



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

ODI RESUME

Investigation: EA 06-001
 Prompted By: PE05-052
 Date Opened: 01/20/2006 Date Closed: 12/01/2006
 Principal Investigator: Peter C. Ong
 Subject: Sunroof Glass Failure

Manufacturer: General Motors Corp.
 Products: 2004 - 2006 Cadillac SRX with Ultraview type sunroofs
 Population: 47,232

Problem Description: Alleged shattering of the glass sunroof panel while the vehicle was being driven or occupied.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	9	18	27
Crashes/Fires:	0	0	0
Injury Incidents:	3	6	9
# Injuries:	10	9	19
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	0	10	10

*Description of Other: Warranty claims related to issue

Action: Close this Engineering Analysis.

Engineer: Peter C. Ong *PCO*
 Div. Chief: Thomas Z. Cooper
 Office Dir.: Kathleen C. DeMeter

Date: 12/01/2006
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Summary: ODI's investigation of the Cadillac SRX glass roof did not identify any defective manufacturing process, design, or quality control issue with the SRX glass roof system. GM believes that the most likely cause of breakage is stone or sharp object impact against the glass. The investigation included a peer multi-vehicle analysis. That analysis found that other vehicles with large glass roof systems experience random stone/object impacts and broken glass panels. The incident rate for the subject vehicles did not stand out in this analysis.

The SRX Ultraview power glass roof consists of up to three tempered glass panels surrounded by metal trim around the perimeter of the roof structure. The main front panel is a large movable glass panel residing over the first and second row occupants. The middle non-movable panel is not accessible from the inside. The rear non-movable panel is an optional panel (Ultraview plus option) and is viewable from the inside.

A safety-related defect has not been identified at this time and further use of agency resources does not appear to be warranted. Accordingly, this investigation is closed. The closing of this investigation does not constitute a finding by NHTSA that a safety-related defect does not exist. The agency will monitor this issue and reserves the right to take further action if warranted by the circumstances.

See summary report for additional information.

Background: On January 20, 2006, ODI opened this Engineering Analysis (EA) based on allegations of sunroof glass breakage in certain MY 2004 - 2006 Cadillac SRX crossover utility vehicles (subject vehicles), while being driven on the roadway. GM reports that it produced 47,232 subject vehicles with the Ultraview power glass roof and through May 2006, it sold 39,912 vehicles. Prior to opening the EA, ODI conducted a Preliminary Evaluation (PE05-052¹) on MY 2004 - 2005 SRX vehicles. This EA² is a continuation of that investigation into glass roof breakage and includes the MY2006 vehicles.

Sunroof Assembly: The Ultraview power glass roof consists of up to three tempered glass panels surrounded by metal trim around the perimeter of the roof structure. The main front panel is a large moveable glass panel residing over the first and second row occupants (see Figures 1 and 2). This panel is approximately 47 inches long x 31 inches wide. The inside opening is 24 inch long x 14 inches wide. The middle non-movable panel is 12 inches long x 31 inches wide and is not viewable from the inside. The rear non-movable panel is optional (Ultraview Plus option), is 23 inches long x 31 inches wide and is viewable from the inside the vehicle. Below each viewable glass panel, a movable sunshade panel can extend to block out the light permeating from the roof glass.

Owner Complaints and Warranty Claims: As of May 2006, ODI identified 27 owner complaints and eight warranty claims of front panel roof glass breakage. They include nine injury incidents resulting in 19 injuries. All the injuries were relatively minor in nature, consisting of shallow tissue cuts and scrapes from falling glass fragments or from handling glass fragment during the cleanup process. There were no injuries to the ocular (eye) region, but some injuries to the face, neck, and upper arm. In addition, there were two warranty claims of rear panel glass breakage with no injuries reported. From interviews with the complainants, most of them stated that they were driving their vehicle on open roadway (see Figure 3) and were not operating the sunroof at the time of the incident. All drivers were able bring their vehicles safely to the shoulder afterwards.

Sunroof Glass Design and Modifications: Like most manufacturers, GM uses a Type 3/AS3 tempered safety glass panel per ANSI/SAE standards for glazing material (Z26.1). In tempered glass, the surface of the glass is in compression and the glass has capacity to withstand high breaking stresses before failure. When tempered glass breaks, the fracture spreads across the entire glass panel and produces many small fragments without jagged edges or sharp shards. The SRX glass panels pass all the Z26.1 recommended tests. GM has not identified any manufacturer modifications or process changes related to this issue.

GM Field Inspection and Analysis: GM conducted field inspections of some vehicles reporting a broken sunroof glass panel. It was able to recover and closely inspect five broken glass panels to attempt to determine the origin of the breakage and the root cause. From these inspections and analyses, it determined that the initiation or impact points were random in nature,

¹ Resumes, Information Request letters, and manufacturer responses can be found in the public file for PE05-052.

² Resumes, Information Request letters, and manufacturer responses can be found in the public file for EA06-001.

occurred at different locations on the front glass panel and were the result of impact and not imperfections in the glass.

ODI SRX Vehicle Analysis: Figure 4 shows the 37 unique owner complaints and warranty claims plotted by report date. The data indicate no concentration of incident reports by report date, and no environmental/seasonal factors. Figure 5 shows these reports by build month. The reporting trend by build month shows a small (single digit) number of reports for any particular month and these appear to be randomly distributed. The time-to-failure (months in service) trend was also random in nature and ranged from one to 25 months of usage (Figure 6) with no concentration of vehicles at a particular service time period. The average number of incidents is approximately 1-2 per month. The combined incident rate from the 37 reports and over the 39,000 sold vehicles is around 70 per 100,000 vehicles per exposure-year.

ODI Peer Vehicle Analysis: ODI requested peer vehicle information from eleven manufacturers concerning their MY 2004-2006 vehicles. Peer vehicle data was obtained on the Acura RL, Audi A3, BMW 3-Series, BMW 6-Series, BMW X3/X5, Honda Element, Land Rover LR3, Lexus RX 330, Mercedes Benz R350/R500, Mini Cooper, Nissan Maxima, Nissan Quest, Pontiac G6, Porsche Cayenne, Scion tC, Subaru Forester and the Subaru Legacy/Outback vehicles. These manufacturers supplied data on vehicles having a large glass roof panel(s). The peer glass roofs consist of both movable and fixed panel(s) constructed from tempered, laminate or combination laminate-tempered glass. For the purpose of incident rate comparison, ODI excluded vehicles with laminate and combination laminate-tempered glass roofs because these designs retain the glass pieces rather than separate into many individual small pieces when broken. These 15 remaining peer vehicles represent a combined fleet population of 785,000 vehicles and 10 million total miles of travel.³ The peer manufacturer responses reported 30 owner complaints and 100 warranty claims related to glass roof breakage with six reported injury incidents. Three peer manufacturers did not report any incidents and two peer manufacturers reported higher incident rates than the subject SRX vehicle. The average report rate was approximately 16 incidents per 100,000 vehicles per exposure-year. The peer vehicle data indicates that they too are susceptible to occasional and random impacts that can lead to glass breakage.

Conclusion: The SRX Ultraview glass roof may shatter when struck by an object and this is true for peer vehicles as well. The rate of incident for the subject vehicle is within the range of peer vehicles for glass roof breakage. There were no incidents of vehicle loss-of-control because of the “startle” factor (loud noise and falling glass fragments). This investigation did not identify any defective manufacturing, process, design or quality control issue with the SRX glass roof system. Glass breakage appears to be due to random impacts with stones or sharp objects. A safety-related defect has not been identified at this time.

³ Stacy C. Davis and Susan W. Diegel, Transportation Energy Data Book, Edition 25 (Virginia: National Technical Information Service, 2005), p. 3-9 (Table 3.5).

Figure 1. Overview of the Ultraview Sunroof System

Overview

Front Movable Glass Section

Front Sunroof and Sunshade Opened



Rear and Middle Non-movable Glass Panels (middle panel not viewable from inside)

Figure 2. Sunroof Glass Operation

Overview

Cadillac SRX UltraView Roof System



Closed Position



Partially Open



Open Position



Closed Position



Open Position

Figure 3. Vehicle Trend by Vehicle Speed
Reports (as of 06/2006)

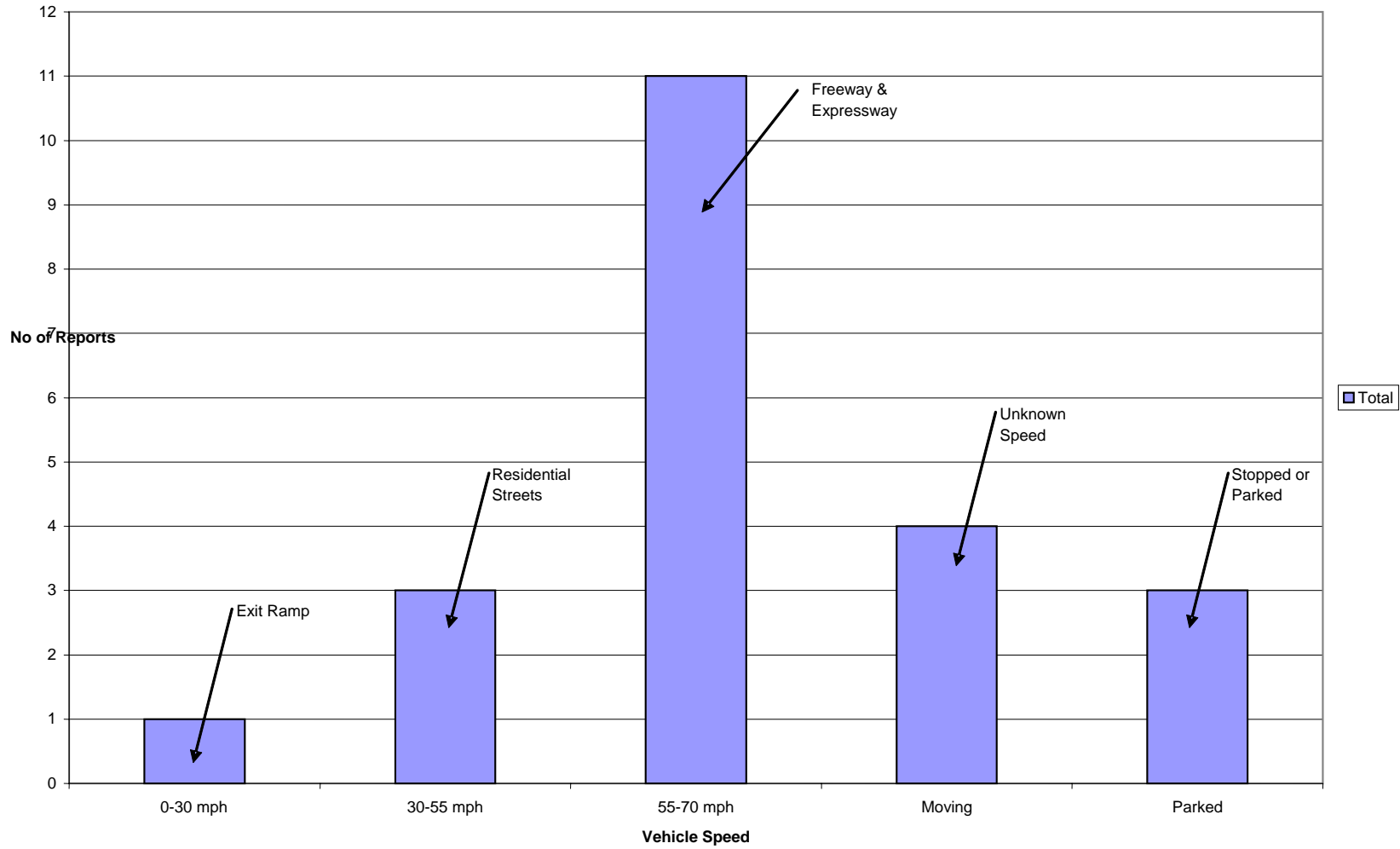


Figure 4. Report Trend by Report Date
Reports (as of 06/2006)

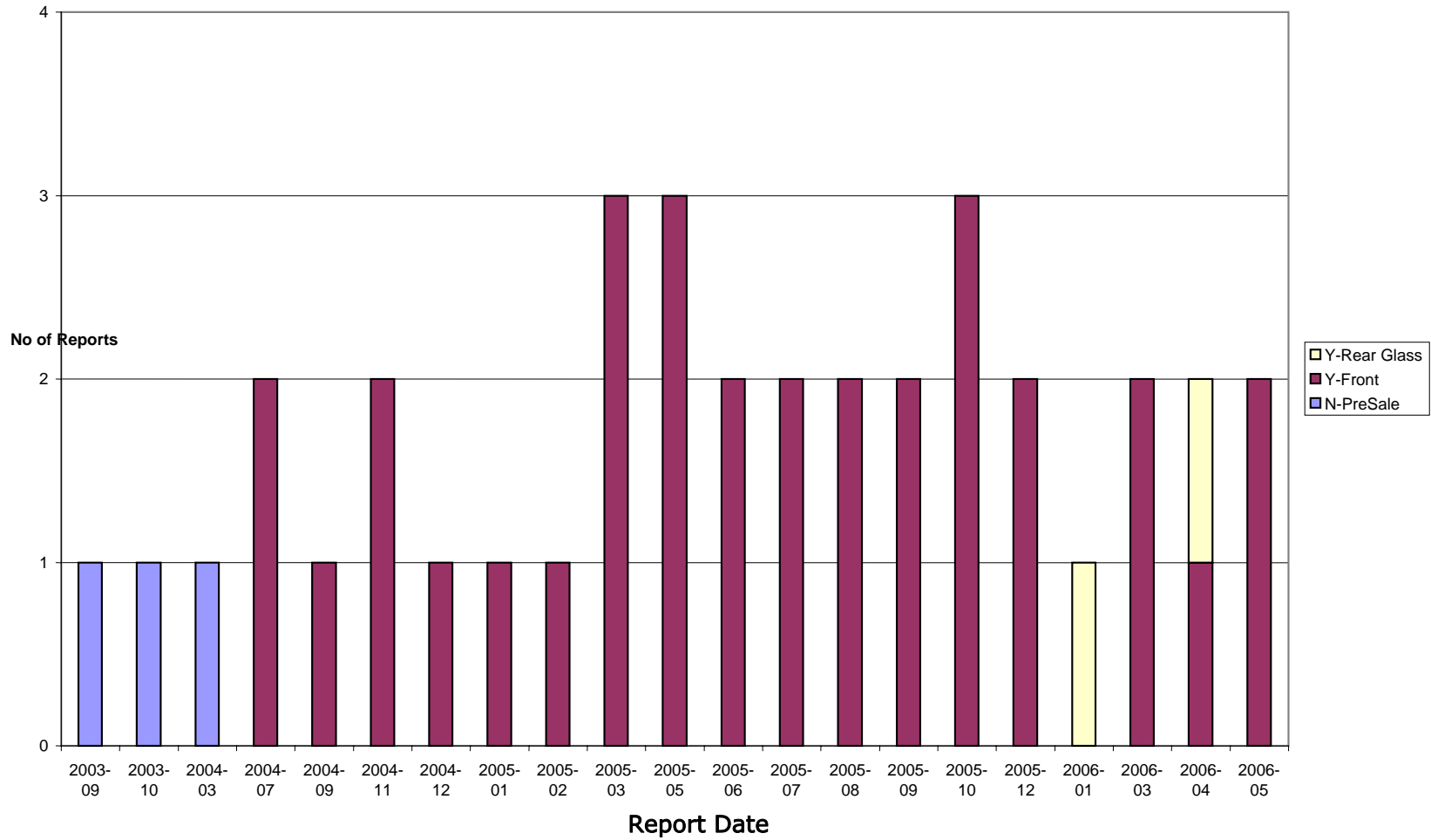


Figure 5. Reporting Trend by Build Month

Reports (as of 06/2006)

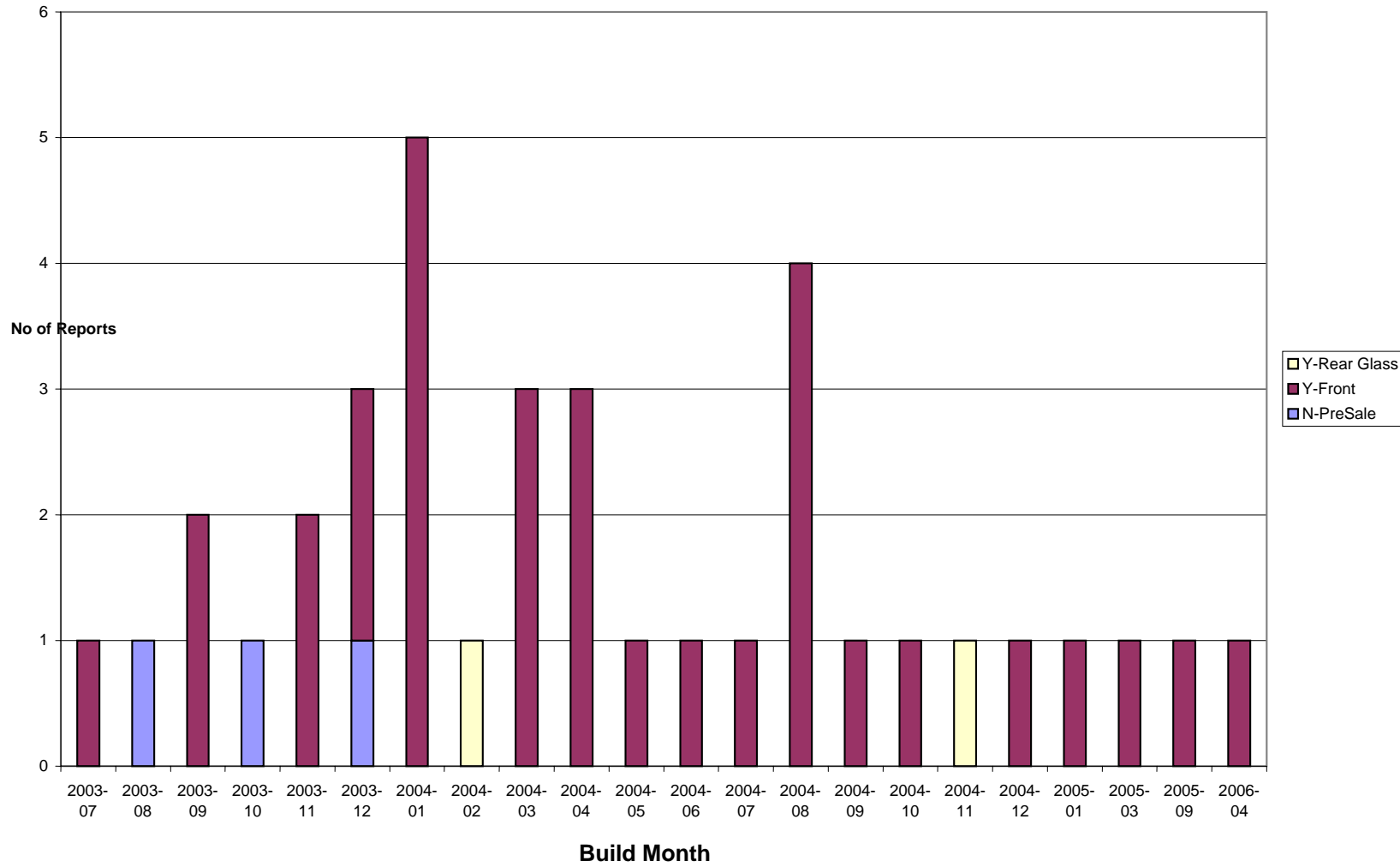


Figure 6. Incident Reports by Months in Service (MIS)

Reports (as of 06/2006)

