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

NHTSA

DOT HS 812 614

September 2018

Special Crash Investigations Remote Vehicle Fire/Child Restraint System Investigation Vehicle: 2004 Lincoln LS Location: California Date: March 2012

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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.

Suggested APA Format Citation:

Dynamic Science, Inc. (2018, September). *Special Crash Investigations Remote Vehicle Fire/Child Restraint System Investigation; Vehicle: 2004 Lincoln LS; Location: California; Crash Date: March 2012* (Report No. DOT HS 812 614). Washington, DC: National Highway Traffic Safety Administration.

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT HS 812 614		

4. Title and Subtitle	5. Report Date
Special Crash Investigations Remote Vehicle Fire/Child Restraint System Investigation Vehicle: 2004 Lincoln LS Location: California Crash Date: March 2012	September 2018
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Dynamic Science, Inc.	DS16028

9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Dynamic Science, Inc. 299 West Cerritos Avenue Anaheim, CA 92805	11. Contract or Grant No. DTNH22-12-C00271

12. Sponsoring Agency Name and Address	13. Type of Report and Period Covered
National Highway Traffic Safety Administration 1200 New Jersey Avenue SE. Washington, DC 20590	Technical Report March 2012
	14. Sponsoring Agency Code

15. Supplementary Notes

This report documents the Remote Vehicle Fire/Child Restraint System (CRS) Investigation and the post-impact fire in a 2004 Lincoln LS involved in a single-vehicle crash and the two child occupants restrained in CRSs.

16. Abstract

The crash occurred during an afternoon in March 2012 on a curved section of roadway in a rural area of California. Conditions were daylight, raining, and wet. The belted driver of the Lincoln was a 38-year-old male. The second-row occupants were a 3-year-old male and a 6-year-old female restrained in child restraint systems. The Lincoln was traveling westbound allegedly at a speed too fast for conditions. In a left curve, the Lincoln crossed the center line, departed the roadway, and struck a wooden power utility pole. Witnesses reported that they saw an explosion and fire immediately after the impact. The Lincoln was on fire and live power lines were strewn on the ground around the vehicle. Two passersby stopped and retrieved a fire extinguisher from their vehicle. They removed the child occupants from the Lincoln and extinguished the fire. The driver of the Lincoln appeared trapped and unconscious. He remained in the vehicle and was declared deceased on-scene before being removed. The 3-year-old male sustained police-reported "A" (severe) injuries and the 6-year-old female sustained "B" (moderate) injuries. Both children were transported by ambulance to a local hospital, treated, and released.

17. Key Words	18. Distribution Statement
air bag, non-deployment, deployment, injury, child restraint system, CRS, fire	Document is available to the public from the National Technical Information Service, www.ntis.gov.

19 Security Classif. (of this report)	20. Security Classif. (of this page)	21 No. of Pages	22. Price
Unclassified	Unclassified	16	

Form DOT F 1700.7 (8-72)i Reproduction of completed page authorized

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Remote Vehicle Fire/Child Restraint System Investigation
Case Number: DS16028
Vehicle: 2004 Lincoln LS
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Date: March 2012

BACKGROUND

This report documents a remote Vehicle Fire/Child Restraint System Investigation in the post- impact fire in a 2004 Lincoln LS involved in a single vehicle crash, and the two child occupants restrained in CRSs. 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 Special Crash Investigations (SCI) team obtained the police report and the case was initiated by the SCI group of the National Highway Traffic Safety Administration in December 2016. SCI also obtained police on-scene images and the fire district log relating to the crash.

Figure 1. 2004 Lincoln LS (police photo)

The crash occurred during an afternoon in March 2012 on a two-lane, east/west State roadway in a rural area of California. Traveling westbound, the roadway curved left at the crash site. Conditions at the time of the crash were daylight, overcast, and raining, and the asphalt roadway was wet. The belted driver of the Lincoln was a 38-year-old male. The second row was occupied by a 3-year-old male and a 6-year-old female. According to the police report, both children were restrained in CRSs. The CRS in the second row left position was visible in police photos but the CRS in the second row right position was not visible. The Lincoln was traveling westbound allegedly at a speed too fast for conditions. In the left curve, the Lincoln crossed the center line, departed the roadway on the left edge, and struck a wooden power utility pole with its left plane. Witnesses reported that they saw an explosion and fire immediately after the impact. The Lincoln was on fire and there were power lines strewn on the ground around the vehicle. Two passersby retrieved a fire extinguisher from their vehicle and approached the Lincoln on foot. They entered the vehicle, removed the child occupants, and extinguished the fire. They did not extricate the driver. The coroner's report stated the driver was trapped and unconscious following the crash.

The driver of Lincoln sustained police-reported “K” (fatal) injuries and was declared deceased on-scene before his body was removed from the vehicle. The 3-year-old male sustained “A” (severe) injuries. The 6-year-old female sustained “B” (moderate) injuries. Both children were transported by ambulance to a local hospital where they were treated and released.

SUMMARY

Crash Site

The crash occurred on a curved and level section of an undivided east/west State-maintained highway in California (**Figure 2**). Crash site data including roadway measurements were obtained from the police report, police on- scene images, and satellite images. The roadway was asphalt surfaced and was configured with one eastbound lane, one westbound lane, and narrow paved shoulders. The eastbound and westbound lanes each measured 3.7 m (12.0 ft) in width and the shoulders each measured (0.3 ft) in width. The travel lanes were separated by a double solid and dashed yellow painted stripe and bordered by solid white painted fog lines. The roadway appeared to be in good condition. The left curve had a radius of 1,250 m (4,101 ft) at the south fog line. The roadside on the left edge was unpaved and covered with grass. A wooden utility pole of an unknown diameter stood 2.7 m (9.0 ft) south of the south roadway edge. This pole supported electrical power lines and transformers. The posted speed limit was 89 km/h (55 mph). The investigating police officer noted no unusual conditions present at the time of the crash.

Figure 2. Crash site looking west (police photo)

Conditions at the time of the crash as reported by the nearest weather station were as follows: temperature 10.0 °C (50.0 °F), 94 percent humidity, east/southwest winds at 29.6 km/h (18.4 mph), 6.4 km (4.0 mi) visibility and overcast skies. It was raining and the roadway was wet. A crash diagram is included at the end of this report. It was created using satellite images and measurements obtained from the police report.

Figure 3. Crash site look-back view looking east (police photo)

Pre-Crash

The Lincoln was traveling westbound allegedly at a speed too fast for conditions. The roadway curved slightly left and the driver appears to have over-steered while negotiating the curve, causing the vehicle to initiate a counterclockwise yaw. The Lincoln initiated a left trajectory path, crossing the center line and the eastbound lane. The driver likely then steered right and the vehicle initiated a clockwise yaw and departed the roadway on the left edge. It traveled on the unpaved roadside as the left tires furrowed into the ground depositing tire tracks measuring 12.8 m (42.0 ft), 6.1 m (20.0 ft) and 10.7 m (35.0 ft) in length.

Crash

The left plane of the Lincoln struck the wooden power pole, shearing it off at the base (Event 1). The area of contact to the vehicle was in the passenger sector of the left plane. The pole, transformers, and power lines fell and hit the ground in the vicinity of the vehicle post-crash (Event 2). The Lincoln initiated a post-impact clockwise rotation and traveled approximately 3.7 m (12.0 ft) west of the point of impact (POI). It came to rest facing east with its left side tires 0.8 m (2.5 ft) and 1.2 m (4.0 ft) south of the roadway. According to witnesses, they observed an explosion followed by a fire located at the vehicle (Event 2). On-scene photos indicate the fire consumed part of the left side of the passenger compartment.

Post-Crash

Passersby stopped their vehicle and approached the Lincoln to render aid. The driver of the Lincoln was observed to be unconscious and appeared trapped; the 3-year-old male and 6- year-old female occupants were observed to be conscious, and the vehicle was on fire and smoking. Downed power lines were strewn about the ground close to the vehicle (**Figure 4**). The passersby retrieved a fire extinguisher from their vehicle and extinguished the fire. They then opened the second-row right-side door and removed the two child occupants from the vehicle. They could not remove the driver from the vehicle because he was unconscious and trapped.

Figure 4. Utility pole, transformers, and power lines (foreground) and 2004 Lincoln LS (background) (police photo)

On-scene police photos indicate the fire burned adjacent to and underneath the vehicle's left plane (**Figure 5**). The photos of the interior suggest the fire did not spread to the engine compartment or interior of the vehicle or burn long enough to cause significant damage. The fire was extinguished prior to police and fire units arriving on-scene. Given the witness statements and police report, the investigation determined the original source of the fire was downed power lines lying near the vehicle.

Fire Department Involvement

SCI obtained a copy of the fire district log that documented time and notes from radio contact to on-scene arrival. According to the log, the fire department response time began 2 minutes after the crash and the first unit arrived on-scene 7 minutes after the crash. The fire company dispatched four engines, two command units, and one rescue unit. The call included 10 fire department personnel. The fire log did not include data relating to the actual fire since it was extinguished prior to the arrival police and fire personnel. The coroner arrived 76 minutes after the crash.

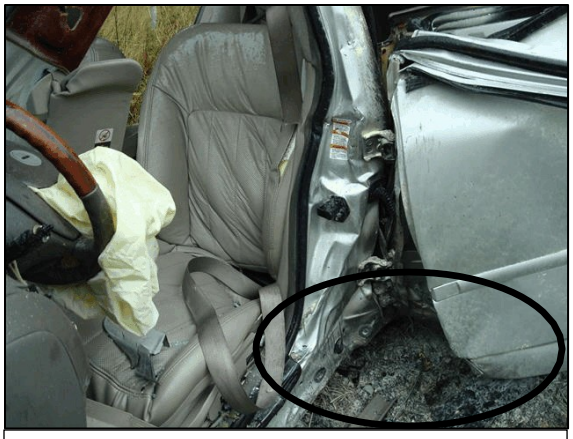


Figure 5. Burn area, 2004 Lincoln LS (police photo)

The fire company did not complete an EMS report as they did not transport any occupants. An ambulance company responded with one vehicle, one paramedic, and one medic for the on-scene treatment and transport of the two child occupants of the Lincoln. One police agency responded. The Fire District Log is summarized in the table below.

ENGINE NUMBER	TIME RESPONDING	TIME ON SCENE	TIME RETURNING	TIME SECURED
CHIEF 1	1409	1414	1512	1529
Command Unit 1	-	-	1604	-
Command Unit 2	1409	1414	1544	1604
BASE (Station) 1				
Engine 1	1414	1419	1458	1519
Rescue Unit 1	1418	1431	1431	1520
BASE (Station) 2				
Engine 2	1414	1419	1604	1626
BASE (Station) 3				
Engine 3	1412	1415	16041	1613
Engine 4	1418	1418	1458	1505

Source: Fire District Log and interview

2004 LINCOLN LS

Description

The 2004 Lincoln LS was identified in the police report. A search using the vehicle's license plate revealed a partial VIN of 1LNHM87AY4Yxxxxxx. The vehicle's mileage was unknown. The Lincoln was a 4-door sedan equipped with a 3.9 liter 8-cylinder gasoline engine, ABS brakes, and power moon roof. The vehicle manufacturer recommended size P235/50R17 tires with a pressure of 207 kPa (30 psi) for the front and rear. No specific tire data was available for this vehicle but police indicated the tires appeared to be newer and all had ample tread.

The Lincoln's interior was equipped with two rows of seating to accommodate a total of five occupants. The front row was configured with two bucket seats and adjustable head restraints. The seat track setting for the driver was unknown. The second row was configured with a bench seat and adjustable head restraints.

Exterior Damage

Exterior images of the Lincoln taken by police were used to conduct a partial exterior vehicle inspection. The vehicle sustained direct contact damage to the left plane caused by the impact with the wood utility pole in Event 1 and the fire in Event 2. Fire damage appeared to be isolated to the left sill, left lower doors, and possibly the undercarriage. Thermal damage appeared to be minor and limited to paint and surface area.

Figure 6. Direct damage to left roof, 2004 Lincoln LS (police photo)

The front row left side door was removed during post-crash extrication efforts. Contact damage caused by the pole impact was located in the passenger sector of the left plane. Crush damage from the pole impact appeared to be located primarily in the area extending longitudinally from the left A-pillar to the left B-pillar and vertically extending from the left sill to the left roof (**Figure 6**). The estimated Collision Deformation Classification (CDC) for the Lincoln in Event 1 was 10LPAW3.

NHTSA Recalls and Investigations

A search using the vehicle's year/make/model revealed no NHTSA Recalls or Investigations.

Interior Damage

The Lincoln sustained interior damage caused by impact forces, the fire, and post-impact extrication efforts. The windshield was fractured and the moon roof was displaced. Side glass was disintegrated on the first and second rows of the left side. The driver's door was removed

during extrication efforts. The instrument panel was fractured and the front row left seat cushion and back were deformed rearward and to the right. Lateral intrusion as seen in photographs reduced the front row at the left instrument panel, left door panel, sill, roof side rail, A-pillar, B-pillar, roof and driver's seat cushion, and back. Lateral intrusion reduced the second row at the left door and left roof side rail which contacted the CRS installed in the left seat position (**Figure 7**).

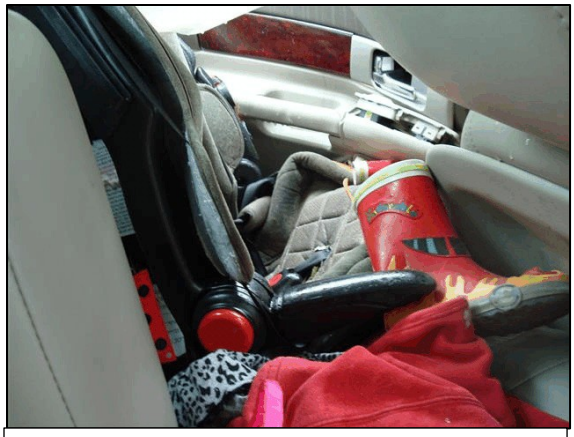


Figure 7. Second row left side door intruding into occupant compartment, 2004 Lincoln LS (police photo)

Manual Restraint Systems

The Lincoln was equipped with seating for five occupants and all seats were configured with three-point lap and shoulder seat belts. The front row belts were equipped with sliding latch plates, adjustable D-rings, and retractor pretensioners. The driver's belt was configured with an emergency locking retractor (ELR). Police indicated the driver of the Lincoln was using the lap and shoulder seat belt properly at the time of the crash and, following the crash, the driver's seat belt was locked in the used position by the actuated pretensioner. The driver's seat belt was cut by responders during post-crash activities. The second row seat belts were configured ELR/automatic locking retractors (ALR) and sliding latch plates. Police indicated the 3-year-old male occupant seated in the second row left position and the 6-year-old female occupant seated in the second row right position were in CRSs. A forward-facing CRS is visible in photos as being installed at the left seat position but no CRS is visible in the right seat position. The Lincoln was configured with Lower Anchors and Tethers for CHildren (LATCH) in the second row at all three seat positions but it is unknown whether it was used for CRS installation. No further data was available regarding CRS installation and usage.

Supplemental Restraint Systems

The Lincoln's supplemental restraint systems (SRS) included dual stage frontal air bags for the driver and front right occupant, seat-mounted side impact air bags for the front row occupant, and side impact inflatable curtain (IC) air bags for both rows. During the crash, the driver's frontal air bag and left IC air bag deployed. The deployed left IC air bag was adjacent to the CRS-restrained occupant seated in the second row left position and it appears this air bag possibly contacted the CRS and occupant during the crash (**Figure 8**).

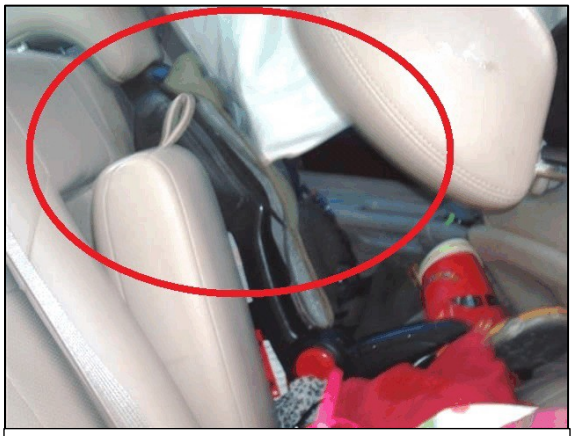


Figure 8. Deployed left IC air bag and CRS installed in second row left position, 2004 Lincoln LS (police photo)

Child Restraint Systems

Unknown Make/Model

The 3-year-old male occupant of the Lincoln was seated in the second row left seat position and using a CRS of an unknown make and model (**Figure 9**). The CRS appears to be a forward-facing model configured with headrest, armrests, padded cushion, and an integrated 5-point harness system. The method for installing the CRS in the vehicle was unknown. Witnesses who were the first to arrive on-scene indicated to police that they removed the child from the CRS and vehicle. The occupant using this CRS occupant weighed 17 kg (37 lb) and his height at the time of the crash is unknown. No further details regarding this occupant's restraint usage were known.

Figure 9. CRS in second row left seat position, 2004 Lincoln LS (police photo)

Unknown Make/Model

The police report indicated the 6-year-old female occupant was in a CRS located in the second row right position at the time of the crash. This occupant weighed 25 kg (55 lb) and her height was unknown. The CRS for this occupant was not visible in the police photos and no further data was available concerning the occupant's restraint usage. The IC air bag on the right side of the vehicle did not deploy.

2004 LINCOLN LS OCCUPANTS

Driver Demographics

Age/sex:	38 years/male
Height:	173 cm (68 in)
Weight:	82 kg (180 lb)
Eyewear:	None
Seat type:	Bucket seat with adjustable head restraint
Seat track position:	Unknown
Manual restraint usage:	Lap and shoulder seat belt used
Usage source:	Police report
Air bags:	Frontal and IC air bag deployed
Alcohol/drug data:	Hydromorphone (brand name Dilaudid) overdose; 0.26 mg/L
Egress from vehicle:	Removed while unconscious through left side door
Transport from scene:	To coroner's office
Type of medical treatment:	None

Driver Injuries

Inj. No.	Injury	AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Fracture of cervical vertebra NFS	650216.2	Left side door panel	Probable
2	Laceration, major (12.7 cm / 5.0 in) of left forearm	710604.2	Left side glass	Probable
3	Fracture of left lower leg NFS	852002.2	Left side panel forward of the A-pillar	Probable
4	Lacerations, minor, of left face	210602.1	Flying glass	Probable
5	Contusions of chest	410402.1	Seat belt webbing	Probable

* Additional injury detail is available in the SCI case viewer

Driver Kinematics

The belted 38-year-old male driver of the Lincoln was seated in an unknown posture and was operating the vehicle at an unknown speed. The coroner's report indicated the driver had ingested a toxic amount of hydromorphone and sustained an overdose. He lost control of the vehicle and it departed the roadway. At impact with the pole, the driver was likely displaced forward and left in response to the direction of force. The driver's frontal air bag and left IC air bag deployed and his seat belt pretensioner actuated. The driver's left side door and the left instrument panel intruded laterally reducing the occupant compartment and deforming the driver's seat right and rearward. The driver loaded the pretensioned seat belt and was likely held in his seated position by the seat belt. His head and neck were displaced in a hyperflexive movement causing an unspecified fractured cervical vertebra. His face was possibly contacted by flying glass causing minor laceration. His chest loaded the shoulder portion of the seat belt webbing causing chest contusions. His left arm likely contacted fractured glass causing a major laceration. The seat cushion and back intruded into the second row probably loading the CRS and occupant in the second row seat left position. The driver's left lower leg contacted the left side panel forward of the A-pillar causing an unspecified type fracture. He was in his seated position and unconscious when the Lincoln came to rest. He was pronounced deceased on-scene, extricated by fire personnel, and taken to the coroner's office. The coroner's report stated the cause of death was "blunt force trauma from a vehicle accident and hydromorphone overdose," and the manner of death was classified as accidental. (One of the brand names for hydromorphone is Dilaudid.)

Second Row Left Occupant Demographics

Age/sex:	3 years/male
Height:	Unknown
Weight:	17 kg (37 lb)
Eyewear:	None
Seat type:	Bench with adjustable head restraint
Seat track position:	NA
Manual restraint usage:	Forward-facing CRS
Usage source:	Police report and photos
Air bags:	None available
Egress from vehicle:	Removed due to age and injuries by witnesses
Transport from scene:	Ambulance to hospital
Type of medical treatment:	Treated and released

Second Row Left Occupant Injuries

Inj. No.	Injury	AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Fracture of distal shaft left tibia	854251.2	Front row seat back	Probable
2	Abrasions of forehead	210202.1	Front row seat back	Probable
3	Closed head injury	100099.9	Front row seat back	Probable

* Additional injury detail is available in the SCI case viewer

Second Row Left Occupant Kinematics

The 3-year-old male occupant was harnessed in a forward-facing orientation in a CRS with a 5-point harness system in the second row left seat position. His posture was unknown. At impact with the pole, this occupant was likely displaced forward and left in response to the direction of force. He may have remained held in his seated position by the harness restraint. The driver's seat back was displaced rearward intruding longitudinally into the second row occupant compartment probably contacting the 3-year-old and CRS. The occupant's forehead contacted the seat back causing an unspecified closed head injury and an abrasion to the forehead. His left lower leg contacted the seat back causing a fracture to the tibia. The vehicle initiated a post-impact clockwise rotation and traveled rearward a short distance before coming to rest. The occupant remained in his seated position to final rest. He was removed from the vehicle through the right side door by passersby who stopped on-scene to render aid. The occupant was transported by ambulance to a local hospital, treated for his injuries and released.

Second Row Right Occupant Demographics

Age/sex:	6 years/female
Height:	Unknown
Weight:	25 kg (55 lb)
Eyewear:	None
Seat type:	Bench with adjustable head restraint
Seat track position:	NA
Manual restraint usage:	Forward-facing CRS
Usage source:	Police report
Air bags:	None available
Egress from vehicle:	Removed due to age by witnesses
Transport from scene:	Ambulance to hospital
Type of medical treatment:	Treated and released

Second Row Right Occupant Injuries

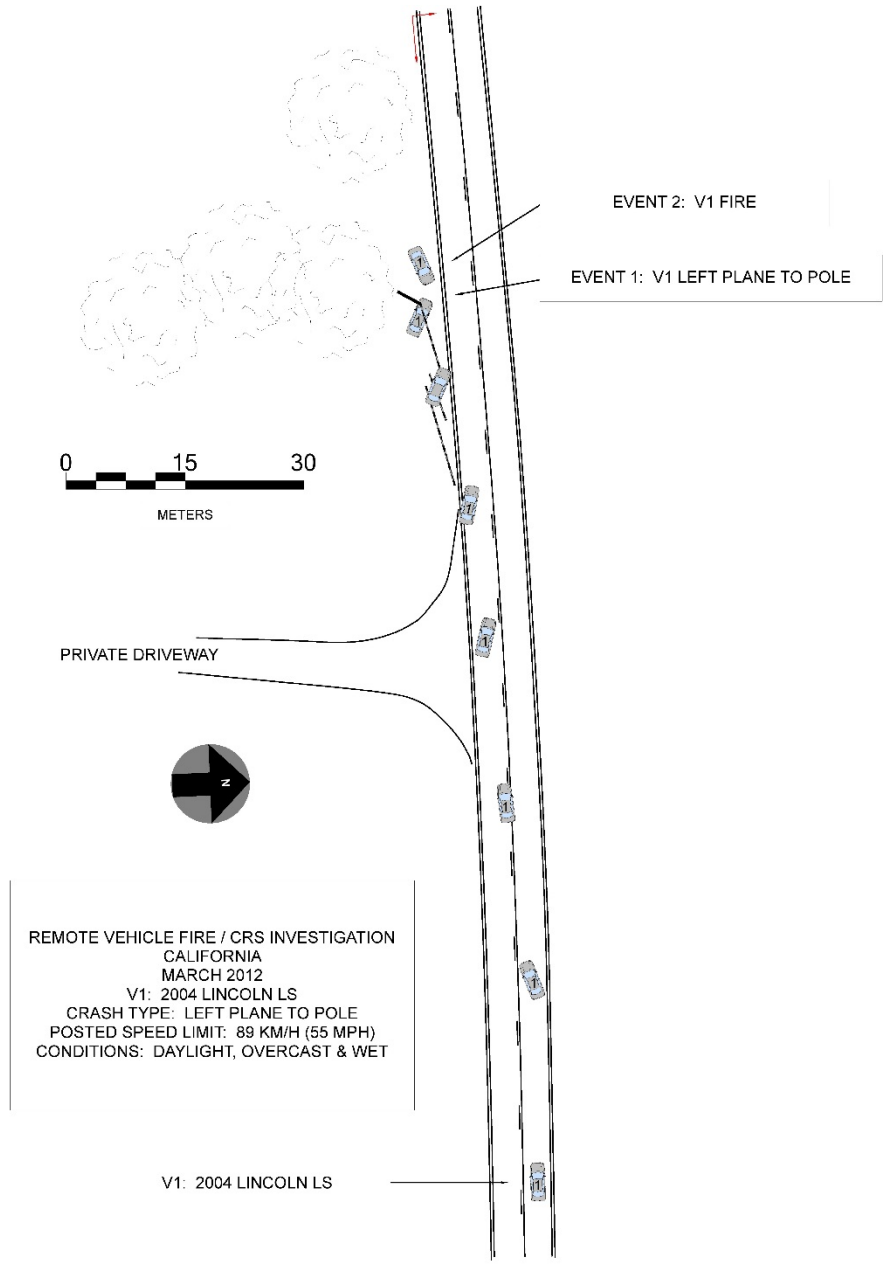
Inj. No.	Injury	AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Laceration of left ear	210202.1	Flying glass	Possible

* Additional injury detail is available in the SCI case viewer

Second Row Right Occupant Kinematics

The 6-year-old female occupant was reported by police to be seated in a CRS in the second row right seat position. Her posture was unknown. No further information regarding her restraint usage was available. At impact with the pole, this occupant was likely displaced forward and left in response to the direction of force. The occupant's left ear was possibly contacted by flying glass causing a 1.2 cm (0.5 in) laceration. The vehicle initiated a post-impact clockwise rotation and traveled rearward a short distance before coming to rest. She was removed from the vehicle through the right-side door by passersby who stopped on-scene to render aid. The occupant was transported by ambulance to a local hospital, treated for the laceration, and released later that day.

CRASH DIAGRAM



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13816-090518-v2