



ODI RESUME

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

Investigation: EA06-010
Prompted By: PE06-009
Date Opened: 06/15/2006 Date Closed: 09/11/2007
Principal Investigator: Stephen McHenry
Subject: Fuel tank punctures

Manufacturer: DaimlerChrysler Corporation
Products: 2004-2006 Chrysler Pacifica
Population: 299,694

Problem Description: Fuel tanks may puncture from contact with road debris.

FAILURE REPORT SUMMARY

	ODI	Manufacturer	Total
Complaints:	5	22	26
Crashes/Fires:	0	0	0
Injury Incidents:	0	0	0
# Injuries:	0	0	0
Fatality Incidents:	0	0	0
# Fatalities:	0	0	0
Other*:	0	155	155

*Description of Other: Parts restriction field reports

Action: This Engineering Analysis has been closed.

Engineer: Stephen McHenry *SMH* Date: 10/11/2007
 Div. Chief: Jeffrey L. Quandt Date: 10/11/2007
 Office Dir.: Kathleen C. DeMeter Date: 10/11/2007

Summary: EA06-010 was opened based on information gathered in Preliminary Evaluation PE06-009. PE06-009 was opened based on information obtained in a peer information request as part of a Preliminary Evaluation (PE05-050) of fuel tank puncture in model year (MY) 2003 through 2006 Nissan Murano vehicles. In January 2006, Nissan submitted a Defect Information Report to ODI that identified a defect in the fuel tank shielding in approximately 209,000 MY 2003 through 2006 Nissan Murano vehicles. To remedy the problem, Nissan installed shields on the exposed front surfaces of the recalled vehicles. Peer data collected for MY 2004 through 2005 Pacifica vehicles during PE05-050 included 120 field reports documenting tank replacements due to puncture or damage by road debris as part of a parts restriction program conducted at the request of the tank supplier (Inergy).

Analysis of the information provided by Chrysler during PE05-050, PE06-009 and EA06-010 show that the front surface of the fuel tanks in the subject Pacifica vehicles is not completely protected from road debris by the floor pan or other body structure. The tanks were compared with peer vehicles, including several identified by Chrysler as sharing similar design characteristics (unshielded high-density polyethylene plastic fuel tanks in a saddlebag configuration). Some of the peer designs reviewed by ODI packaged the tanks in recessed cavities in the floor pan or used shields to protect exposed surfaces on the front of the tank. In general, these tanks had the lowest complaint rates for tank puncture by road debris. However, other peer designs reviewed by ODI had packaging similar to the subject vehicles and some of these also had some complaints of tank puncture. None of the peer vehicles analyzed by ODI had tanks puncture data comparable to Chrysler's field reports from its part restriction programs, so that data could not be used in peer comparisons.

Analysis of the complaint data shows that the rate for the subject vehicles is about half that observed in the recalled Murano vehicles and not significantly higher than some of the peer vehicles analyzed with similar design characteristics. Testing by the NHTSA Vehicle Research and Testing Center (VRTC) showed differences between the Murano and Pacifica fuel tank packaging and exposure to road debris thrown by the front tires. 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 continue to monitor complaints and other information relating to the alleged defect in the subject vehicles and take further action in the future if warranted.

Engineering Analysis Closing Report

EA NUMBER: EA06-010

SUBJECT: Fuel tank puncture from contact with road debris.

DATE OPENED: June 5 2006 **DATE CLOSED:** September 11 2007

SUBJECT VEHICLES: Model year (MY) 2004 through 2006 Chrysler Pacifica vehicles.

SUBJECT COMPONENT: HDPE plastic fuel tanks.

ALLEGED DEFECT: The fuel tank may leak fuel as a result of a puncture incurred from impact with road debris.

VEHICLE POPULATION: At the cutoff date for Chrysler's response to EA06-010, January 25, 2007, there had been 299,694 Pacificas manufactured for sale or lease in the United States.

Model Year	U.S. Market Volume
2004	98,583
2005	118,564
2006	82,547

Table 1: Pacifica Population

DESCRIPTION OF SUBJECT COMPONENT: The front wheel drive Pacifica uses a fuel tank that is made of a high-density polyethylene (HDPE) plastic, located in the rear and center of the vehicle. Plastic fuel tanks are not uncommon in automobiles, as they are typically less expensive to manufacture than metal tanks, are easier to produce and are more resistant to the deteriorating effects of gasoline and the environment.

Additionally, because plastic fuel tanks can be more readily formed into complex shapes, it is possible to specially configure plastic fuel tanks into shapes designed to increase tank capacity without subtracting space from the passenger compartment. Due to the insulation properties of plastics, it is also possible to obtain a reduction in noise of the fuel sloshing in the tank and of the operation of the fuel sender pump.

Plastic tanks are considered to be safer in a crash situation. The blow molding process used to manufacture plastic fuel tanks does not produce seams which must be joined and sealed as with a metal fuel tank. Plastic tanks deform and have some ability to rebound back to shape. When a metal fuel tank absorbs energy and deforms, the pressure within the tank increases as the volume decreases, making the metal fuel tank vulnerable at the welded or clamped areas, where failure can potentially occur. Furthermore, in a crash situation, the HDPE fuel tanks are not a source of sparks.

The fire resistance of HDPE plastic fuel tanks is considered good due to the heat insulation nature of the material, and they are more resistant than metal fuel tanks to the corrosive environment conditions inside and outside the tanks.

On the MY 2004 to 2006 Chrysler Pacifica models that are the subject of EA06-010, the HDPE fuel tank is of a saddlebag design, similar to that of the Nissan Murano subject vehicle of PE05-050. This design consists of one tank with two reservoirs to either side of a pathway in the center of the tank. The fuel on the passenger side is pumped to the driver side of the tank and then pumped forward for use by the engine.

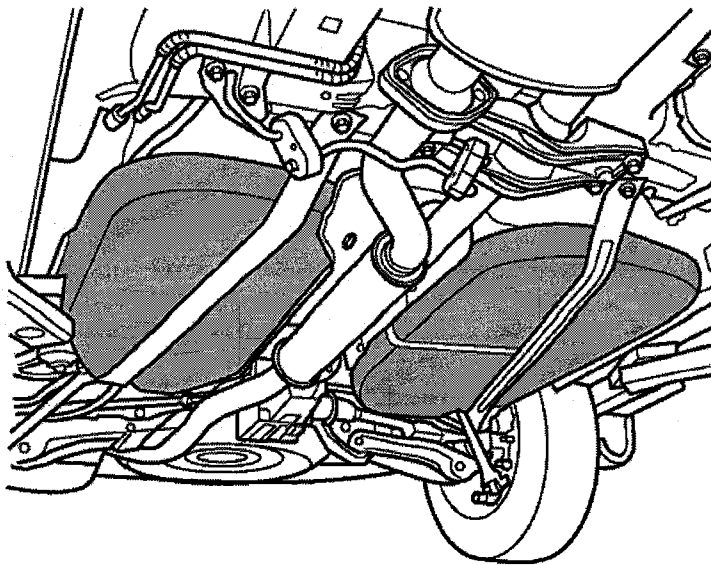


Figure 1: Diagram of underneath of Chrysler Pacifica showing plastic saddlebag style fuel tank (area in gray)

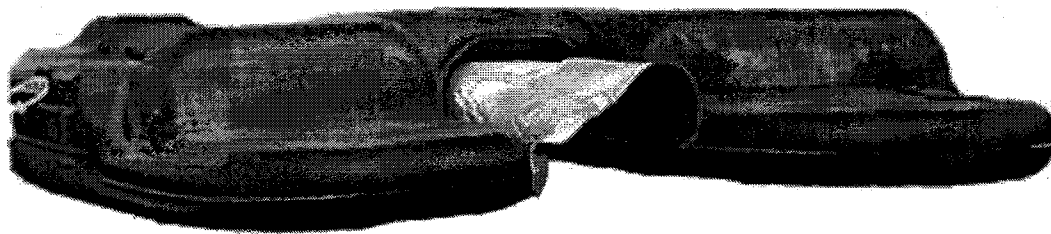


Figure 2: Photo of Pacifica HDPE fuel tank.

The pathway in the center of the tank is to allow for the placement of the exhaust, and the driveshaft in the all-wheel drive application. The fuel is pumped over the center section through the bridge connecting the two sections, at the top of the tank. The forward sections are lower than the rear sections, which rise to take advantage of the design of the body in allowing greater tank capacity. The metal shield in the center tunnel area is to reflect radiant heat from the exhaust system away from the tank.

BASIS: On September 13, 2005, the Office of Defects Investigation (ODI) opened Preliminary Investigation PE05-050 to investigate allegations of fuel tank punctures as a result of contact with road debris in MY 2004 through 2005 Nissan Murano vehicles. Information was also requested from other manufacturers of vehicles with similar fuel tank design and packaging in order to establish a comparison basis for analyzing the Nissan response data. These included the MY 2003 through 2005 Acura MDX, Honda

Pilot, Volvo XC90 and Ford Explorer; MY 2001 through 2005 Toyota Highlander and Lexus RX300/330; and the MY 2004 through 2005 Chrysler Pacifica vehicles.

When PE05-050 was opened in September 2005, ODI had received four complaints from consumers regarding Nissan Murano tank punctures. At that time, ODI had not received any complaints of fuel tank punctures in Chrysler Pacifica vehicles.

In a January 9, 2006 letter, Nissan notified ODI of its plan to recall approximately 209,000 MY 2003 through 2006 Nissan Murano vehicles to correct a deficiency in fuel tank shielding. A total of 38 tank puncture incidents had been reported to ODI and Nissan when PE05-050 was closed on January 31, 2006. These incidents included complaints reported to ODI (at that time a total of 12), consumer complaints reported to Nissan (31 total, 26 not previously known to ODI), and Nissan field reports (0).

A similar analysis of the Pacifica response data yielded consumer complaints to Chrysler (15) and Chrysler field reports (120). The comparative complaint/field-report rate per 100,000 vehicles was significantly higher for the Pacifica vehicles than for any of the other peers that ODI studied during PE05-050. ODI also noted that the Murano and Pacifica were the only vehicles for which information was requested under PE05-050 that did not have shielding on the front region of the fuel tank. The apparently high rate for the Pacificas prompted the opening of PE06-009 into the MY 2004 through 2006 Chrysler Pacifica vehicles.

PE05-050 Complaint Rate

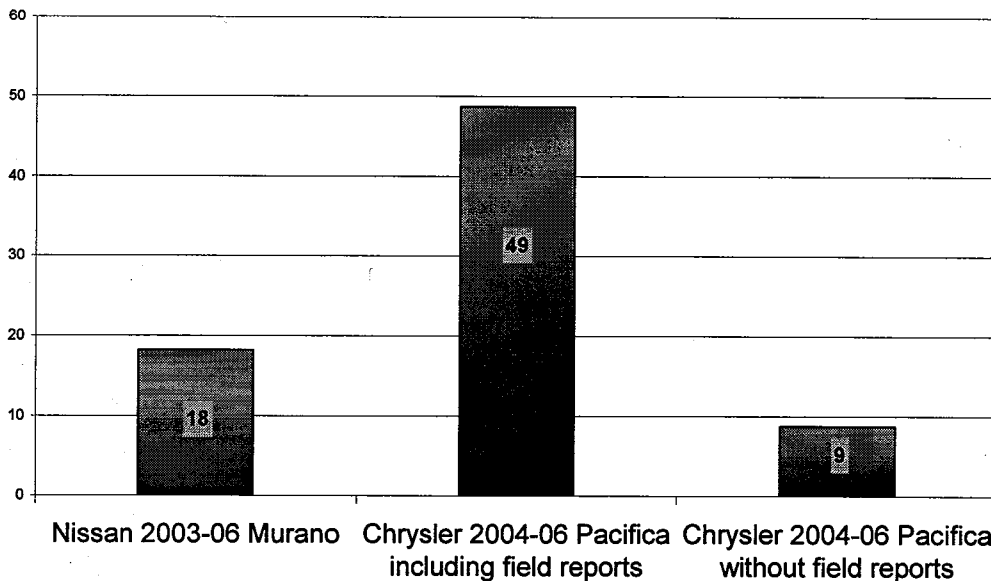


Chart 1: Comparative complaint rates Murano versus Pacifica including field reports from parts restriction, and with only complaints counted (same criteria as Murano)

MANUFACTURER'S EVALUATION OF THE ALLEGED DEFECT: In the response for peer data in PE05-050, Chrysler noted, "The fuel tank assembly in the subject peer vehicles meets or exceeds all applicable FMVSS [Federal Motor Vehicle Safety Standards and Regulations] standards, as well as all DCC [DaimlerChrysler Corporation] specifications and design guidelines. Although the data contained within

this response does reference some allegations of fuel tank damage from road debris, it is unreasonable to believe that any fuel tank assembly would be immune to all conceivable damage from the wide variety of debris that may be encountered during typical driving situations. In addition, DCC is not aware of any reports involving crash, injury, fire, property damage or fatality related to the subject vehicle fuel tank damage from road debris.”

In the April 21, 2006 response to PE06-009, Chrysler stated, “According to NHTSA, DCC’s level of input was higher than other manufacturers who responded to the PE05-050 peer inquiry. DCC, however, believes that its actual occurrence rate is consistent with the industry. DCC submitted a greater number of field reports because it maintained a part restriction program that created inputs for all fuel tank replacements, not typically submitted or tracked by the manufacturer.”

ODI ANALYSIS: The Chrysler Pacifica is a mid-size crossover SUV first introduced for MY 2004, the first sales of the Pacifica reported as beginning January 21, 2003. The parts restriction program was put in place by Chrysler and their Pacifica fuel tank manufacturer, Inergy Automotive Systems, starting in January 2003, because it was the first time that Chrysler and Inergy had designed and manufactured a HDPE plastic saddlebag style fuel tank and the production teams responsible wanted to monitor its performance from the start. Such feedback would be helpful in monitoring the performance of the dual fuel pumping system, the evaporative emissions systems performance as related to the tank, any fuel filling issues, and tank integrity among other issues. The program continued until June 2005, when it was taken off of restriction because the tank was performing well.

The parts restriction field reports generated during the time period of January 2003 to June 2005 do not reveal much useful data in terms of text descriptive of the puncture events. A typical comment was “vehicle hit something in the road, tank damaged.” These road debris puncture reports were part of a larger pool of parts restriction reports on tank replacements. These replacements were generally not covered under warranty. There was no attempt to obtain more detailed information as that was not the scope of the restriction program at that time. A second restriction program was instituted by Chrysler from February 2006 to March of 2006 in response to EA06-010 to obtain more specific data on the nature of tank replacements.

Nissan’s Defect Information Report for the Murano vehicles provided the following description of the defect: “The fuel tank in these vehicles is located under the floorpan and forward of the rear suspension. The lowest point of the forward edge of the fuel tank is at a level above the front suspension members and engine cradle such that if there is an object in the roadway, the engine cradle and suspension structure will deflect it and prevent it from contacting the fuel tank in most driving situations. However, due to the level of the forward edge of the tank unique to this model, in the event that a vehicle front tire runs over a small, sharp object in the road, catches it and propels it towards the rear of the vehicle, there is a possibility it may strike the front edge of the fuel tank and puncture it in this model.”

ODI compared the subject vehicle complaint rate with the rate recorded in the Murano investigation and the rates for several peer vehicles from PE05-050 and with vehicles identified by Chrysler, in response to PE06-009, as sharing similar design

characteristics (unshielded high-density polyethylene plastic fuel tanks in a saddlebag configuration). Some of the peer designs reviewed by ODI packaged the tanks in recessed cavities in the floor pan or used shields to protect exposed surfaces on the front of the tank. These vehicles did not have complaints of tank puncture by road debris. However, there were some peer designs with tank packaging similar to the subject vehicles and some of these also had some complaints of tank puncture. None of the non-Chrysler peer vehicles analyzed by ODI had tanks puncture data comparable to Chrysler's field reports from its part restriction programs, so that data could not be used in peer comparisons. Table 2 summarizes the tank design factors for the subject and peer vehicles and lists them in descending order of complaint rate for tank puncture by road debris.

Vehicles		Tank Design Factors		Tank puncture complaints	
Model Year/Make/Model	Population	Protected by floor pan	Shielded	Reports	Rate per 100,000 vehicles
2003-05 Nissan Murano	190,746	No	No	38	19.9
2004-06 Chrysler Pacifica	297,067	No	No	26	8.8
2005-06 Chrysler LX ¹	619,166	No	No	31	5.0
2001-05 Toyota Highlander	562,387	No	Yes	15	2.7
2003-05 Ford Explorer	609,988	No	(1)	11	1.8
2005-06 Ford Freestyle	129,558	No	No	2	1.5
2003-05 Honda Pilot	401,137	No	Yes	4	1.0
2003-05 Acura MDX	178,617	No	Yes	1	0.6
2004-06 Volvo V70	29,270	Yes	No	0	-
2004-06 Volvo XC70	50,555	Yes	No	0	-
2004-06 Mazda RX-8	61,356	Yes	No	0	-
2005-06 Cadillac STS	68,601	Yes	No	0	-
2004-06 Cadillac SRX	78,954	Yes	No	0	-
2003-05 Volvo XC90	105,109	Yes	No	0	-
2004-06 Cadillac CTS	172,375	Yes	No	0	-

Table 2: Peer Vehicle Comparison Ranked by Complaint Rates.

(1) Skid plates on vehicles with four-wheel drive.

NHTSA's Vehicle Research and Testing Center (VRTC) in East Liberty, Ohio conducted comparative vehicle inspection and testing regarding tank packaging, exposure, and trajectories of objects thrown by the front tires for the Murano and the Pacifica. VRTC found that the trajectories from the front tire point of contact with the road surface to the fuel tank are similar for the Nissan Murano and the Chrysler Pacifica vehicles. However, the VRTC also identified differences between the fuel tanks on the two vehicles in the surface area exposed to impact from objects thrown by the front tires

¹ Dodge Charger, Dodge Magnum and Chrysler LX.

and the shape of the front surface of the tank that is exposed to objects thrown by the front tires (Figures 3-6).

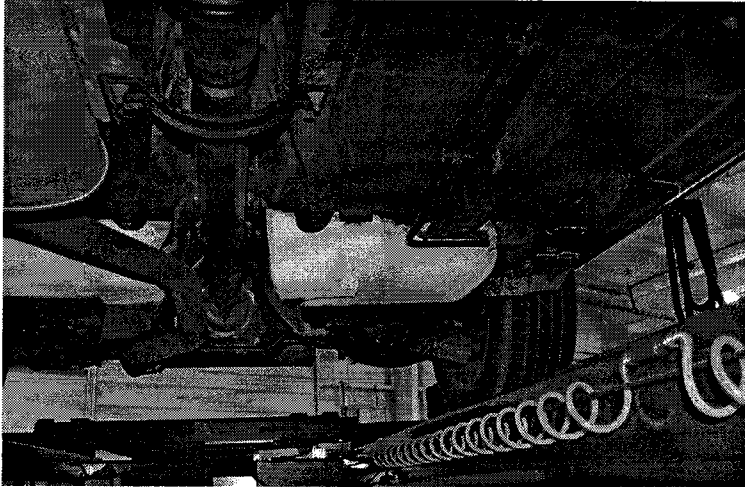


Figure 3: Photo of Nissan Murano driver's side fuel tank without shield (tank has been coated with white latex tape for impact testing purposes).



Figure 4: A closer view of the Nissan Murano tank shows that it is of a design that presents a flatter, taller front face (white latex tape added by the VRTC).

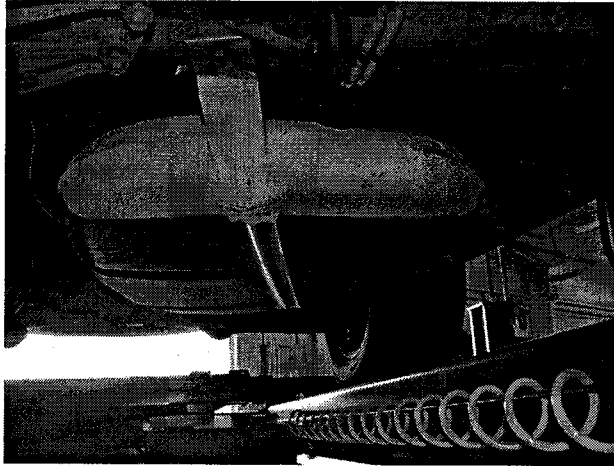


Figure 5: A photo of the driver's side Pacifica fuel tank (white latex tape added by the VRTC).

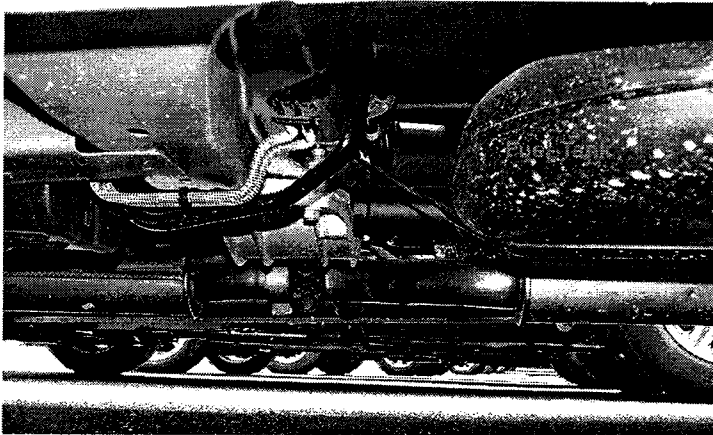


Figure 6: A side view photo of the driver's side Pacifica fuel tank, front of the vehicle to the left.

Chart 2 provides a comparison of the complaint rates adjusted for exposure years for the recalled Nissan Murano vehicles and the subject vehicles. The Murano rate is approximately 2.5 times higher than that of the subject vehicles.

Complaint-Exposure Rate

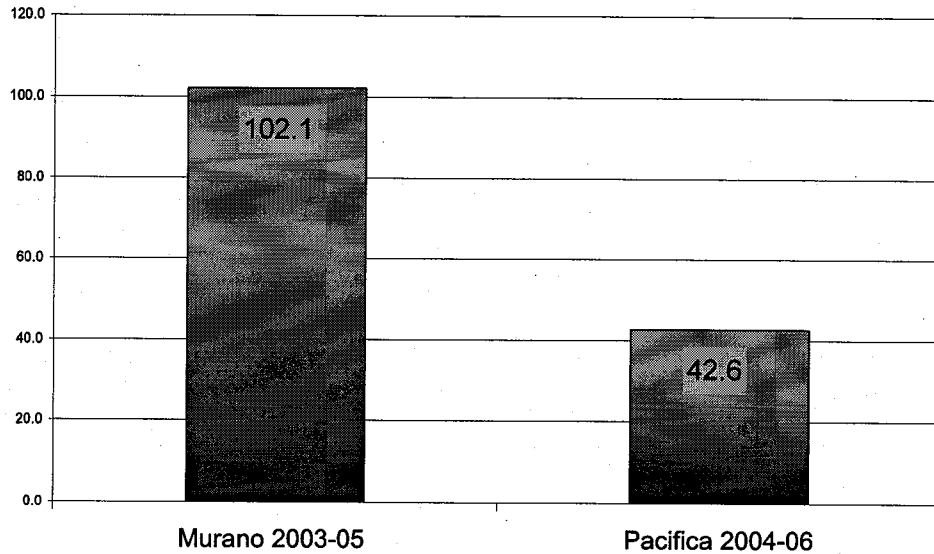


Chart 2: Subject vehicle exposure adjusted complaint rate comparison with recalled Nissan Murano vehicles (complaint per million vehicle years).

ODI has not received any VOQs regarding fuel tank punctures on the subject vehicles within the previous nine months, and has only received two within the last year. Analysis of the complaint data show that the rate for the subject Pacifica vehicles is less than half that observed in the recalled Murano vehicles. Some of the peer designs reviewed by ODI packaged the tanks in recessed cavities in the floor pan or used shields to protect exposed surfaces on the front of the tank. In general, these tanks had lower complaint rates for tank puncture by road debris. Peer designs with packaging similar to the subject vehicles also had some complaints of tank puncture, although the rates were lower than for the Pacifica vehicles. 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 continue to monitor complaints and other information relating to the alleged defect in the subject vehicles and take further action in the future if warranted.