

May 20, 2011

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National Highway Traffic Safety Administration
1200 New Jersey Ave., S. E., Room W48-307
Washington, D.C. 20590

N100425 Partial

NVS-213cnl
RQ10-004

Dear Mr. Quandt:

This letter is General Motors' (GM) third partial response to your Recall Query (RQ), received on February 17, 2011 to investigate allegations of electric power steering (EPS) system failure in model year (MY) 2004 through 2007 Saturn ION vehicles manufactured by GM for sale in the United States, and to request certain information about these vehicles and similarly equipped peer vehicles.

As agreed upon in emails of March 24, 2011 and May 13, 2011, this third partial response contains the responsive information to request numbers 2, 3, 4, 5, 6, 10, 13, 14, 16 and 17 for MY 2004 through 2007 Saturn ION vehicles. Unless otherwise noted, it does not include data previously provided in GM's response to PE10-005 sent April 14, 2010. The remainder of the response for the Chevrolet Malibu and Pontiac G6 peer vehicles will be provided by June 17, 2011. Also, as agreed, GMs' responses will not include the Chevrolet Cobalt and the Pontiac G5.

Your questions and our corresponding replies are as follows:

2. **State 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 and peer vehicles:**
 - a. **Consumer complaints, including those from fleet operators;**
 - b. **Consumer complaints, including those from operators, where a failure or malfunction of the EPS system was reported;**
 - c. **Field reports, including dealer field reports;**
 - d. **Field reports, including dealer field reports where EPS failure was claimed;**
 - 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. Property damage claims;**
- g. Third-party arbitration proceedings where GM is or was a party to the arbitration; and**
- h. Lawsuits, both pending and closed, in which GM is or was a defendant or codefendant.**

For subparts "a" through "f" 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 "h," 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 g and h, 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.

Table 2-1 below summarizes records that may relate to allegations of loss of power assist during vehicle operation in the subject vehicles. GM has organized the records by the GM file number within each attachment. Refer to access database "Q_03_REQUEST NUMBER TWO DATA" for categories prescribed by the NHTSA.

Also included in the Access database are additional owner reports that were generated in order to obtain reimbursements that are not included in Table 2-1. For owners to be reimbursed, they were required to file an owner report by calling the GM Customer Assistance Center (CAC). Those records are designated by a check in the box in the "Reimbursement" column in the database. In addition, for each of these reimbursement records, there is also a corresponding warranty claim that is included in the response to question 5.

We are identifying those complaints that contain a description or facts that relate to the loss of power steering assist (items marked "A" in the "Reviewed" column) in the attachment "Q_03_REQUEST NUMBER TWO DATA" or contain a description or facts that make it uncertain if the complaint relates to the loss of power steering assist (items marked "B" in the "Reviewed" column) in the attachment "Q_03_REQUEST NUMBER TWO DATA".

Type of Report	GM Reports	Subcategories			
		Corresponding to NHTSA Reports	Number with Property Damage	Number with Crash	Number of Injuries/Fatalities
Owner Reports	3297	193	41	75	14/2
Field Reports	260	5	0	0	0/0
Total Reports (Including Duplicates)	3557	198	41	75	14/2
Total Vehicles with Reports (Unique VIN)	3489	185	41	74	14/2

TABLE 2-1: REPORT CLASSIFICATION - ALLEGATIONS LOSS OF POWER ASSIST DURING VEHICLE OPERATION IN SUBJECT VEHICLES

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

Source System	Last Date Gathered
Customer Assistance Center	25 Feb 11 to 20 Apr 11
Technical Assistance Center	2 Mar 11 to 10 Mar 11
Field Information Network Database (FIND)	14 Mar 11
Field Product Report Database (FPRD)	4 Mar 11
Company Vehicle Evaluation Program (CVEP)	4 Mar 11
Captured Test Fleet (CTF)	4 Mar 11
Early Quality Feedback (EQF)	4 Mar 11

TABLE 2-2: 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. Incident date;
 - h. Report or claim date;
 - i. Whether any warning lights or sounds were illuminated or heard at the time the alleged defect occurred;
 - j. Whether the vehicle was towed into the dealership;
 - k. Whether the driver was able to restart the vehicle, and reset the EPS system;
 - l. If the EPS was reset, did the failure occur more than once;

- m. Diagnostic Trouble Code(s) (DTCs) indicated at the time of repair;**
- n. Repair(s) dealer made to the vehicle;**
- o. Whether a crash is alleged;**
- p. Whether property damage is alleged;**
- q. Number of alleged injuries;**
- r. Number of alleged fatalities; and**
- s. A summary of the incident.**

Provide this information in Microsoft Access 2003, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

The requested information is provided on the ATT_1_GM disk; folder labeled "Q_03". Refer to the Microsoft Access 2000 file labeled "Q_03_REQUEST NUMBER TWO DATA".

- 4. Produce copies of all documents 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 are embedded in the file provided in ATT_1_GM disk; folder labeled "Q_03". Refer to the Microsoft Access file labeled "Q_03_REQUEST NUMBER TWO DATA". GM has organized the records by the GM file number within each attachment. Each record has an attachment that describes the report. Many of these records have additional attachments that GM will submit in an additional supplement at a later date.

To date, GM's investigation of the alleged defect has not included an assessment of the cause(s) of each incident responsive to question 2. Some incident reports may not contain sufficient reliable information to accurately assess cause. FPR documents are included with this response and are also included in the Table 2-1. FIND documents that are associated with some of the FPR documents are not included.

- 5. State, by model and model year, total counts for all of the following categories of claims, collectively, that have been paid by GM to date that relate to repair or replacement of the subject system in the subject and peer vehicles: warranty claims; extended warranty claims; claims for good will services; and field, zone, or similar adjustments and reimbursements. This should include all claims made in accordance with procedures specified in any service bulletins issued by GM related to the subject components.**

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

- a. M'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. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
- g. Whether there was a claim for towing within three days before or after the subject claim (yes/no);
- h. Whether there is any other reference to towing in the claim (yes/no);
- i. Labor operation number;
- j. Problem code;
- k. Diagnostic Trouble Code(s) (DTCs) indicated at the time of repair;
- l. Replacement part number(s) and description(s);
- m. Concern stated by customer;
- n. Comment, if any, by dealer/technician relating to claim and/or repair; and
- o. GM's assessment of whether the claim was associated with an EPS failure while driving.

Provide this information in Microsoft Access 2003, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

For the subject vehicles, the regular warranty and goodwill warranty claims with allegations of loss of power assist during vehicle operation are summarized by model and model year in Table 5-1. MIC and UWC extended service contract claims with allegations of loss of power assist during vehicle operation are summarized by model and model year in Table 5-2. Both tables include warranty claims (including reimbursements and special coverage). A summary of all warranty claims, including those with allegations of noise, drivability, and other issues and the information requested in 5(a-o), is provided on the ATT_1_GM disk; folder labeled "Q_05". Refer to the Microsoft Access 2003 file labeled "Q_05_WARRANTY DATA". A list of the labor codes, customer complaint codes and trouble codes used to collect the warranty data is provided in response to question 6.

MAKE	MODEL	2004MY	2005MY	2006MY	2007MY	TOTAL
Saturn	ION	4,061	3,071	5,145	4,708	16,985

TABLE 5-1 REGULAR WARRANTY CLAIMS WITH ALLEGATIONS OF LOSS OF POWER ASSIST DURING VEHICLE OPERATION FOR SUBJECT VEHICLES

MAKE	MODEL	2004MY	2005MY	2006MY	2007MY	TOTAL
Saturn	ION	209	36	70	85	400

TABLE 5-2 MIC AND UWC EXTENDED SERVICE CONTRACT CLAIMS WITH ALLEGATIONS OF LOSS OF POWER ASSIST DURING VEHICLE OPERATION FOR SUBJECT VEHICLES

SOURCE SYSTEM	LAST DATE GATHERED
GART - regular warranty	21 Mar 11
MIC – extended service contract claims	21 Jan 11
UWC – extended service contract claims	18 Feb 11

TABLE 5-3 DATES PULLED

GM searched the GM Global Analysis and Reporting Tool (GART-regular warranty), the Motors Insurance Corporation (MIC-extended service contract claims) and the Universal Warranty Corporation (UWC-extended service contract claims) databases to collect the warranty data for this response.

GM's warranty database does not contain the following information: vehicle owner's name, telephone number or customer concern statement. GM is providing a field labeled "Verbatim Text" in response to item 5K (dealer/technician comment). The verbatim text is an optional field in the GM warranty system for the dealer to enter any additional comments that may be applicable to the warranty claim. The verbatim text field is not required to be completed for every warranty claim.

The warranty data provided has limited analytical value in analyzing the field performance of a motor vehicle component. The warranty records do not contain sufficient information to establish the condition of the part at the time of the warranty correction; and service personnel may not consistently use the appropriate labor and trouble codes. Warranty numbers represent claims by our dealers for reimbursement for parts and labor costs incurred in performing warranty service for our customers.

A summary of warranty claims that may relate to the subject condition is provided on the ATT_1_GM disk; folder labeled "Q_05". Refer to the Microsoft Access 2003 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.**

The GM GART regular warranty database and the MIC extended service contract claims database were searched using the labor codes listed in Table 6-1, that may

be related to the alleged defect of EPS system failure. Claims that contained a verbatim comment that indicated loss of power assist during vehicle operation, contained diagnostic trouble codes C0475, C0545 or C0550, contained a "T" code for reimbursement, or a "T" code for special coverage are contained in Table 5-1, Table 5-2 and Table 13 in the column "loss of power assist during vehicle operation". Counts of claims that contained a verbatim comment that indicated noise or contained one of the customer codes listed in Table 6-2 are in Table 13 in the column "noise". All other claims were then sorted into categories of drivability, claims in which only the power steering message was displayed or unknown issues. All claims are contained in ATT_1_GM disk; folder labeled "Q_13".

UWC does not use labor codes or trouble codes.

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.

Some of the VINs have multiple entries for various labor codes. The warranty claims reflect the number of labor operations used by dealers, which is higher than the number of actual visits to dealers for repairs.

LABOR CODE	DESCRIPTION:
E7630	UPPR COL ASSIST ASSY. POWER STEERING
E7631	MOTOR CNTR ASSY. POWER STEERING
E7660	COLUMN ASM, STEERING
E7680	COLUMN ASSY, STEERING
E8434	EPS MOTOR REPLACE
Z1241	PRODUCT LIABILITY//INVESTIGATION REP PR (GOODWILL)
Z1242	PAR-REPAIRS/REIMBURSEMENT (GOODWILL)
Z1243	INSPECTION-PRODUCT ALLEGATION RESOLUTION
V2220	REPLACE POWER STEERING ASSIST MOTOR
V2221	CUSTOMER REIMBURSEMENT – VEHICLE REPAIRED WITH NEW MOTOR
V2222	CUSTOMER REIMBURSEMENT – VEHICLE NOT REPAIRED WITH NEW MOTOR
V2223	FLOOR PAN REIMBURSEMENT
T5780	REPLACE STEERING COLUMN
T5781	REPLACE POWER STEERING MOTOR CONTROL MODULE
T5782	CUSTOMER REIMBURSEMENT
T5783	REPLACE POWER STEERING MOTOR CONTROL MODULE
T5784	CUSTOMER REIMBURSEMENT
T5681	REPLACE THE STEERING COLUMN ASM
T5682	CUSTOMER REIMBURSEMENT

TABLE 6-1 LABOR CODES USED IN WARRANTY AND MIC SEARCH

CUSTOMER CODE	DESCRIPTION:
N3	WIND NOISE
N2	WHISTLE
NZ	WHINE
NY	TAPPING
NW	SQUISH
NV	SQUEAL
NU	SQUEAK
NS	ROAR
NR	ROAD NOISE
NQ	RATTLE
NP	POPPING
NO	PING
NL	ITCH/SCRATCH/SCRAPE
NJ	HOWLING
NI	HISS
NH	GROWL
NG	GRIND
126	DRIVABILITY - NOISE
NF	CREAK
NE	CLUNK
ND	CLICK/TICKING
NC	CHATTER
NB	BUZZ
NM	KNOCK
NN	MOAN
NT	RUMBLE

TABLE 6-2 CUSTOMER CODES USED IN WARRANTY AND MIC SEARCH

The number of extended service contracts on the subject vehicles that have been sold by MIC as of January 21, 2011 and UWC as of February 18, 2011 regardless of status (in-force, expired, cancelled) are contained in Tables 6-3 and 6-4.

MAKE	MODEL	2004MY	2005MY	2006MY	2007MY	TOTAL
Saturn	ION	72,936	47,024	43,388	39,210	202,558

TABLE 6-3 SUBJECT VEHICLES - MIC EXTENDED SERVICE COVERAGE CONTRACTS SOLD
(REGARDLESS OF STATUS; IN-FORCE, EXPIRED, CANCELLED)

MAKE	MODEL	2004MY	2005MY	2006MY	2007MY	TOTAL
Saturn	ION	594	460	689	439	2,182

TABLE 6-4 SUBJECT VEHICLES - UWC EXTENDED SERVICE COVERAGE CONTRACTS SOLD
(REGARDLESS OF STATUS; IN-FORCE, EXPIRED, CANCELLED)

10. 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.

The information listed in Table 10 below is a summary of actions that have been conducted, are being conducted, are planned, or are being planned by or for GM regarding the subject condition on the subject vehicles as of April 29, 2011. Documents and additional supporting information are included in the Attachments as noted in the table. General Motors is continuing to review additional documents to determine if they are responsive to this information request. If additional responsive documents are identified, GM will also send those to the NHTSA in a supplement to this response.

General Motors requested assistance and documents from suppliers in responding to this question and this response includes those documents and the information received from suppliers.

<p>Action 10-A: GM steering performance, testing and steering studies. Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-A" ATT_2_GM_Conf disk; folder labeled "Q_10-A_Conf" Description: Steering performance, testing and studies. Summary: Documents related to the performance of the steering system, steering testing information and results and studies related to the steering system.</p>
<p>Action 10-B: Design Changes Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachment: ATT_1_GM_disk; folder labeled "Q_10-B" ATT_2_GM_Conf disk; folder labeled "Q_10-B_Conf" Description: Information related to steering system design changes. Summary: Documentation related to design changes to the steering system, engineering work orders (EWO), and temporary work orders (TWO).</p>

<p>Action 10-C: Engineering drawings and design change proposals. Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-C" ATT_2_GM_Conf disk; folder labeled "Q_10-C_Conf" Description: Information related to the steering system. Summary: Documentation that contains engineering concept studies, engineering proposals and engineering drawings.</p>
<p>Action 10-D: Design information Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-D" ATT_2_GM_Conf disk; folder labeled "Q_10-D_Conf" Description: Summary:</p>
<p>Action 10-E: GM Investigation Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-E" ATT_2_GM_Conf disk; folder labeled "Q_10-E_Conf" Description: Information related to the steering system investigation. Summary: Documents related to GM's investigation for the steering system including presentations and review information.</p>
<p>Action 10-F: GM Internal Meetings Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-F" ATT_2_GM_Conf disk; folder labeled "Q_10-F_Conf" Description: Information from GM meetings. Summary: Documents resulting from GM meetings including meeting minutes and action item lists.</p>
<p>Action 10-G: Dealer bulletins, service procedures, owner letters, Transport Canada responses. Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-G" ATT_2_GM_Conf disk; folder labeled "Q_10-G_Conf" Description: Information including bulletins, owner letters, service procedures and response information to Transport Canada. Summary: Documents related steering information in bulletins sent to dealers, service procedures, owner letters and response information to Transport Canada.</p>
<p>Action 10-H: Field performance Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-H" ATT_2_GM_Conf disk; folder labeled "Q_10-H_Conf" Description: Information related field performance of the steering system. Summary: Steering system documents related to field performance including field reports, vehicle inspection reports, field returned parts information and warranty data and summaries.</p>

<p>Action 10-I: Analysis Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-I" ATT_2_GM_Conf disk; folder labeled "Q_10-I_Conf" Description: Information related to analysis done related to the steering system. Summary: Documents related to steering system analysis including analysis of the grease used in the steering system as well as other analysis results and summaries.</p>
<p>Action 10-J: Standards and specifications Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-J" ATT_2_GM_Conf disk; folder labeled "Q_10-J_Conf" Description: Information on technical specifications and other standards. Summary: Documents related to GM standards including Vehicle Technical Specifications, Subsystem Technical Specifications, Component Technical Specifications and other specification information.</p>
<p>Action 10-K: Processes and Methodology Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-K" ATT_2_GM_Conf disk; folder labeled "Q_10-K_Conf" Description: Information on processes and methodology. Summary: Documents related to GM's methodology, process, review processes and other GM analysis processes.</p>
<p>Action 10-L: Miscellaneous Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: GM Engineering Attachments: ATT_1_GM_disk; folder labeled "Q_10-L" ATT_2_GM_Conf disk; folder labeled "Q_10-L_Conf" Description: Other miscellaneous information. Summary: Documents related to other miscellaneous information related to steering.</p>
<p>Action 10-M: Supplier Start Date: Reference date(s) on included documents. End Date: Reference date(s) on included documents. Engineering Group: Suppliers Attachments: Disks labeled: "JTEKT NORTH AMERICA, INC. DOCUMENTS PROVIDED TO GM IN CONNECTION WITH RQ10-004 REQUEST NO. 10 MAY 2, 2011" "DENSO-ASMO DOCUMENTS PROVIDED TO JTEKT NORTH-AMERICA, INC. AND GENERAL MOTORS IN CONNECTION WITH RQ10-004 REQUEST NO. 10 APRIL 23, 2011" Description: Information from suppliers related to the steering system. Summary: Documents from suppliers related to the steering system.</p>

TABLE 10-1 SUMMARY OF ACTIONS THAT HAVE BEEN CONDUCTED

13. Provide a table with the following information regarding the actual failure frequencies for the subject and peer vehicles, by model year and design level (if design changes applicable to the alleged defect have been implemented in production):

a. Vehicle production counts;

- b. Total complaints;
- c. Total warranty claims;
- d. For each of the following service intervals state the number of each population that have reached that time-in-service and the number of complaints and warranty claims received within each service interval: 12-, 24-, 36-, 48-, and 60 months;
- e. State GM's assessment of the percentages of EPS failure complaints that involve a loss of EPS while driving for the subject and peer vehicle populations. (Alternatively, if GM does not believe that the percentages for the sub-populations are significantly different, state an approximate percentage that would apply to all);
- f. For complaints that GM does not believe involve loss of EPS assist, provide a breakdown of the percentages associated with other conditions (noise associated with steering, drivability issues such as alignment, EPS malfunction indicator light on etc.);
- g. State GM's assessment of the percentages of EPS failure warranty claims that involve loss of EPS while driving for the subject and peer vehicle populations. (Alternatively, if GM does not believe that the percentages for the sub-populations are significantly different, state an approximate percentage that would apply to all); and
- h. For warranty claims that GM does not believe involve loss of EPS while driving, provide a breakdown of the percentages associated with other conditions (e.g., steering related noise, drivability issues such as alignment, and EPS malfunction indicator light on).

The responsive table requested in question 13 is provided on the ATT_1_GM disk; folder labeled "Q_13". Note that this table includes all warranty claims and GM reports, from GM's April 14, 2010 response (PE10-005) as well as those included in this response. Some of the data included in question 12 in response to PE10-005 contained errors, so GM has corrected that information in this response. The corrected data has been included in this table along with the latest ION Warranty Claim information. To be consistent, the Complaint data from the April 14, 2010 has also been included in the response to question 13.

14. Provide a table with the following information regarding statistically estimated/modeled EPS system failure frequencies for each vehicle population as defined in this letter:
- a. A short description of the method/model used for the statistical analysis, including the bases for selecting each method, explanations for any differences in modeling methods for different populations, and the report period used for the analysis (e.g., warranty period);
 - b. Charts showing the model results for each population;
 - c. The results of the analysis (e.g., slope and characteristic life parameters if a 2-parameter Weibull model is used); and

- d. The estimated failure rates at 12-, 24-, 36-, 48-, 60-, and 72-months-in-service.**

The responsive information requested in 14a-d is provided on the ATT_2_GM_CONF disk; folder labeled "Q_14_GM_Conf".

16. Provide the following information regarding the effect of the alleged defect on steering effort and vehicle control in the subject and peer vehicles:

- a. Steering effort as a function of lateral acceleration for normal system operation and after EPS failure;**
- b. Copies of all system test standards associated with steering effort/feel with normal operation and after a system failure;**
- c. Copies of all studies, reports or related material associated with each of the following for the subject vehicles or any other vehicles: (1) driving steering effort capability (for the full range from 5th to 95th percentile male and female drivers); and (2) ergonomic/human factors analyses of driver reactions to sudden changes in steering effort; and**
- d. Provide a table showing GM's assessment of each of the crash complaints provided with this letter and in GM's response material, including incident speed, road conditions, traffic conditions, description of the steering maneuver attempted, the approximate lateral acceleration, the driver's description of the effect on steering performance/effort, and GM's assessment of the crash severity and all causal factors.**

16 a

For the IONs, the steering effort as a function of lateral acceleration for normal system operation and after EPS failure are provided in ATT_2_GM_CONF disk; folder labeled "Q_16_GM_Conf"; file "Q_16a - Subject vehicle steering effort."

16 b

Copies of all system test standards associated with steering effort/feel with normal operation and after a system failure were provided in Q_15 of PE10-005 sent April 14, 2010; ATT_2_GM_CONF disk; folder labeled "Q_15_b."

16 c

GM is not aware of recent studies, reports or related material in response to question 16c. Documents were provided in Q_15 of PE10-005 sent April 14, 2010; ATT_1_GM disk; folder labeled "Q_15_C".

16 d

In some cases GM investigated claims/reports of crashes that allege loss of power steering assist. GM's assessment of those claims/reports is listed in the column entitled "GM Assessment" in the Microsoft Access 2000 file labeled "Q_03_REQUEST NUMBER TWO DATA". In other cases, GM did not perform an

investigation, but the available facts indicate that the vehicle was travelling at speeds in the range of 30 mph or greater. GM believes that if power assist is lost while a vehicle is moving at speeds in the range of 30 mph or greater there is a small difference in steering efforts perceived in subjective evaluations at these speeds and it is unlikely to lead to loss of vehicle control. Refer to question 3 attachments, for attachments that may provide facts or information to support GM's assessment.

17. Provide GM's assessment of the alleged defect in the subject vehicles, including:

- a. 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 of the vehicle would have that the alleged defect was occurring or subject system was malfunctioning, and**
- f. The reports included with this inquiry.**

a) Causal or contributing factor(s)

Contributing factors vary with model type, model year and vehicle driving / usage. Differences in the steering assist mechanism hardware and assist calibrations will influence the rate between models and model years. Vehicles with the same or similar EPS motor may have significantly different occurrence rates due to the following:

- **Steering assist calibration** - The electric steering motor circuit diagnostic algorithm (DTC C0475) is not continuously active. The amount of time the EPS system functions with the algorithm active is a function of the steering assist calibration. These calibrations relate motor current to steering wheel input torque. Motor assist current is also adjusted to compensate for steering wheel input torque rate of change and calculated assist motor temperature. Thus, the motor circuit diagnostic operation, and the occurrence of DTC C0475, can vary by model, model year, tire size, vehicle speed, duty cycle and steering rate.
- **Motor shaft bearing** - Before the 2005 MY, the motor shaft bearing had a labyrinth type non-contacting seal. Bearings in vehicles built in the 2005 MY and later had a seal with no labyrinth. Both seals are primarily for particulate protection, however, a labyrinth path can reduce oil entering the motor.
- **Coupling** - In the 2004 MY ION, the coupling piece between the motor and the worm gear is smooth. In the 2005 MY, the coupling design was changed to include grooves on the outer diameter along the length of the coupling. The grooves tend to capture and channel the oil to the shaft motor bearing.

b) The failure mechanism(s)

The ION EPS motor is a 12-volt brushed DC reversible motor with a 58-amp rating. The motor assists steering through a worm shaft and worm gear located in the steering column housing. The worm shaft is axially connected at a declining 10 degree angle to the motor shaft. The worm and worm wheel reduction gear box contains a large quantity of grease. Analysis has shown that oil can separate from the grease and follow the interface between the worm drive and the motor into the motor case. As the motor brushes wear, graphite particles form in the motor case. This graphite can combine with the oil from the worm drive and accumulate between the commutator segments. If enough oil/graphite mix builds up between the commutator segments, a conductive path results that can trigger DTC C0475 due to this slight impedance change in the motor circuit.

c) The failure mode(s)

With the power steering control module motor circuit diagnostic active, this diagnostic may detect the conductivity change between commutator segments caused by the build-up of oil and graphite dust. This diagnostic, which when tripped shuts off current flow to the motor, is in place to detect high severity motor shorts but is tripped by the conductivity change at the commutator.

d) The risk to motor vehicle safety that it poses

GM does not believe that this condition poses an unreasonable risk to motor vehicle safety. Steering control is maintained, although increased driver effort would be required at low vehicle speeds.

Many of the claims alleging a crash were the result of the publicity surrounding the issue at the time. Over 75% of the crash allegations were reported after GM mailed the Special Coverage 10187 letter to customers. Like the warranty claims discussed in greater detail below, the rate of crash allegation rose to a peak for 2 months after the Special Coverage letters were sent to customers, and then dropped off quickly.

The DTC is conservative and protects the customer from more severe failure modes that could cause loss of steering. The setting of this DTC and the resulting shutting off of the EPS motor was implemented to protect against different, higher severity EPS motor shorts. Such a short could lead to the loss of the ability to steer. Instead, the system preserves the ability to steer the vehicles by disabling EPS assist.

General Motors has extended the warranty for the subject vehicles for loss of power assist under Special Coverage 10187 for 10 year or 100,000 miles, whichever comes first. It appears that the implementation of Special Coverage 10187 not only

addressed actual cases of loss of power assist, it also addressed many customer's concerns of the potential loss of power assist and some other customer's concerns related to the EPS motor. This is indicated by the rise in the rate of claims by month since July 20, 2010 when GM initiated the Special Coverage. This rate increase may be due to several factors. These factors include steering system noises, dripping oil and customers that requested replacement of the EPS motor whether the condition existed or not. Nevertheless, the rate of claims is declining.

In many cases power steering assist may be restored by turning the engine off and back on. On the next ignition cycle if the EPS motor voltage is not detected to be out of range the current DTC will clear, power assist would be provided and the Driver Information Center (DIC) message would be off. The C0475 DTC would be maintained in history, but would clear after 100 consecutive malfunction-free ignition cycles.

The rate of labor operation T5783 claims, power steering motor replacement under the Special Coverage, has declined since the Special Coverage was announced.

e) What warnings, if any, the operator of the vehicle would have that the alleged defect was occurring or subject system was malfunctioning

When the Power Steering Control Module (PSCM) detects motor voltage out of range, in addition to disabling steering assist, the PSCM sets DTC C0475, commands the DIC to display "PWR STRG," and momentarily activates a chime to alert the driver to the DIC message.

On the next ignition cycle if the EPS motor voltage is not detected to be out of range the current DTC will clear, power assist would be provided and the DIC message would be off. The C0475 DTC would be maintained in history, but would clear after 100 consecutive malfunction-free ignition cycles.

The owner's manual states under "Electric Power Steering"

If the engine stalls while you are driving, the power steering assist system will continue to operate until you are able to stop the vehicle. If you lose power steering assist because the engine stops or the system is not functioning, you can steer, but it will take much more effort.

f) Refer to Table 2-1 for the number of GM reports that match the NHTSA's reports.

In summary, GM does not believe that this condition poses an unreasonable risk to motor vehicle safety because:

- Steering control can be maintained, although driver effort would increase at low vehicle speeds.

- All warranty and report rates rose precipitously when the Special Coverage was announced. The data suggest many of the repairs included in these rates were not related to repair of loss of power assist.
- The crash rate of the subject vehicles was significantly lower than the Cobalt crash rate prior to the publicity of the field action. Crash reports also increased dramatically when the Special Coverage was announced. Over 75% of the crash allegations were reported after GM mailed the Special Coverage 10187 letter to customers, and many of these involved crashes that occurred several months before the Special Coverage. This would indicate that many of these claims were the result of the public awareness of the Special Coverage.
- The DTC is conservative and is set to preserve the ability to steer the vehicle by disabling EPS assist. It protects the customer from more severe failure modes that could cause loss of steering.
- If power steering assist is disabled, the message "PWR STRG" is displayed in the DIC and a chime is momentarily activated to alert the driver to the DIC message.
- All of the subject vehicles are covered for loss of power assist by Special Coverage 10187 for 10 year or 100,000 miles, whichever comes first.
- The rate of labor operation T5783 claims (power steering motor replacement under the Special Coverage) dropped significantly two months after the initial peak that occurred immediately after the announcement.

* * *

General Motors requested assistance from suppliers in responding to question 10 and this response includes information 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.

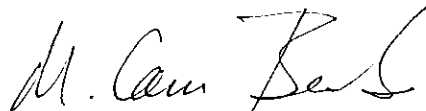
This response is based on searches of General Motors LLC (GM) locations where documents determined to be responsive to your request would ordinarily be found. As a result, the scope of this search did not include, nor could it reasonably include, "all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including 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), in or after January 1, 2002, who 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), analyses, 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,

A handwritten signature in black ink, appearing to read "M. Carmen Benavides".

M. Carmen Benavides
Director, Product Investigations
and Safety Regulations

Attachments