretensioner was actuated with the belt locked in the used position. The webbing revealed evidence of occupant loading with scuff marks near the D-ring beginning 90.0 cm (35.4 in) above the stop button. The front right occupant's lap and shoulder belt was used during the crash. The pretensioner was actuated with the belt locked in the used position. The webbing revealed evidence of occupant loading with scuff marks near the D-ring beginning 116.0 cm (45.7 in) above the stop button.

The second row seat belts were equipped ELR/ALR and sliding latch plates. The left and right position belts were configured with adjustable D-rings adjusted to full down and full up, respectively. The center belt had an integrated retractor. All three belts showed evidence of historical usage. The left seat position was occupied by the 11-year-old female. The belt at this position showed no evidence of occupant loading and the investigating police officer indicated the occupant was unrestrained. The right seat position was occupied by the 1- year-old female restrained in the



Figure 6. Second row right seat belt, evidence of occupant loading, 2006 Nissan Pathfinder

rear-facing CRS. The CRS was installed using the vehicle's lap and shoulder seat belt. The belt and CRS shell revealed loading evidence consistent with a rear-facing installation. The belt was scuffed beginning at 20.0 cm (7.9 in) above the stop button (**Figure 6**). The CRS installation is discussed further in the *Child Restraint System* section of this report.

Supplemental Restraint Systems

The Nissan's supplemental restraint systems included frontal air bags with dual stage inflators and seat-mounted side air bags for the front row, and combination roll-sensing/side impact IC air bags for both rows. According to the owner and occupant of the vehicle, the air bags were original equipment and had not been replaced, serviced or recalled. During the crash, both frontal air bags, both IC air bags, and the driver's seat-mounted side air bag deployed.

Given the crash configuration and severity of the frontal impact followed by the rollover event, it is likely the frontal air bags, driver's seat-mounted side impact air bag and left IC air bag deployed during the first event and the right IC air bag deployed during the rollover.

The driver's frontal air bag deployed from the steering wheel hub. It was circular in shape and measured 45.0 cm (17.7 in) in diameter. The air bag was configured two vent ports on the upper aspect and two internal tethers. The lower aspect of the back panel revealed a ragged tear measuring 12.0 cm (4.7 in) long in addition to blood deposits from the driver. Given the crash configuration, it is probable the driver loaded the frontal air bag during the crash. The source of the damage was unknown. The front right occupant's frontal air bag deployed from the top right IP. The air bag measured 45.0 cm (17.7 in) x 70.0 cm (27.5 in) in its deflated state. It was configured with two vent ports, and revealed no evidence of occupant loading or damage.

The driver's seat-mounted side air bag deployed from the outboard aspect of the seat back. It was oval in shape and measured 26.0 cm (10.2 in) x 50.0 cm (19.7 in). The inboard side exhibited blood deposits from the driver. It is likely he loaded this air bag during the crash.

The left and right IC air bags deployed during the rollover from the left and right roof side rails above the three rows of occupant seating. The air bags measured 220.0 cm (86.6 in) x 57.0 cm (22.4 in) in their deflated state. At the forward aspect, they were configured with a sail and tether measuring 40.0 cm (15.7 in) and 14.0 cm (5.5 in) long, respectively. The left IC air bag was cut or torn away from the A-pillar at some time prior to inspection. It revealed blood deposits in the front row aspect from the driver. It is probable the driver loaded this air bag during the rollover. The right IC air bag was unremarkable. It is unlikely the rear-facing occupant seated in the CRS at the second row right position was contacted by the deployed right IC air bag (**Figure 7**).



Figure 7. Deployed right IC air bag, second row right seat position, 2006 Nissan Pathfinder

Child Restraint System

Graco Snugride 35

The Graco Snugride 35 CRS was a rear-facing infant safety seat (**Figure 8**) Model Number 1759689 and date of manufacture 09/03/2009. It was used by the 12-month-old female occupant of the Nissan and installed in the second row right seat position. The mother of the child was the front right occupant in the Nissan at the time of the crash. She was interviewed and provided data on the installation, adjustment, usage, and history of the CRS. The occupant obtained the CRS from a friend who had purchased it new and used it for a short time (approximately two months) for a newborn infant. The CRS had not been in prior crashes and was not previously damaged. All components were present including the instruction manual and no recalls were in effect. The Graco was configured with a 5-point harness system with buckle and retainer clip, three-level harness slots, adjustable handle, level indicator, padded cushion and removable canopy.



Figure 8. Graco Snugride 35 CRS

The occupant parameters for using the seat are as follows.

Weight: 5 to 35 lb (2.3 to 15.87 kg)

Height: 32 in (81 cm) or less

The occupant met the weight and height requirements for this safety seat.

The Nissan was configured with Lower Anchors and Tethers for CHildren (LATCH) in the second row. The two outboard seat positions were equipped with lower anchors and all three positions were equipped with upper tether anchors. All three seat positions were equipped with continuous loop lap and shoulder seat belts with sliding latch plates and ELR/ALR retractors. The Graco was historically used in multiple vehicles and just prior to the trip was removed from another vehicle and installed in the Nissan by either the driver or front right occupant. For use in the Nissan, it was installed without the stay-in-vehicle base. The CRS lower anchors of the LATCH system were part of the base, precluding the use of LATCH for this installation, so the vehicle's lap and shoulder belt were used to install the safety seat. At the time of the inspection, the base with the LATCH attachments was missing from the CRS shell and not present in the vehicle. According to the interviewee, the carry handle was in the up position and the canopy was in the stowed position.

The CRS shell and the vehicle seat belt exhibited evidence of occupant loading consistent with a seat belt installation. The police report indicated when the investigating officer arrived on-scene he observed the CRS was out of the vehicle with the shoulder harness straps were cut. The interviewee indicated the straps were cut by passersby who removed the 12-month-old occupant from the safety seat and vehicle. The investigation determined in all likelihood the lap and

shoulder seat belt was routed correctly through the rear-facing belt path using the guides located on the left and right aspects of the shell. Correct installation when using the seat belt requires the retractor to be switched to ALR mode. The mother was aware of the switchable retractor and stated it was in ALR mode. The occupant did not use the recline indicator during the installation. She indicated the child appeared to be in an appropriate recline angle based on her experience installing this and other safety seats. She indicated the CRS was installed firmly to the vehicle seat and there was no indication it moved from its original position on the vehicle seat when the vehicle came to rest on its left side after the crash.

On the day of the crash, the family made several stops during the day including a stop just minutes prior to the crash and the interviewee did not remember which occupant assisted the child into the seat following the most recent stop. She historically adjusted the harness retainer clip to armpit level and adjusted the shoulder straps snugly without excessive slack over the child's shoulders. The CRS harness shoulder straps were cut and removed from the shell during post-crash activities and the occupant did not recall specifically which set of slots (of three possible) the shoulder straps were routed through. Examination of the slots during the inspection did not reveal evidence of which slots were in use.

The vehicle seat belt webbing revealed evidence of occupant loading and the safety seat shell exhibited corresponding evidence of occupant loading. This evidence included discoloration of the plastic shell which is typically caused by stress at impact (**Figures 9 and 10**). The seat area revealed these discolored markings in the forward left and right sections as well as at the bottom edge of the right armrest. Additionally, the CRS foam was fractured at the upper aspect. No other damage was noted.



Figure 9. Graco Snugride 35 shell showing damaged areas



Figure 10. Occupant loading damage at rear-facing seat belt hook

Rollover Mitigation

Based on dynamic (moving) test results, the Nissan had a rollover rating of three stars (out of a possible five) and a 22.8 percent chance of rollover in a single-vehicle crash. The vehicle was equipped with standard all-wheel drive and ABS. The vehicle was traveling at an unknown speed when struck in a frontal crash by another vehicle traveling in the opposite direction. Following the impact, the Nissan initiated a counterclockwise rotation causing it to yaw right side leading. The right side tires engaged the ground with sufficient opposing lateral force to cause a right side leading trip rollover. The vehicle rolled three quarter-turns and came to rest off the roadway facing south on its left side. The estimated roll distance was 14 m (46 ft). Given the severity of

the initial impact and wet roadway surface, it is improbable the driver of the Nissan had control over the vehicle's speed and steering following the impact and prior to the rollover.

The vehicle was equipped with tires of the recommended size, each of the three tires present for inspection having a tread measuring 8 mm (10/32 in) in depth. Tire pressure for the left rear and right front tires was lower than recommended at the time of the inspection. The left front tire was missing and the right rear tire was flat.

NHTSA Safety Recalls and Investigations

A search revealed no active safety recalls or investigations for this vehicle.

2006 NISSAN PATHFINDER OCCUPANTS

Driver Demographics

Age/Sex: 42 years/male
Height: 175 cm (69 in)
Weight: 74 kg (163 lb)
Eyewear: Eyeglasses
Seat type: Bucket seat with adjustable head restraint
Seat track position: Middle track
Manual restraint usage: Lap and shoulder seat belt used
Usage source: Vehicle inspection, police report
Air bags: Frontal air bag, seat-mounted side air bag and IC air bag deployed
Alcohol/drug data: Unknown
Egress from vehicle: Removed while unresponsive
Transport from scene: Declared deceased on-scene
Type of medical treatment: None

Driver Injuries

Inj. No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Injuries to the head NFS	100999.9	Left A-pillar	Probable

Source: Police report and interview

Driver Kinematics

The belted 42-year-old male driver of the Nissan was seated in an upright posture and was actively steering the vehicle. At impact with the Ford, the driver's frontal and side air bag deployed, and his seat belt pretensioner actuated. He was displaced forward and left in response to the direction of force and loaded the seat belt, frontal air bag and steering wheel. It is likely the driver's head continued to be displaced forward and left, contacting the left A-pillar and causing injuries of an undetermined nature. Following the impact, the Nissan rotated counterclockwise and initiated a right side leading trip rollover. The driver was displaced first to the right, then toward the roof and finally to the left. During the rollover, the left IC air bag deployed. The driver

remained held in his seated position but came to rest against the left door panel due to the overturned orientation of the vehicle. He deposited blood on the side air bag, head restraint and roof header. The driver was removed by responders from the Nissan due to his injuries and unresponsive nature, and was pronounced deceased on-scene. The driver sustained fatal head injuries of an unknown nature. No autopsy was performed and requests for a medical examiner's report were unsuccessful.

Front Row Right Occupant Demographics

Age/Sex: 44 years/female
 Height: 165 cm (65 in)
 Weight: 73 kg (161 lb)
 Eyewear: None
 Seat type: Bucket seat with adjustable head restraint
 Seat track position: Middle track
 Manual restraint usage: Lap and shoulder seat belt used
 Usage source: Vehicle inspection
 Air bags: Frontal air bag and IC air bag deployed, seat-mounted side air bag not deployed.
 Egress from vehicle: Exited with assistance through right side window opening
 Transport from scene: Ambulance to hospital
 Type of medical treatment: Treated and released

Front Row Right Occupant Injuries

Inj. No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Abrasion, right elbow	710202.1	Right door panel	Probable
2	Laceration, minor, left knee	810602.1	Right lower IP	Probable

Source: Medical records

Front Row Right Occupant Kinematics

The belted 44-year-old female front right occupant of the Nissan was seated in an upright posture in the bucket seat. At impact with the Ford, the occupant's frontal air bag deployed and her seat belt pretensioner actuated. She was displaced forward and left in response to the direction of force and loaded the seat belt and frontal air bag. Her right elbow likely contacted the right door panel causing an abrasion and her left knee likely contacted the lower IP causing a minor laceration. Following the impact, the Nissan rotated counterclockwise and initiated a right side leading trip rollover. The occupant was displaced first to the right, then toward the roof and finally to the left. During the rollover, the right IC air bag deployed. She remained held in her seated position but came to rest leaning against the center console but held in her seat by the pretensioned seat belt. Passersby who arrived before emergency responders assisted this occupant as she exited the vehicle through the right side window opening. She was later transported by ambulance to a local hospital where she was treated and released.

Second Row Left Occupant Demographics

Age/Sex: 11 years/female
Height: 145 cm (57 in)
Weight: 47 kg (104 lb)
Eyewear: Eyeglasses
Seat type: Bench seat with folding back and adjustable head restraint
Seat track position: NA
Manual restraint usage: Lap and shoulder seat belt not used
Usage source: Vehicle inspection
Air bags: IC air bag deployed
Egress from vehicle: Exited with assistance through rear hatch
Transport from scene: Air ambulance to hospital
Type of medical treatment: Admitted for six days, discharged to home

Second Row Left Occupant Injuries

Inj. No.	Injury	AIS 2015	Involved Physical Component (IPC)	IPC Confidence Level
1	Fracture, open, left femur	853262.3	Front row seat back	Probable
2	Laceration, major, left frontal scalp and forehead	110604.2	Front row seat back	Probable
3	Abrasions, face	210202.1	Front row seat back	Probable

Source: Medical records

Second Row Left Occupant Kinematics

The unbelted 11-year-old female second row left occupant of the Nissan was seated in an upright posture on the bench seat. At impact with the Ford, the occupant was likely displaced from her seat in a forward and left trajectory in response to the direction of force. Her scalp, forehead, face and left leg likely contacted the front row left seat back, which was displaced rearward intruding longitudinally into the second row. It is probable this contact caused a major laceration extending from the frontal forehead to the left forehead, abrasions to the face and an open displaced indirect fracture of the left femur. During the rollover, the occupant was displaced first to the right, then toward the roof and finally to the left. The left IC air bag deployed and this occupant possibly loaded it at some time during the crash due to the rollover dynamics and her unbelted movement in the second row. Following the crash, she came to rest in the second row. Passersby arrived before emergency responders. They entered the vehicle through the rear hatch and observed the child to have serious injuries and therefore did not attempt to move her from her position in the vehicle. Emergency responders arrived later and moved the child from the vehicle through the rear hatch. They treated her on the ground prior to transporting her by ambulance to a local hospital. She was admitted for six days and then discharged to her home. She sought follow-up treatment of an unknown nature for the fracture injury.

Second Row Right Occupant Demographics

Age/Sex:	12 months/female
Height:	76 cm (30 in)
Weight:	10 kg (22 lb)
Eyewear:	None
Seat type:	Bench seat with folding back and adjustable head restraint
Seat track position:	NA
Manual restraint usage:	CRS with 5-point harness, installed using and lap and shoulder seat belt
Usage source:	Vehicle inspection
Air bags:	IC air bag deployed
Egress from vehicle:	Removed with assistance through rear hatch
Transport from scene:	Ambulance to hospital
Type of medical treatment:	Treated and released

Second Row Right Occupant Injuries

According to the occupant's medical records and the occupant interview, she was not injured.

Second Row Right Occupant Kinematics

The 12-month-old female occupant located in the second row right position of the Nissan was seated in a moderately reclined (angle unknown) rear-facing CRS and restrained by the 5-point harness. At impact with the Ford, the occupant was displaced forward and left in response to the direction of force loading the CRS shell and seat belt. Following the first impact, the Nissan rotated counterclockwise and initiated a right side leading trip rollover. The occupant was displaced first to the right, then toward the roof and finally to the left but remained held in place in the vehicle by the seat belt and in the CRS by harness. During the rollover, the right IC air bag deployed. There was no evidence suggesting the deployed IC air bag contacted either the CRS or occupant. Following the crash, the occupant was suspended leaning to the left and crying. Passersby arrived before emergency responders. They entered the vehicle through the rear hatch, cut the CRS harness and removed the child from the vehicle through the rear hatch.

When responders arrived this occupant was transported by ambulance to a local hospital, examined and released. She was determined to have no injuries and a Glasgow Coma Score (GCS) of 15.

2004 FORD F-250

Description

The 2004 Ford F-250 (**Figure 11**) was identified in the police report with the VIN 1FDNF21L64Exxxxxx.

The Ford was manufactured as an incomplete light truck to which an aftermarket utility box was added to the back. An on-scene image showed the utility body box assembly and racks attached to the chassis.

The vehicle was configured with a regular cab and long wheelbase, four-wheel drive, 8-cylinder 5.4-liter gasoline engine, hydraulic brakes and ABS.



Figure 11. 2004 Ford F-2 (media image)

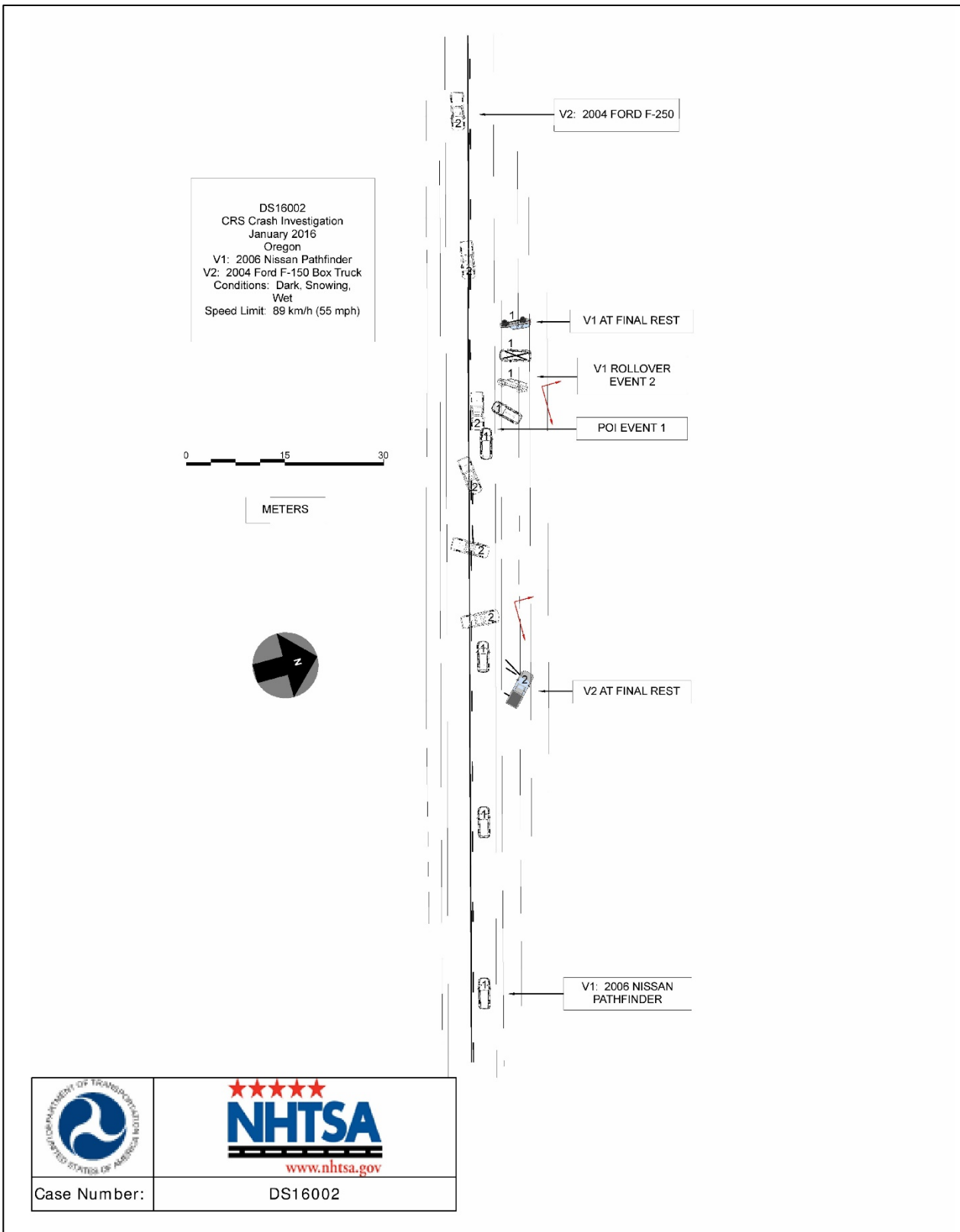
Exterior Damage

The Ford sustained moderate severity damage to the front and left planes during the impact with the Nissan in Event 1. The front bumper and left front fender were crushed, and the left front wheel and tire were displaced. The estimated CDC for the Ford in Event 1 was 12FLEE9.

Occupant Data

The driver of the Ford was a 42-year-old male. He sustained minor injuries, was transported by ambulance to a local hospital, and released.

CRASH DIAGRAM



DOT HS 812 643
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U.S. Department
of Transportation
**National Highway
Traffic Safety
Administration**

