



LM
8/27/07

August 17, 2007

Jeffrey L. Quandt, Chief
Vehicle Control Division
Office of Defects Investigation
National Highway Traffic Safety Administration
1200 New Jersey Ave., S. E., Room W48-307
Washington, D.C. 20590

N070167

NVS-213car
PE07-033

Dear Mr. Quandt:

This letter is General Motors' (GM) response to your information request (IR), dated July 9, 2007, regarding allegations of engine stalling due to fuel pump assembly failures in Model Year (MY) 2001-2004 Chevrolet Cavalier vehicles manufactured by GM for sale or lease in the United States.

Your questions and our corresponding replies are as follows:

1. **State, by model and model year, the number of subject vehicles GM has manufactured for sale or lease in the United States. Separately, for each subject vehicle manufactured to date by GM, state the following:**
 - a. **Vehicle identification number (VIN);**
 - b. **Make;**
 - c. **Model;**
 - d. **Model Year;**
 - e. **Date of manufacture;**
 - f. **Date warranty coverage commenced; and**
 - g. **The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).**

Provide the table in Microsoft Access 2000, or a compatible format, entitled "PRODUCTION DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

General Motors is providing the number of subject vehicles produced for sale or lease in the United States by make, model and model year in Table 1 below:

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	219,858	262,253	218,392	214,624	915,127

Table 1 Vehicle Production

The production information requested in 1a-1g is provided on the ATT_1_GM disk in the folder labeled Q_01; refer to the Microsoft Access 2000 file labeled, "Q_01_Production Data." GM is providing the state where the vehicle was shipped in response to request 1g. For some of the subject vehicles, which have incomplete warranty files, the GM warranty system does not contain a warranty start date or state where the vehicle was shipped and, therefore, these fields are blank in Microsoft Access 2000 file.



2. State, by model and model year, the number of each of the following, received by GM, or of which GM is otherwise aware, which relate to, or may relate to, the alleged defect in the subject vehicles:
- a. Total consumer complaints, including those from fleet operators;
 - b. Consumer complaints, including those from fleet operators, where a vehicle stall was reported;
 - c. Total field reports, including dealer field reports;
 - d. Field reports, including dealer field reports, where a vehicle stall was reported;
 - e. Reports involving a crash, injury, or fatality, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
 - f. Reports involving a fire, including, but not limited to those involving smoke, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
 - g. Property damage claims; and
 - h. Third-party arbitration proceedings where GM is or was a party to the arbitration; and
 - i. Lawsuits, both pending and closed, in which GM is or was a defendant or codefendant.

For subparts "a" through "g," state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

In addition, for items "e" through "i," provide a summary description of the alleged problem and causal and contributing factors and GM's assessment of the problem, with a summary of the significant underlying facts and evidence. For items "h" and "i," identify the parties to the action, as well as the caption, court, docket number, and date on which the complaint or other document initiating the action was filed.

As a result of a telephone conversation with NHTSA, GM is providing in Table 2-1, reports of alleged engine stalling while driving due to fuel pump assembly failure. GM is also providing in Table 2-2, reports of alleged engine no start or hard to start due to fuel pump assembly failure. GM has organized the records by the GM file number within each attachment. To date, GM's investigation of the alleged defect has not included an assessment of the cause(s) of each incident responsive to Request No. 2. Some incident reports may not contain sufficient reliable information to accurately assess cause.

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/FATALITIES*	NUMBER WITH FIRES**
Owner Reports	318	2	2	4	3**	1**
Field Reports	52	1	0	0	0	0
Not-In-Suit Claims	1	0	0	0	1	0
Subrogation Claims	1	0	1	1	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (Including Duplicates)	372	3	3	5	4	1
Total Vehicles with Reports (Unique VIN)	367	3	2	4	4	1

TABLE 2-1: REPORT BREAKDOWN – ENGINE STALLING WHILE DRIVING

* GM HAS NO FATALITY REPORTS

** One report included an alleged injury and a fire. After replacing a fuel pump assembly, an improper service procedure was used in an attempt to start the vehicle.

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES/FATALITIES*	NUMBER WITH FIRES
Owner Reports	261	1	0	0	0	0
Field Reports	41	0	0	0	0	0
Not-In-Suit Claims	0	0	0	0	0	0
Subrogation Claims	0	0	0	0	0	0
Third Party Arbitration Proceedings	0	0	0	0	0	0
Product Liability Lawsuits	0	0	0	0	0	0
Total Reports (including Duplicates)	302	1	0	0	0	0
Total Vehicles with Reports (Unique VIN)	300	1	0	0	0	0

TABLE 2-2: REPORT BREAKDOWN – NO START/HARD START CONDITIONS

* GM HAS NO FATALITY REPORTS

The sources of the requested information and the last date the searches were conducted are tabulated in Table 2-3 below.

Source System	Last Date Gathered
Customer Assistance Center	6/20/07
Technical Assistance Center	6/22/07
Field Information Network Database (FIND)	7/19/07
Field Product Report Database (FPRD)	7/19/07
Company Vehicle Evaluation Database (CVEP)	7/16/07
Captured Test Fleet (CTF)	7/16/07
Early Quality Feedback (EQF)	7/16/07
Legal/Employee Self Insured Services (ESIS)/Product Liability Claims/Lawsuits	7/23/07

TABLE 2-3: DATA SOURCES

3. Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:
 - a. GM's file number or other identifier used;
 - b. The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);

- c. **Vehicle owner or fleet name (and fleet contact person), address, and telephone number;**
- d. **Vehicle's VIN;**
- e. **Vehicle's make, model and model year;**
- f. **Vehicle's mileage at time of incident;**
- g. **Vehicle's speed at time of incident;**
- h. **Incident date;**
- i. **Report or claim date;**
- j. **Whether any warning lights were illuminated at the time the alleged defect occurred (identify light);**
- k. **Whether the vehicle stalled as a result of the alleged defect;**
- l. **Whether the driver was able to restart the vehicle, if the vehicle stalled (i.e., immediate, delayed, if it took greater than 5 minutes to restart, or no);**
- m. **Whether the vehicle was towed into the dealership;**
- n. **Whether a crash is alleged;**
- o. **Whether a fire is alleged;**
- p. **Whether property damage is alleged;**
- q. **Number of alleged injuries, if any;**
- r. **Number of alleged fatalities, if any; and**
- s. **A summary of the incident.**

Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

The requested information is provided on the ATT_1_GM disk in the folder labeled Q_03 refer to the Microsoft Access 2000 file labeled, "Q_03_REQUEST NUMBER TWO DATA – TABLE 2-1," for information on those cases that may relate to the engine stalling while driving due to fuel pump assembly failure. On the same disk, refer to the file labeled, "Q_03_REQUEST NUMBER TWO DATA – TABLE 2-2," for information on those cases that may relate to the vehicle exhibiting a no start or hard to start condition due to fuel pump assembly failure. All available attachments associated with those records can also be found in the same folder in the files labeled "Q_03_REQUEST NUMBER TWO DATA ATTACHMENTS TABLE 2-1" and "Q_03_REQUEST NUMBER TWO DATA ATTACHMENTS TABLE 2-2." Some incident reports may not contain sufficient reliable information to accurately answer all parts of question 3.

4. **Produce copies of all documents, including all document attachments, related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method GM used for organizing the documents.**

Copies of the records summarized in Table 2-1 and Table 2-2 are on the disk the ATT_1_GM embedded in the folder labeled Q_03; refer to the Microsoft Access 2000 files labeled "Q_03_REQUEST NUMBER TWO DATA – TABLE 2-1" and "Q_03_REQUEST NUMBER TWO DATA – TABLE 2-2." All available attachments associated with those records can also be found in the same folder in the files labeled "Q_03_REQUEST NUMBER TWO DATA ATTACHMENTS TABLE 2-1" and "Q_03_REQUEST NUMBER TWO DATA ATTACHMENTS TABLE 2-2." GM has organized the records by the GM file number within each attachment.

5. State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by GM to date that relate to, or may relate to, the alleged defect in the subject vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign.

Separately, for each such claim, state the following information:

- a. GM's claim number;
- b. Vehicle owner or fleet name (and fleet contact person) and telephone number;
- c. VIN;
- d. Repair date;
- e. Vehicle mileage at time of repair;
- f. Whether any warning lights were illuminated at the time the alleged defect occurred (indicate name of light);
- g. Whether the vehicle stalled as a result of the alleged defect;
- h. Whether the driver was able to restart the vehicle, if the vehicle stalled;
- i. Whether the vehicle was towed into the dealership;
- j. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
- k. Labor operation number;
- l. Problem code;
- m. Replacement part number(s) and description(s);
- n. Concern stated by customer; and
- o. Comment, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

As a result of a telephone conversation between NHTSA and GM on July 19, 2007, GM is providing Warranty Data for fuel pump component or assembly replacements on the subject vehicles, regardless of whether it resulted in a stall condition.

Tables 5-1 through 5-5 summarize the regular warranty data that may be related to fuel pump component or assembly replacements. This data was sorted into five categories as shown on the tables. The definition of those categories is as follows:

- Stall – Vehicle stalled while driving
- No Start/Hard Start – Vehicle had a no start or hard to start condition, but there was no indication that it stalled while driving.
- Fuel Level Sensor – Vehicle had a claim related to the fuel level gage, but there was no indication that the vehicle stalled while driving and no indication that it had a no start condition.
- Other Drivability Conditions – Vehicle had a claim related to the fuel pump assembly or the fuel level sensor, but there was no indication that the vehicle stalled while driving and no indication that it had a no start condition.
- Unknown – The warranty claim did not provide enough information to put the claim in any of the previous four categories.

A list of labor codes and customer codes is provided in response to item No. 6.

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	1469	1325	1506	359	4659

Table 5-1
 Regular Warranty Claims – Stall while driving

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	7861	6346	6416	1042	21665

Table 5-2
 Regular Warranty Claims – No Start/Hard Start

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	6036	4551	3571	1147	15305

Table 5-3
 Regular Warranty Claims – Fuel Level Sensor

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	1413	950	940	669	3972

Table 5-4
 Regular Warranty Claims – Other Drivability Conditions

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	3321	2244	2278	641	8484

Table 5-5
 Regular Warranty Claims - Unknowns

Tables 5-6 and 5-7, summarize the extended warranty claims for the subject vehicles that may be related to fuel pump component or assembly replacements. These claims are separated into two tables, the first for those that relate to the fuel pump assembly and the second for those that relate to the fuel level sensor. These claims do not provide enough detail to sort the information into the same categories as the regular warranty data.

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier (MIC)	1908	1332	3541	171	6952
Chevrolet Cavalier (UWC)	43	26	88	6	163

Table 5-6
 Extended Warranty Claims for Fuel Pump Assembly

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier (MIC)	616	408	310	44	1378
Chevrolet Cavalier (UWC)	10	4	4	1	19

Table 5-7
 Extended Warranty Claims for Fuel Level Sensor

Table 5-8 summarizes the goodwill warranty claims that were collected by searching the appropriate warranty labor codes. From those codes, one goodwill warranty claim was identified that may be related to the alleged condition.

Make/Model	2001 MY	2002 MY	2003 MY	2004 MY	Total
Chevrolet Cavalier	0	0	1	0	1

Table 5-8
 Goodwill Warranty Claims for Fuel Pump Assemblies and Fuel Level Sensor:
 (Labor Codes Z1241 and Z1242)

The sources of the requested information and the last date the searches were conducted are tabulated in Table 5-9 below.

Source System	Last Date Gathered
GM CARD – Regular Warranty	7/17/2007
Motors Insurance Corporation (MIC) – Extended Warranty	7/12/2007
Universal Warranty Corporation (UWC) – Extended Warranty	7/25/2007

Table 5-9 Data Source

A summary of the warranty claims, including the information requested in 5 (a-o), is provided on the ATT_1_GM disk in the folder labeled Q_05; refer to Microsoft Access 2000 file labeled, "Q_05_WARRANTY DATA."

6. Describe in detail the search criteria used by GM to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State, by make and model year, the terms of the new vehicle warranty coverage offered by GM on the subject vehicles (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that GM offered for the subject vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.

To search for and collect the warranty data for this response, the GM Claim Adjustment Retrieval Database (CARD) regular warranty database and the Motors Insurance Corporation (MIC) extended warranty database were searched using the labor codes listed in table 6-1. Universal Warranty Corporation (UWC) does not use labor codes or customer codes.

Labor Code	Description
L1200	Sender/Pump, Fuel Tank Unit - Replace
L1197	Sensor, Fuel Level (Tank Unit) - All
J5590	Pump, In Tank Fuel - Replace
L1198	Filter, Fuel (In Tank)-Replace All
Z1241	Product Liability/Investigation REP PR (Goodwill)
Z1242	PAR – Repairs/Reimbursement (Goodwill)

Table 6-1 Labor codes Used in Warranty Search

The labor codes Z1241 and Z1242 can be used by dealers for reimbursement for goodwill warranty repairs. They are not specific to replacement of the subject components. GM

reviewed the goodwill claims with these two labor codes. Claims that clearly did not relate to replacement of subject components based on a review of the dealer verbatim, customer code, repair cost and vehicle VIN are not being provided.

Within the Labor Codes (L1200, L1197, L1198 & J5590), customer complaint codes are also provided for warranty claims. Table 6-2 lists those customer codes that were used to further classify the reasons that the subject components were replaced.

Customer Complaint Code	Description
PU	PERFORMANCE: STALLS-HOT ENG
PB	PERFORMANCE: CUTS OUT
PT	PERFORMANCE: STALLCOLD(FAILED EMISS
PR	PERFORMANCE:SLUGGISH(STALLS-HOT EN
PQ	PERFORMANCE: ROUGHIDLE-HOT(STALLCOL
PN	PERFORMANCE: NO START(ROUGH IDLECOL
PF	PERFORMANCE: HARD ST-COLD(HESIT-HOT
PG	PERFORMANCE: HARD ST-HOT(HESIT-HOT
AV	VISUAL: UNUSUAL GAGE READING
V5	VISUAL: SPOT/STAIN(UNUSU GAGERDG)
N2	NOISE: WHISTLE
N3	NOISE: WIND NOISE
NA	NOISE: BOOM
NB	NOISE: BUZZ
NC	NOISE: CHATTER
ND	NOISE: CLICK/TICKING
NE	NOISE: CLUNK
NF	NOISE: CREAK(GRIND)
NG	NOISE: GRIND(GROWL)
NH	NOISE: GROWL(HISS)
NI	NOISE: HISS(HOWLING)
NJ	NOISE: HOWLING(KNOCK)
NK	NOISE: INTERFERENCE(MOAN)
NM	NOISE: KNOCK(POPPING)
NN	NOISE: MOAN(RATTLE)
NP	NOISE: POPPING(ROAR)
NQ	NOISE: RATTLE(RUMBLE)
NR	NOISE: ROAD NOISE(SQUEAK)
NS	NOISE: ROAR(SQUEAL)
NT	NOISE: RUMBLE(WHINE)
NU	NOISE: SQUEAK(WHISTLE)
NV	NOISE: SQUEAL(WIND NOISE)
NW	NOISE: SQUISH(CHATTER)
NY	NOISE: TAPPING
NZ	NOISE: WHINE
WG	WARNING LIGHTS: SERVICE ENGINE SOON
PH	PERFORMANCE: HESIT-COLD(MISS)
PI	PERFORMANCE: HESIT-HOT(OVERHEATING)
PP	PERFORMANCE: ROUGH IDLECOLD(SLUGGIS
PS	PERFORMANCE: SPARK KNOCK(SURGE)
PV	PERFORMANCE: SURGE
VN	VISUAL: LEAK/LEAKS(MISSING)

Table 6-2 Customer complaint codes used to classify regular warranty claims

The process used to categorize the regular warranty data is described in an attached Microsoft Word document. This is located on ATT_1_GM disk in the folder labeled Q_06; refer to Microsoft Word file labeled, "Q_06_WARRANTYDATASORT."

The subject vehicles are covered by a bumper-to-bumper new vehicle warranty for three years or 36,000 miles whichever occurs first. Many different extended warranty options are available through GM dealerships. They are offered at different prices and for varying lengths of time, based on customer's preference, up to 7 years from the date of purchase or up to a total of 100,000 vehicle miles. The General Motor's warranty system does not contain information on the number of vehicles that have extended warranty coverage. The number of extended warranty coverage contracts on the subject vehicles that have been sold by MIC regardless of status (in-force, expired, cancelled) as of May 25, 2007 is contained in Table 6-3.

MAKE/MODEL	2001 MY	2002 MY	2003 MY	2004 MY
Chevrolet Cavalier	49480	85453	54121	45787

TABLE 6-3: MIC EXTENDED WARRANTY COVERAGE CONTRACTS SOLD

- 7. Produce copies of all service, warranty, and other documents that relate to, or may relate to, the alleged defect in the subject vehicles, that GM has issued to any dealers, regional or zone offices, field offices, fleet purchasers, or other entities. This includes, but is not limited to, bulletins, advisories, informational documents, training documents, or other documents or communications, with the exception of standard shop manuals. Also include the latest draft copy of any communication that GM is planning to issue within the next 120 days.**

GM has issued the following bulletins relative to the alleged defect on the subject vehicles:

Service Information Bulletin #01-06-04-008D, issued 4/3/2003. Instructed dealers that the fuel level sender and the fuel pump assembly are now sold separately and to only replace the appropriate part to repair the customer's concern.

Service Information Bulletin #05-06-04-026A, issued 4/27/2005. Applicable to those cases where the vehicle hesitates, does not start, and/or has lack of power. Instructs dealers that the vehicle may have low fuel pressure due to a restricted fuel pump strainer. In those cases, instructs the dealer to replace the 100 micron strainer with a 200 micron strainer.

General Motors is not planning to issue in the next 120 days, any service, warranty or other technical documents or communications to its dealers, regional offices, zone offices or other entities regarding the subject condition in the subject vehicles.

The bulletins are included on the ATT_1_GM disk in the folder labeled Q_07; refer to the folder labeled, "Q_07_BULLETINS." The preceding information was collected from GM Service Operations. The data collection was completed on July 25, 2007.

- 8. State whether GM has had any written or oral communications with any fuel pump manufacturer(s) regarding the alleged defect in the subject vehicles. If so, provide copies of all such communications that were in writing, identifying the date of the communication, the name and position title of GM employee sending or receiving the communication, and the name, company, division, and position title of the fuel pump manufacturer employee receiving or sending the communication. For any oral communication, state the date on which it was conducted, identify all participants by name, position title, and employing company and division or other entity, and provide a transcript of the communication. If no transcript was made, state the substance of the**

communication in full and any actions taken as a result of the communication and by whom those actions were taken.

GM is including a summary table of the requested information on ATT_1_GM in the folder labeled Q_08. The additional information corresponding to that summary is located on ATT_2_GM_CONF disk in the folder labeled Q_08; refer to the folder labeled, "Q_08_COMM"

9. Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, GM. For each such action, provide the following information:

- a. **Action title or identifier;**
- b. **The actual or planned start date;**
- c. **The actual or expected end date;**
- d. **Brief summary of the subject and objective of the action;**
- e. **Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and**
- f. **A brief summary of the findings and/or conclusions resulting from the action.**

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

Some of the documents that are included in the response to question 9 are in Spanish or German. The English translation of these documents will be provided at a later date.

Action 9-A:

- Small Car Group Fuel Storage & Handling Subsystem Technical Specification (J/P90/GMX130)
- Fuel Pump & Sender Module Component Technical Specification (J/P90/GMX130)

Start Date: 12/1996

End Date: 12/1998

Engineering Group: GM Chassis Engineering

Attachments: Documents can be found on the ATT_2_GM_CONF disk in the folder labeled Q_09, refer to the files labeled, Q_09_A_GM_SSTS and Q_09_A_GM_CTS.

Description: Technical specifications related to fuel delivery.

Summary of Action: Technical specifications for the fuel pump, sender module, and fuel system

Action 9-B:

- Analysis Development Validation Plan & Report

Start Date: 12/1998

End Date: 6/2002

Engineering Group: Siemens VDO Automotive Corporation

Attachments: Documents can be found on the ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the file labeled, Q_09_B_ADV

Description: Validation plans and validation reports for fuel pump assembly module.

Summary of Action: Includes the original plan for introduction of the module as well as updates for tool transfer and engineering changes.

Action 9-C:

- Design Failure Modes Effects Analysis (DFMEA)

Start Date: 11/1998

End Date: 4/1999

Engineering Group: Siemens VDO Automotive

Attachments: Documents can be found on the ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the file labeled, Q_09_C_DFMEA

Description: DFMEA performed by fuel pump assembly manufacturer.

Summary of Action: Used to identify potential failure modes and their effects.

Action 9-D:

- Internal Rejection Records
- Concern Analysis Reports (CAR)
- Problem Reports and Resolution (PRR)
- Quality Problem Resolution Reports
- Part Submission Warrant Documents
- Summaries of Data on Pump Production (scrap rates, reasons for scrap)
- Process Failure Mode Effects Analysis (PFMEA)

Start Date: 12/1993

End Date: 7/2003

Engineering Group: Siemens VDO Automotive

Attachments: Documents can be found on ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the files labeled, Q_09_D_IRR, Q_09_D_CAR, Q_09_D_PRR, Q_09_D_QPRR, Q_09_D_PSW_A, Q_09_D_PSW_B, Q_09_D_DATA_A, Q_09_D_PFMEA

Description: Quality related information from fuel pump supplier.

Summary of Action: Information from the fuel pump supplier documenting scrap rates, reasons for scrap rates, resolution of quality issues, process failure modes analysis and part submission warrants.

Action 9-E:

- GM Fuel System Product Development Team (PDT) Meeting Minutes

Start Date: 5/1999

End Date: 6/2001

Engineering Group: GM Chassis Engineering

Attachments: : Documents can be found on the ATT_2_GM_Conf disk in the folder labeled Q_09, refer to the file labeled, Q_09_E_GM_PDT

Description: Minutes from Product Development Team meetings.

Summary of Action: Minutes from those meetings that included actions related to the alleged defect.

Action 9-F:

- Documents Related to Root Cause of Fuel Pump Assembly Issues

Start Date: 2/2000

End Date: 10/2002

Engineering Group: Siemens VDO Automotive

Attachments: Documents can be found on the ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the file labeled, Q_09_F_RC

Description: Siemens root cause analysis.

Summary of Action: Summary information from Siemens discussing root cause of noise, no start/stall and level sensor issues.

Action 9-G:

- GM Evaluation Reports

Start Date: 12/2000

End Date: 9/2001

Engineering Group: GM Chassis Engineering

Attachments: Documents can be found on the ATT_2_GM_Conf disk in the folder labeled Q_09, refer to the file labeled, Q_09_G_GM_EvalRpt

Description: Vehicle test reports

Summary of Action: Test reports documenting results of driving tests under specified conditions evaluating potential changes to the fuel pump assembly.

Action 9-H:

- Problem Reporting and Tracking System (PRTS)

Start Date: 9/2002

End Date: 5/2005

Engineering Group: GM Chassis Engineering

Attachments: Documents can be found on the ATT_2_GM_Conf disk in the folder labeled Q_09, refer to the file labeled, Q_09_H_GM_PRTS

Description: GMs tracking of problems reported on the fuel pump assembly and fuel level sensor.

Summary of Action: 2 PRTS items documented and tracked, 1 for the fuel pump assembly and another for the fuel level sensor.

Action 9-I:

- Siemens VDO Automotive – Executive Review Meeting Minutes

Start Date: 8/2004

End Date: 6/2005

Engineering Group: Siemens VDO Automotive

Attachments: Documents can be found on the ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the file labeled, Q_09_I_Exec

Description: Reviews that included Cavalier fuel pump assembly.

Summary of Action: Minutes from Executive Reviews that included discussions of issues for the Cavalier fuel pump assembly.

Action 9-J:

- GM "J" Car Vehicle and Process Integration Review (VAPIR) Meeting Minutes

Start Date: 2/2005

End Date: 5/2005

Engineering Group: GM Engineering

Attachments: Documents can be found on the ATT_2_GM_Conf disk in the folder labeled Q_09, refer to the file labeled, Q_09_J_GM_VAPIR

Description: Meeting minutes

Summary of Action: Review meetings to discuss vehicle engineering issues.

Action 9-K:

- Returned parts analysis reports

Start Date: 7/2007

End Date: 8/2007

Engineering Group: Siemens VDO Automotive

Attachments: The complete set of documents can be found on the ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the file labeled, Q_09_K_PRT. Those portions of the documents that are not confidential can also be found on ATT_3_SPLR disk in the folder labeled Q_09.

Description: Results of parts analysis and teardowns on a GM form.

Summary of Action: Summarizes the analysis process and results of Siemens analysis of fuel pump assemblies returned through GM's warranty and out-of-warranty parts return process.

Action 9-L:

- Miscellaneous communications

Start Date: 2/2005

End Date: 5/2005

Engineering Group: GM

Attachments: Documents can be found on the ATT_2_GM_Conf disk in the folder labeled Q_09, refer to the file labeled, Q_09_GM_COMM

Description: E-mail communications

Summary of Action: Miscellaneous e-mail communications related to the fuel pump.

Action 9-M:

- Communications related to fuel pump durability specifications

Start Date: 6/6/2001

End Date: 6/26//2001

Engineering Group: Siemens VDO Automotive

Attachments: Documents can be found on the ATT_4_SPLR_CONF disk in the folder labeled Q_09, refer to the file labeled, Q_09_M_Dura

Description: Fuel pump durability discussion

Summary of Action: Miscellaneous communications related to the fuel pump.

Action 9-N:

- Fuel Pump Assembly Investigation

Start Date: 6/2007

End Date: 8/2007

Engineering Group: GM Engineering

Attachments: Documents can be found on the ATT_2_GM_Conf disk in the folder labeled Q_09_N.

Description:

- Investigation Status Reviews (2)
- Explanation of the warranty analysis
- Analysis of regular warranty data

Summary of Action: Presentations giving status of the investigation, explanation of the process used to perform warranty data analysis, and the results of the warranty analysis.

10. Describe all modifications or changes made by, or on behalf of, GM in the design, material composition, manufacture, quality control, supply, or installation of the subject component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles. For each such modification or change, provide the following information:

- a. The date or approximate date on which the modification or change was incorporated into vehicle production;
- b. A detailed description of the modification or change;
- c. The reason(s) for the modification or change;
- d. The part numbers (service and engineering) of the original component;
- e. The part number (service and engineering) of the modified component;
- f. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
- g. When the modified component was made available as a service component; and
- h. Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that GM is aware of which may be incorporated into vehicle production within the next 120 days.

GM is providing a summary of the product engineering information requested in 10(a-h) on the ATT_1_GM disk in the folder labeled Q_10; refer to the file labeled, Q_10_Changes. Also included on ATT_2_GM_CONF disk in the folder labeled Q_10 are the Engineering Work Orders that correspond to the changes. Refer to the folder labeled Q_10_COMM.

GM is not planning to incorporate any modifications or changes into production of the subject vehicles that relate to the alleged defect within the next 120 days.

11. Produce each of the following:

- a. **One exemplar sample of each design version of the subject component;**
- b. **Field return samples of the subject component exhibiting the subject failure mode; and**
- c. **Any kits that have been released, or developed, by GM for use in service repairs to the subject component/assembly which relate, or may relate, to the alleged defect in the subject vehicles.**

Enclosure 11 contains a sample of the latest service part for the subject component. Some of the design versions installed in the subject vehicles are no longer being produced for production or service. Refer to question 10 for a list of design versions of the subject component.

Enclosure 11 also contains a fuel pump motor with worn brushes from a field returned fuel pump assembly.

The sample of the latest service part is representative of kits that GM has used in the repair of the subject component. The kits are described in the service bulletins included in question 7 and allow for the fuel pump assembly to be serviced by replacing the fuel level sender or the fuel pump strainer.

12. State the number of each of the following that GM has sold that may be used in the subject vehicles by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of sale (including the cut-off date for sales, if applicable):

- a. **Subject component; and**
- b. **Any kits that have been released, or developed, by GM for use in service repairs to the subject component/assembly.**

For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number). Also identify by make, model and model year, any other vehicles of which GM is aware that contain, or have contained, the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

An electronic summary table of the requested service part information for the subject components is provided on the ATT_1_GM disk in the folder labeled Q_12; refer to the Microsoft Excel file labeled, "Q_12_Part_Sales."

These numbers represent all service parts sales regardless of location. This data has limited analytical value in analyzing the field performance of a motor vehicle component because the records do not contain sufficient information to establish the reason for the part sale. It is not

possible from this data to determine the number of these parts that have been installed in the subject vehicles or the number remaining in dealer or replacement part supplier inventory.

This table contains service part numbers, part description, part usage information including the GM vehicles that contain the identical component, part sales figures by month and calendar year, and the supplier's name and address, contact name and phone number.

- 13. Provide a description of how the subject component operates within each design version of the subject vehicles. Include a simple skeleton diagram of each design version of the subject vehicle that uses the subject component, identifying and showing the location of the fuel tank and various components of the fuel pump and fuel sender assemblies within the fuel tank.**

GM is including the requested information on ATT_4_SPLR_CONF disk in the folder labeled Q_13; refer to the file labeled, "Q_13_Pump_Desc_A". Additional information is included on ATT_1_GM disk in the folder labeled Q_13; refer to the file labeled "Q_13_Pump_Desc_B."

- 14. Furnish GM's assessment of the alleged defect in the subject vehicle, including:**

- a. The causal or contributory factor(s);
- b. The failure mechanism(s);
- c. The failure mode(s);
- d. The risk to motor vehicle safety that it poses;
- e. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component was malfunctioning; and
- f. The reports included with this inquiry.
- g. The 1-year fuel pump failure warranty rate;
- h. The 3-year fuel pump failure warranty rate;
- i. The 5 and 10-year projected fuel pump failure rates;
- j. The percent of fuel pump failures that will result in a stalling incident for subparts "g" through "i;" and
- k. The percent of stalling incidents that will result in a no restart condition.

GM examined 35 fuel pump assemblies returned from GM dealers in the United States and Canada due to customer complaints of; stall while driving (14), no start/hard start (12), and other reasons (9). The fuel pump module strainer on some return parts exhibited mild flow restriction, but not to the extent that it would cause a stall or a no start/hard start condition. When the parts were disassembled and inspected, high motor brush wear rate was found on 32 of the 35 pumps (91%). A comparison of the commutator material to that of a new service part, showed no difference in chemical composition. A comparison of the returned brush material to that of a new service part showed no difference in chemical composition or hardness and both factors were within specified limits. Brush spring force testing has also shown that it was within specified limits and normal variation.

The brushes and commutator of an electric motor are the key components of the electrical circuit, which allow the motor to convert electrical into mechanical energy. When starting up an electrical direct current motor of this type at a constant voltage, a high starting current is required for a very short period of time (on the order of milliseconds). This starting current represents the energy required by the motor to overcome rotational/electrical inertia, friction in the motor bearings, and the load on the motor (in this case the fuel pumping section's inertia,

friction, and viscous fuel load). Once the motor comes up to its design speed, the electric current flowing decreases to a much lower level and stabilizes.

If the brush and commutator interface degrades (which was observed in the field return pumps), the electrical resistance across this junction will typically increase, and ultimately inhibit the flow of electrical current through the motor windings. If high contact resistance exists, the likely result is that the customer would initially experience a hard start or longer crank. As the condition progresses there would not be adequate starting torque to initiate rotation, and the pump motor will not operate.

If a fuel pump in this condition starts, the engine/vehicle may operate normally. This is due to the lower electrical demand to maintain pump motor rotation and the reserve pumping capacity (as described below) that is usually available when delivering fuel to the engine. The fuel pump and motor are sized for the most severe vehicle load condition. The fuel pump is sized based on gross vehicle weight, max temperature, powertrain enrichment calibration, and vehicle performance requirements. Consequently, under lower vehicle and engine loads, more typical of daily vehicle operation, there is a reserve capacity for the fuel pump to deliver fuel flow and pressure. As the commutator-brush interface degrades and the electrical resistance increases, susceptibility to interruptions of the power and fuel delivery sufficient to cause an engine to stall increases.

For these reasons, vehicles having fuel pump motors with high brush wear, will exhibit a predominant failure mode of a prolonged start or no start condition. This is reflected in the regular warranty data as shown in tables 5-1 and 5-2.

Gasoline contains varying levels of peroxide, or sulfur (which may be elemental or corrosive) Peroxide, and/or sulfur, can react with the copper commutator to corrode or roughen the surface of the commutator. As the carbon brushes contact the rough copper commutator they can wear at a higher than anticipated rate. As this wear increases, arcing may occur that will further increase the wear rate. Fuel pump assemblies tested in fuel with 50 PPM of peroxide exhibit brush wear similar to that of the field returned parts.

In the fall of 2003, fuel companies began the process of removing sulfur from gasoline. Warranty data for the 2004 Model Year vehicle, shows an even lower incident rate for stall or no start conditions when compared to 2001-03 Model Year vehicles. This data shows the influence of the fuel quality/composition on fuel pump life.

In conclusion, GM has reviewed the data gathered for this response and believes that this condition does not pose an unreasonable risk to motor vehicle safety for the following reasons:

- The warranty rate for stalling conditions due to fuel pump assembly failure is low, 5.0 IPTV at 36 months of service. In the worse case scenario, the Weibull-projected rate for 5 years in service is 14.6 IPTV and is 35.8 IPTV for 10 years in service. There are only 29 owner and field reports that are not included in the warranty analysis, and including these reports in the Weibull analysis would have an insignificant impact. The analysis related to this is included ATT_2_GM_CONF in the folder labeled Q_09_N.
- The failure mode, warranty analysis, and field experience indicate that a vehicle with advanced motor brush wear would have incidents of a no start or difficult to start prior to a stall, which may lead a customer to seek service prior to a stall event.
- There are only 4 minor crashes and 2 minor injuries alleged to be the result of fuel pump assembly failure.

* * *

General Motors requested assistance and documents from suppliers in responding to items 9 and 13 and this response includes those documents received from suppliers.

GM claims that certain information, in documents that are part of lawsuit and claims files maintained by the GM Legal Staff, is attorney work product and/or privileged. That information includes notes, memos, reports, photographs, and evaluations by attorneys (and by consultants, claims analysts, investigators, and engineers working at the request of attorneys). GM is producing responsive documents from claims files that are neither attorney work product nor privileged, and withholding those that are attorney work product and/or privileged.

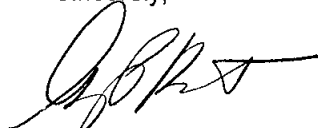
This response is based on searches of General Motors Corporation (GM) locations where documents determined to be responsive to your request would ordinarily be found. As a result, the scope of this search did not include, nor could it reasonably include, "all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of GM (including all business units and persons previously referred to), who are or, in or after 1998, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

- a. Design, engineering, analysis, modification or production (e.g. quality control);
- b. Testing, assessment or evaluation;
- c. Consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
- d. Communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers. "

This response was compiled and prepared by this office upon review of the documents produced by various GM locations, and does not include documents generated or received at those GM locations subsequent to their searches.

Please contact me if you require further information about this response or the nature or scope of our searches.

Sincerely,



Gay P. Kent
Director
Product Investigations

Attachments