



U.S. Department  
of Transportation

**National Highway  
Traffic Safety  
Administration**



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DOT HS 812 693

May 2019

# **Special Crash Investigations Remote Vehicle Fire Child Restraint System Investigation Vehicle: 2000 Buick LeSabre Location: Indiana Crash Date: June 2012**

## **DISCLAIMERS**

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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 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:

Indiana University, Transportation Research Center (2019, May). *Special Crash Investigations Remote Vehicle Fire Child Restraint System Investigation; Vehicle: 2000 Buick LeSabre; Location: Indiana; Crash Date: June 2012* (Report No. DOT 812 693). Washington, DC: National Highway Traffic Safety Administration.

### Technical Report Documentation Page

<p>1. <i>Report No.</i> DOT HS 812 693</p>	<p>2. <i>Government Accession No.</i></p>	<p>3. <i>Recipient's Catalog No.</i></p>	
<p>4. <i>Title and Subtitle</i> Special Crash Investigations Remote Vehicle Fire Child Restraint System Investigation Vehicle: 2000 Buick LeSabre Location: Indiana Crash Date: June 2012</p>		<p>5. <i>Report Date:</i> May 2019</p>	
		<p>6. <i>Performing Organization Code</i></p>	
<p>7. <i>Author</i> Indiana University, Transportation Research Center</p>		<p>8. <i>Performing Organization Report No.</i> IN17005</p>	
<p>9. <i>Performing Organization Name and Address</i> Transportation Research Center Indiana University 501 South Madison Street, Suite 105 Bloomington, Indiana 47403-2452</p>		<p>10. <i>Work Unit No. (TRAIS)</i></p>	
		<p>11. <i>Contract or Grant No.</i> DTNH22-12-C-00270</p>	
<p>12. <i>Sponsoring Agency Name and Address</i> National Highway Traffic Safety Administration National Center for Statistics and Analysis 1200 New Jersey Avenue SE Washington, D.C. 20590-0003</p>		<p>13. <i>Type of Report and Period Covered</i> Technical Report Crash Date: June 2012</p>	
		<p>14. <i>Sponsoring Agency Code</i></p>	
<p>15. <i>Supplementary Notes</i> Remote vehicle fire and child restraint system investigation involving a 2000 Buick LeSabre.</p>			
<p>16. <i>Abstract</i> This report documents the remote investigation of a crash-related fire in a 2000 Buick LeSabre in which a 6-month-old male was seated in a rear-facing child restraint system (CRS) in the second-row left seating position. This crash occurred on a straight, two-lane highway. The Buick was a 4-door sedan equipped with frontal air bags. A 23-year-old female driver (unknown if belted) and a 6-month-old male second-row left passenger, who was seated in rear-facing CRS of unknown make and model, occupied the vehicle. The Buick was in the southbound lane. A 2006 Dodge Stratus was in the northbound lane and the 2005 Chevrolet Malibu was behind the Dodge. The Buick crossed the centerline into the northbound lane and its front plane struck the front plane of the Dodge (Event 1). The impact caused both vehicles to rotate counterclockwise and the front plane of the Chevrolet struck the left plane of the Dodge (Event 2). The Buick came to final rest in the southbound lane heading northwest. The Dodge came to final rest in a field on the east side of the road heading west. The Chevrolet came to final rest heading northeast in the field and was located immediately south of the Dodge. Smoke began to emerge from the instrument panel and cowl area of the Buick immediately following the crash and the driver was trapped in the vehicle. A police officer removed the second-row left occupant of the Buick from his CRS and vehicle through the backlight. The vehicle then caught fire (Event 3). The fire totally consumed the interior of the vehicle and the CRS before the fire could be extinguished by the fire department. The driver of the Buick sustained fatal injuries. The second-row left passenger sustained police-reported "B" (non-incapacitating) injuries and was transported by ambulance to a hospital, then transported by helicopter to a children's hospital. The 28-year-old female driver of the Dodge was transported by helicopter to a hospital where she died of her injuries. The 18-year-old male driver of the Chevrolet sustained police-reported "C" (possible) injuries and was not transported for medical treatment. All the vehicles were towed from the crash scene due to damage.</p>			
<p>17. <i>Key Words</i> vehicle fire, motor vehicle traffic crash, child restraint system, fatal injury</p>		<p>18. <i>Distribution Statement</i> Document is available to the public from the National Technical Information Service, <a href="http://www.ntis.gov">www.ntis.gov</a>.</p>	
<p>19. <i>Security Classif. (of this report)</i> Unclassified</p>	<p>20. <i>Security Classif. (of this page)</i> Unclassified</p>	<p>21. <i>No. of Pages</i> 14</p>	<p>22. <i>Price</i></p>

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**Indiana University Transportation Research Center  
Special Crash Investigations  
Remote Vehicle Fire  
Child Restraint System Investigation  
Case Number - IN17005  
Vehicle: 2000 Buick LeSabre  
Location: Indiana  
Crash Date: June 2012**

## **BACKGROUND**

This report documents the remote investigation of a crash-related fire in a 2000 Buick LeSabre (**Figure 1**) in which a 6-month-old male was seated in a rear-facing child restraint system (CRS) in the second-row left seating position. This investigation was initiated by the National Highway Traffic Safety Administration and assigned to the Special Crash Investigation team at the Indiana University Transportation Research Center in January 2017. The three-vehicle crash occurred in Indiana in June 2012 during daylight and was investigated by a local police agency. The crash involved the Buick, a 2006 Dodge Stratus, and a 2005 Chevrolet Malibu. On-scene photographs were obtained from the police in February 2017. The fire incident report was obtained by the responding fire department in May 2017. A telephone interview was conducted with the driver of the Chevrolet and an administrator of the responding ambulance service in June 2017, respectively. The investigating police officer was interviewed by e-mail in June 2017.



**Figure 1:** Police photo of the damaged 2000 Buick LeSabre, view east

This crash occurred on a straight, two-lane highway. The Buick was a 4-door sedan equipped with frontal air bags. A 23-year-old female driver (unknown if belted) and a 6-month-old male second-row left passenger, who was seated in a rear-facing CRS of unknown make and model, occupied the vehicle. The Buick was in the southbound lane. The Dodge was in the northbound lane and the Chevrolet was behind the Dodge. The Buick crossed the centerline into the northbound lane and its front plane struck the front plane of the Dodge (Event 1). The impact caused both vehicles to rotate counterclockwise and the front plane of the Chevrolet struck the left plane of the Dodge (Event 2). The Buick came to final rest in the southbound lane heading northwest. The Dodge came to final rest in a field on the east side of the road heading west. The Chevrolet came to final rest heading northeast in the field near and south of the Dodge. Smoke began to emerge from the instrument panel and cowl area of the Buick immediately following the crash and the driver was trapped in the vehicle. A police officer removed the second-row left

child of the Buick from his CRS and vehicle through the backlight. The vehicle then caught fire (Event 3). The fire totally consumed the interior and the CRS before the fire could be extinguished by the fire department. The driver of the Buick sustained fatal injuries. The second-row left passenger sustained police-reported “B” (non-incapacitating) injuries and was transported by ambulance to a hospital, then transported by helicopter to a children’s hospital. The 28-year-old female driver of the Dodge was transported by helicopter to a hospital, where she died of her injuries. The 18-year-old male driver of the Chevrolet sustained police-reported “C” (possible) injuries but was not transported for medical treatment. All the vehicles were towed from the crash scene due to damage.

## **CRASH SUMMARY**

### ***Crash Site***

This crash occurred during the day on a straight, two-lane, bituminous highway. The weather conditions were clear with 16 kilometers (10 miles) visibility, southwesterly winds at 10 km/h (6 mph), a temperature of 23.3 °C (74 °F), and a dew point of 13.3 °C (56 °F), according to local weather reports. The roadway ran north/south with one lane in each direction. The roadway was bordered by narrow shoulders. The roadway pavement markings consisted of a solid double yellow center line and solid white edge lines. The speed limit was 89 km/h (55 mph). The crash diagram is included at the end of this report.

### ***Pre-Crash***

The Buick was in the southbound lane. The Dodge was in the northbound lane and the Chevrolet was behind the Dodge. The investigating police officer stated during the SCI interview that several motorists had called 9-1-1 and reported that the driver of the Buick had fallen asleep at several red traffic signals and repeatedly run off the right side of the roadway as well as cross the center line into the northbound lane as the vehicle proceeded southbound on the highway. The Buick crossed the centerline into the northbound lane a final time and approached impact with the Dodge. The police officer was pursuing the Buick and had nearly caught up with the vehicle when the crash occurred.

### ***Crash***

The front plane of the Buick struck the front plane of the Dodge (Event 1). The force direction on the Buick was in the 12 o’clock sector. The impact was severe and resulted in the deployment of the driver’s frontal air bag. The “missing vehicle” algorithm of the WinSMASH program calculated the vehicle’s total delta-V as 48 km/h (30 mph). The longitudinal and lateral velocity changes were -48 km/h (-30 mph) and 0 km/h. The total delta-V for the Dodge was 57 km/h (35 mph). The longitudinal and lateral velocity changes were -57 km/h (-35 mph) and 0 km/h. The results should be considered borderline since neither vehicle was inspected. The Buick’s crush profile was determined by scaling off one of the police on-scene photographs using known vehicle specifications to establish a scale.

The impact caused both vehicles to rotate counterclockwise and the Dodge departed the right side of the road. The driver of the Chevrolet initiated a right steering maneuver and applied the brakes to avoid the crash and also departed the right side of the road. The front plane of the Chevrolet then struck the left plane of the Dodge (Event 2) and both vehicles came to final rest in a field with the Dodge heading west and the Chevrolet heading northeast. The Buick rotated approximately 210 degrees following the impact with the Dodge, coming to final rest in the southbound lane heading northwest (**Figure 2**), where it caught fire (Event 3).



**Figure 2:** Police photo of Buick’s final rest position, arrow shows final rest positions of Dodge and Chevrolet, view north

### ***Post-Crash and Fire-Related Discussion***

The police officer responding to the report of erratic driving by the driver of the Buick stated he arrived at the crash scene within 10 seconds following the crash. The police officer went to the Buick and discovered the driver was trapped in the vehicle. He stated smoke began to come from the vehicle after the crash and when he reached the vehicle, thick white smoke was coming from the instrument panel area and smelled of an electrical fire. He stated there was also a fuel leak directly below the cowl on the driver’s side. The front doors and left rear door were jammed shut from damage and the right rear door would not open since it was probably locked. The police officer stated that there was not enough space to enter the vehicle through the back door glazing, so he used a fire extinguisher from his vehicle to break the backlight glazing. He then climbed over the trunk and into the vehicle through the backlight. The police officer unbuckled the second row left passenger’s 5-point harness and removed him from the CRS and took him out of the vehicle through the backlight. The driver of the Chevrolet stated during the SCI interview that the fire started approximately 3 minutes following the crash. The police officer agreed with this statement, adding that flames became visible through the smoke very quickly and the flames were coming from behind the instrument panel. He stated that the fire spread rapidly, appearing to be accelerated by the fuel leak located under the cowl area on the driver’s side. The police officer stated that five fire extinguishers were used attempting to extinguish the fire. The fire extinguishers were all focused on the instrument panel and exterior cowl area of the vehicle and all were exhausted in the attempt to extinguish the fire. The fire then spread rapidly (within minutes) and it was not possible to remove the trapped driver from the vehicle. Firefighters and equipment from the first of two responding fire departments arrived 13 minutes following the crash. The fire department incident report stated that it was notified at 1331 hours and arrived on scene at 1340 hours. The fire incident report stated that the vehicle was “fully” involved with fire upon their arrival. The firefighters used 533.7 liters (141 gallons) of water to extinguish the fire,

which was brought under control within 10 minutes. They dispersed 3.8 liters (1 gallon) of Class A foam on the ground around and under the vehicle for protection. The fire department also provided hazardous material spill containment and control.

Emergency medical service (EMS) was notified of the crash at 1332 hours and arrived on scene at 1348 hours. The second-row left passenger of the Buick sustained minor injuries and EMS transported him by ambulance to a hospital. The ambulance departed the crash scene at 1352 hours and arrived at the hospital at 1408 hours. The second-row left passenger was treated in the emergency room and then transported by helicopter to a children's hospital, where he was hospitalized. The driver of the Buick sustained fatal injuries. The 28-year-old female driver of the Dodge was transported by helicopter to a hospital, where she died of her injuries. The 18-year-old male driver of the Chevrolet sustained police-reported "C" (possible) injuries and was not transported for medical treatment. All the vehicles were towed from the crash scene due to damage.

The police crash report stated that blood tests for drugs and alcohol were conducted on the driver of the Buick. The results of the tests were negative for alcohol and positive for drugs. The medical examiner's report stated that the drug alprazolam<sup>1</sup> (trade name Xanax) was detected at a level of 72 ng/ml, which was reported as a therapeutic dose.

## **2000 BUICK LESABRE**

### ***Description***

The Buick was a front-wheel drive, 5-occupant, 4-door sedan with the VIN 1G4HR54K8YUxxxxxx equipped with a 3.8-liter, V-6 engine and 4-speed automatic transmission. The vehicle was also equipped with redesigned frontal air bags, front-seat-mounted side impact air bags, and CRS tether anchors in the second row. The specified wheelbase was 285 cm (112.2 in). The vehicle manufacturer's recommended tire size was P215/70R15.

### ***Exterior Damage***

*Exterior Damage Crash Event 1:* The Buick sustained direct and induced damage to the front plane during the impact with the Dodge. The left fender and left front door were also directly damaged. The impact was of sufficient severity to displace the left A-pillar rearward to nearly a vertical orientation, which also displaced the roof structure vertically. The vehicle's damage measurements were determined by scaling off one of the police on-scene photographs using known vehicle specifications to establish a scale. The direct damage to the front plane began at the left corner of the front bumper and extended approximately 82 cm (32 in) to the right across the front plane. The crush profile was approximately triangular-shaped based on the police on-scene photographs of the vehicle. Therefore, two crush measurements, one at each bumper

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<sup>1</sup> Alprazolam is used to treat anxiety associated with panic disorder; it is known under the trade name Xanax. It belongs to a class of medications called benzodiazepines, which act to produce a calming effect. Side effects can include drowsiness or dizziness. [www.webmd.com](http://www.webmd.com)



corner, were measured based on scaling off one of the police photographs and determined to be approximately 121 cm (48 in) and 20 cm (8 in) at C1 and C2, respectively.

*Damage Classification Crash Event 1:* The Collision Deformation Classification (CDC) was 12FYEW5 (0 degrees).

*Exterior Damage Crash Event 3:* The vehicle sustained fire damage primarily to the occupant compartment. The right-side doors, upper quarter panel, and trunk lid were also burned. Neither the hood or the engine compartment were burned, indicating that the fire likely started in the instrument panel and that the ignition source was related to damage to the electrical system.

### ***Event Data Recorder***

The vehicle was equipped with an event data recorder (EDR). The police crash report contained no information regarding the EDR, which was probably destroyed in the fire.

### ***Interior Damage***

The interior of the vehicle was completely consumed by the fire.

### ***Manual Restraint Systems***

The front and second rows of the Buick were typically equipped with 3-point lap and shoulder seat belts. The status of the seat belts could not be determined due to the extent of damage from the fire and the lack of sufficient photographic coverage of the vehicle's interior. It is not known if the driver was belted at the time of the crash.

### ***Supplemental Restraint Systems***

The Buick was equipped with redesigned frontal air bags and front-seat-mounted side impact air bags. The air bags were consumed in the fire.

### ***Child Restraint System***

The second row left passenger was seated in a rear-facing CRS. The make and model of the CRS could not be determined since it was destroyed in the fire. The police officer who rescued the child from the vehicle and unbuckled the CRS harness straps in the process stated that the child was properly restrained by the 5-point harness.

## 2000 BUICK LESABRE OCCUPANTS

### *Driver Demographics*

Age/Sex:	23 years/female
Height:	165 cm (62 in)
Weight:	45 kg (100 lbs)
Eyewear:	Unknown
Seat Type:	Bucket
Seat Track Position:	Unknown
Manual Restraint Usage:	Unknown
Usage Source:	No vehicle inspection
Air Bags:	Frontal probably deployed, seat-mounted side impact may have deployed, air bags consumed in fire
Alcohol/Drug Involvement:	Test performed, negative for alcohol, and positive for alprazolam at a level of 72 ng/ml, which was reported as a therapeutic dose
Egress From Vehicle:	Removed by emergency responders
Transport From Scene:	Removed under authority of coroner
Medical Treatment:	None, deceased at crash scene

### *Driver Injuries*

Injury No.	Injury	AIS 2015	Involved Physical Components (IPC)	IPC Confidence Level
1	Burns, deep tissue charring of 90% of body with multiple heat fractures of bones of extremities, not otherwise specified	912032.6	Thermal burns	Certain
2 3	Fracture, displaced right mid tibia/fibula due to blunt force trauma, not further specified	854221.2 854471.2	Left lower instrument panel (includes knee bolster), right of steering column	Probable

*Sources: Medical examiner records—noninvasive examination, and death certificate. Injury Numbers 1 to 3 came only from the medical examiner records.*

### *Driver Kinematics*

It is not known if the driver was restrained. The frontal impact with the Dodge displaced the driver forward and she likely contacted her right knee and lower leg on the lower instrument panel, resulting in a displaced fracture of the right tibia and fibula. She then probably rebounded back into her seat. The resulting fire resulted in deep tissue charring of 90 percent of her body. The driver was pronounced deceased at the crash scene by the county coroner. The medical examiner's report stated that the cause of death was respiratory arrest due to asphyxia from inhalation of soot.

### ***Second Row Left Occupant Demographics***

Age/Sex: 6-month-old/male  
Height: 67 cm (26 in)  
Weight: 9 kg (19 lbs)  
Eyewear: None  
Seat Type: Unknown  
Seat Track Position: Fixed  
Manual Restraint Usage: Rear-facing CRS  
Usage Source: Police crash report, interview with father  
Air Bags: None  
Alcohol/Drug Involvement: None  
Egress From Vehicle: Removed by police officer  
Transport From Scene: Ambulance  
Medical Treatment: Hospitalized one day

### ***Second Row Left Occupant Injuries***

<b>Injury No.</b>	<b>Injury</b>	<b>AIS 2015</b>	<b>Involved Physical Components (IPC)</b>	<b>IPC Confidence Level</b>
1	Abrasions x 4, top of head, not further specified	110202.1	Child restraint system's back top surface	Probable
2 3	Abrasion left parietal scalp, not further specified and contusion (hematoma), small, in high parietal region, not further specified	110202.1 110403.1	Child restraint system's back top surface	Probable
4	Abrasions x 3, on left lateral elbow, not further specified	710202.1	Noncontact injury: flying glass, left rear glazing	Possible

*Sources: Emergency room records, hospitalization records, EMS treatment record (from scene to initial treatment facility), and EMS treatment record (from initial facility to trauma center). Injury Numbers 1 to 3 came from a combination of EMS treatment and emergency room records. Injury Number 4 came from a combination of emergency room and hospitalization records.*

### ***Second Row Left Occupant Kinematics***

The second row left occupant was seated in an unknown make and model rear-facing CRS. The frontal impact with the Dodge displaced the occupant forward into the back of the CRS resulting in abrasions to the head. The occupant also sustained abrasions on left lateral elbow from flying glass fragments from the disintegrated left rear glazing.

## **2006 DODGE STRATUS**

### ***Description***

The Dodge was a front-wheel drive, 5-occupant, 4-door sedan with the VIN 1B3EL46R36Nxxxxxx, equipped with a 2.7-liter, V-6 engine, 4-speed automatic transmission with sport shift feature, 4-wheel antilock brakes with electronic brake force distribution, and traction control. The vehicle was also equipped with frontal air bags and door-mounted side impact air bags.

### ***Exterior Damage***

*Exterior Damage Crash Event 1 and 2:* The Dodge sustained front plane damage during the impact with the Buick and left plane damage during the impact with the Chevrolet. The police crash scene photographs did not provide sufficient coverage of the vehicle to estimate a crush profile or write a CDC for either impact.

### ***Occupant Data***

The driver (28-year-old female) was restrained by a lap and shoulder seat belt according to the police crash report. The driver was transported by helicopter to a trauma center, where she died of her injuries.

## **2005 CHEVROLET MALIBU**

### ***Description***

The Chevrolet was a front-wheel drive, 5-occupant, 4-door sedan with the VIN 1G1ZS54F85Fxxxxxx, equipped with a 2.2-liter, I-4 engine, 4-speed automatic transmission, front disc brakes, rear drum brakes, and dual-stage frontal air bags.

### ***Exterior Damage***

*Exterior Damage Crash Event 2:* The Chevrolet sustained damage to the front plane. The police crash scene photographs did not provide sufficient coverage of the vehicle to estimate a crush profile or write a CDC for the front plane impact.

### ***Occupant Data***

The driver (18-year-old male) was restrained by a lap and shoulder seat belt according to the police crash report. He sustained police-reported "C" (possible) injuries but was not transported for medical treatment. A passenger was also present in the vehicle; however, the police crash report contained no information on the passenger other than that this person was not injured.

# CRASH DIAGRAM



Clear and Dry

Bituminous Roadway

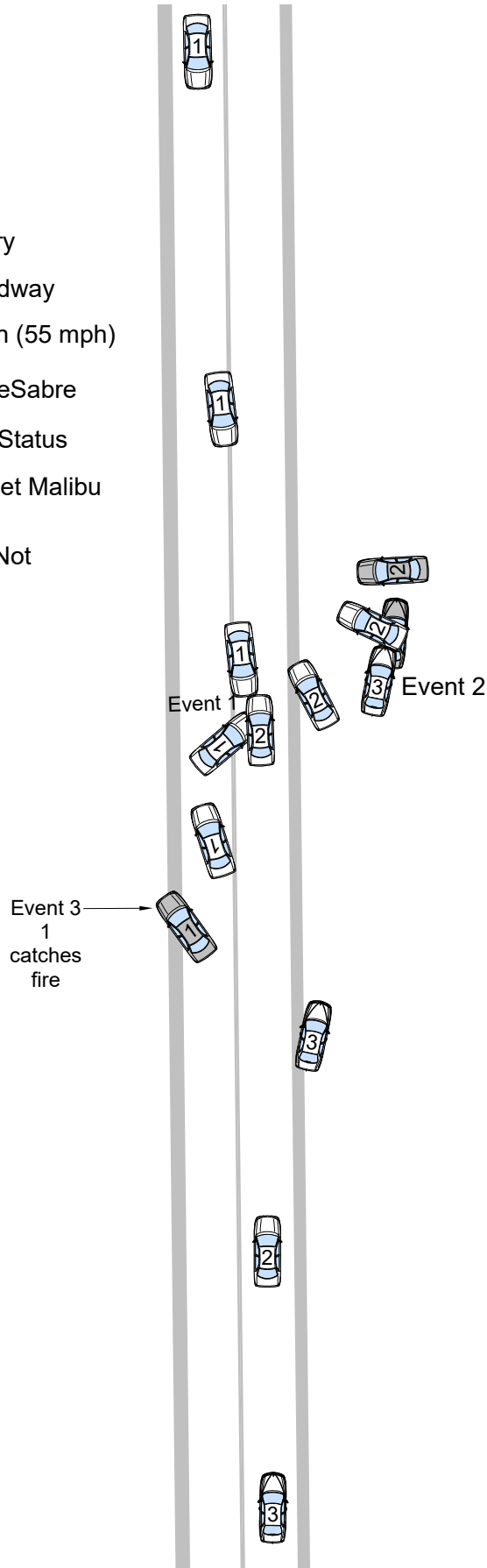
Speed Limit: 89 km/h (55 mph)

1 = 2000 Buick LeSabre

2 = 2006 Dodge Status

3 = 2005 Chevrolet Malibu

Crash  
Schematic, Not  
to Scale



Case Number:

IN17005

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