INFORMATION REDACTED
PURSUANT TO THE FREEDOM OF
INFORMATION ACT (FOIA), 5 U.S.C.
552(B)(6)

GENERAL MOTORS LLC
Global Vehicle Safety

Jun 27, 2019

Gregory Magno, Chief
Vehicle Defects Division – A
Office of Defects Investigation
National Highway Traffic Safety Administration
1200 New Jersey Avenue SE
Room W48-334
Washington, DC 20590

VIA EMAIL
G225693

NEF-101am
RQ19-001

Re: General Motors LLC's Response to NHTSA's May 23, 2019 Information Request in Investigation RQ19-001

Dear Mr. Magno:

This letter contains General Motors LLC's ("**GM**") responses to the information requests in your May 23, 2019 letter (the "**Requests**") relating to National Highway Traffic Safety Administration ("**NHTSA**") Recall Query 19-001, which is a NHTSA investigation of allegations of loss of power steering assist while driving in certain model year 2015 Chevrolet Colorado and 2015 GMC Canyon vehicles manufactured by General Motors. Unless otherwise defined herein, GM's responses rely on the defined terms in the Requests.

GM's document production relating to the responses in this letter is contained on the enclosed compact discs titled ATT_1_GM and ATT_2_GM_CONF. GM identified responsive documents by conducting a reasonable keyword and/or custodian search, as appropriate, of the primary GM electronic databases and document repositories that store potentially responsive documents in the ordinary course of business. GM's document production does not contain: (i) attorney-client privileged information or information protected as attorney-work product; or (ii) documents generated or archived in these locations after the dates that GM conducted its final searches.

Certain portions of these documents are exempt from public disclosure under the Freedom of Information Act (5 U.S.C. § 552(b)(4)) and 49 CFR part 512, and have been redacted in the copy contained on the enclosed compact disc. GM has submitted the unredacted, nonpublic copy of its document production to the NHTSA Office of Chief Counsel under 49 C.F.R. part 512.

Some of the documents in GM's production contain EDR data and personally identifiable information ("**PII**") (e.g., vehicle registration information or VIN, employee names, and customer/employee contact information). GM today submits documents with unredacted EDR data and PII with the understanding that NHTSA (or GM, if NHTSA prefers) will redact any PII before disclosing these documents to the public.

REQUESTS AND RESPONSES

REQUEST 1:

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. Subject component supplier name, part number and design versions installed as original equipment;
   f. Date of manufacture;
   g. Date warranty coverage commenced; and
   h. 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 2010, or a compatible format, entitled "PRODUCTION DATA."

GM RESPONSE:

In response to your request that GM "state, by model and model year, the number of Subject Vehicles GM has manufactured for sale or lease in the United States," GM provides the following table:

MAKE	MODEL	2015	2016	TOTAL
Chevrolet	**Colorado**	64,459	138,287	**202,746**
GMC	**Canyon**	25,357	48,008	**73,365**
	TOTAL	**89,816**	**186,295**	**276,111**

TABLE 1-1: SUBJECT VEHICLES

GM has produced the information requested in subparts "a" through "h" on the ATT_1_GM disc in the folder labeled "Q_01." Refer to the Microsoft Access 2010 file labeled "Q_01_PRODUCTION DATA."[1]

REQUEST 2:

[1] The part numbers for Question 1-e are provided in the data for Q_01 with additional part-number change history available as part of Question 9 in the Q_09 data response.

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 vehicles:
   a. Consumer complaints, including those from fleet operators;
   b. Field reports, including dealer field reports;
   c. Reports involving an injury or fatality;
   d. Reports involving a fire;
   e. Property damage claims;
   f. Third-party arbitration proceedings where GM is or was a party to the arbitration; and
   g. 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 "c" through "g" 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 "e" and "f" 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.

GM RESPONSE:

GM prepared its response to subparts "a" through "g" by conducting a reasonable keyword search for potentially responsive claims in GM Customer Assistance Center (CAC), Technical Assistance Center (TAC), Product Assistance Center (PAC) and GM Legal records.

Table 2-1 summarizes responsive claims where both the Subject Component was reported to have malfunctioned and the vehicle operator reported experiencing a loss of steering assist.

Tables 2-1 is inclusive of the full subject vehicle population for the 2015 and 2016 Chevrolet Colorado and GMC Canyon. Table 2-1 also includes reports of potential malfunctions of the Subject Component that may not be related to the cause underlying the condition for which Recall 16V-054 was issued.[2] The additional potential causes of loss of assist in the Subject Vehicles of which GM is currently aware are listed in the response to Request 12.

[2] Thirty of the VOQs provided with RQ19-001 have an associated claim in Table 2-1 below.

		SUBCATEGORIES			
TYPE OF REPORT	TOTAL REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH FIRE	NUMBER WITH CRASH CLAIMS*	NUMBER WITH INJURIES/ FATALITIES
Owner Reports	*682*	*4*	*0*	*5*	*0/0*
Field Reports	*513*	*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)	*1,195*	*4*	*0*	*5*	*0/0*
Total Vehicles with Reports (Unique VIN)	*1,075*	*4*	*0*	*5*	*0/0*

TABLE 2-1: SUMMARY OF CLAIMS THAT MAY BE RESPONSIVE TO REQUEST 2A-2G for Loss of Assist – All Claims

**Details about the crash claim are listed below.*

Crash Claims

There were five responsive reports of loss of assist (LOA) that allegedly involved a crash.[3] These five crash reports are further explained as follows:

- 1 claim was investigated by GM and found to be LOA at start-up where the driver continued to operate the vehicle with a known LOA.
- 1 claim involved a vehicle subject to safety recall 16V-054.
- 2 claims involved vehicles that were subject to GM's customer satisfaction field action (N17-211561).
- 1 claim involved a low-speed, minor collision that occurred while the vehicle was turning; no further details were provided regarding the LOA.

A summary description of the Alleged Defect, causal and contributing factors, and GM's assessment based on currently available information is provided in response to Request 12.

REQUEST 3:

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.);

[3] There were four additional claims involving a crash that mentioned loss of assist, but these claims were not included in Table 2-1 because GM's Engineering Analysis team investigated each of these claims and concluded that the crash was not related to a loss of power steering assist.

c. Vehicle owner or fleet name (and fleet contact person), street address, email 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 a crash is alleged;
j. Whether a fire is alleged;
k. Whether property damage is alleged;
l. Number of alleged injuries, if any; and
m. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2010, or a compatible format, entitled "REQUEST NUMBER TWO DATA."

GM RESPONSE:

GM has produced the requested information for the Subject Vehicles on the ATT_1_GM disc in the folder labeled "Q_03." Refer to the Microsoft Access 2010 file labeled "Q_03_REQUEST NUMBER TWO DATA."

REQUEST 4:

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. Describe in detail the search methods and search criteria used by GM to identify the items in response to Request No. 2.

GM RESPONSE:

GM is producing the responsive, non-privileged documents associated with the claims listed in Table 2-1. GM has produced these records in the Microsoft Access file labeled "Q_03_REQUEST NUMBER TWO DATA" on the ATT_1_GM disc in the folder labeled "Q_03." To assist in the identification of the documents referenced in the summaries provided in GM's response to Request 2, GM has organized the records by the GM file number.

A subset of the documents associated with claims listed in Table 2-1 will be provided, if applicable files are found in the GM's search, in GM's forthcoming supplemental response, which will be submitted to NHTSA on or prior to July 26, 2019. GM expects these documents may include attachments from the GM TAC (Technical Assistance Center) that are available for production at this time.

This response is based on searches of 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 [GM's] 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, in or after 1995, were involved in any way with" the activities identified by the ODI in subparts "a" through "d" of the "GM" definition provided in the Requests.

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

REQUEST 5:

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), street address, email address 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. Labor operation number(s);
   h. Problem code(s);
   i. Diagnostic trouble code(s);
   j. Replacement part number(s) and description(s);
   k. Concern stated by customer;
   l. Cause as stated on the repair order;
   m. Correction as stated on the repair order; and
   n. Additional comments, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2010, or a compatible format, entitled "WARRANTY DATA."

GM RESPONSE:

To collect warranty data responsive to this request, GM searched all databases containing warranty claim information which consists of the GM Global Analysis and Reporting Tool ("**GART**") for data regarding regular warranty claims.

Table 5-1 summarizes the GART claims which may relate to the Alleged Defect. Table 5-1 was populated using the search method criteria described in GM's response to Request 6.[4] A total of 3655 claims were categorized as responsive.[5]

MAKE	MODEL	2015	2016	TOTAL
Chevrolet	Colorado	1,940	632	**2,572**
GMC	Canyon	894	189	**1,083**
	TOTAL	**2,834**	**821**	**3,655**

TABLE 5-1: GART WARRANTY CLAIMS

Table 5-2 summarizes the rates based on GM's calculation using the total vehicle population.[6] For the 2015 Colorado and Canyon, the calculated incident rate is 31.8 Incidents per Thousand Vehicles (IPTV) at 54 Months in Services (MIS). For the 2016 Colorado and Canyon, the calculated incident rate is 5.0 Incidents per Thousand Vehicles (IPTV) at 44 Months in Services (MIS). (See Table 5-2, below).

The rate below in Table 5-2 for the 2015 Colorado and Canyon vehicles includes all the vehicles recalled under Safety Recall 16V-054 and the vehicles subject to GM's customer satisfaction field action N17-211561.

MY	Warranty IPTV	MIS
MY 2015	**31.8**	**@ 54**
MY2016	**5.0**	**@ 44**

TABLE 5-2: IPTV

Table 5-3 shows the rate for the 2015 Colorado and Canyon vehicles excluding all the vehicles recalled under Safety Recall 16V-054 and the vehicles subject to GM's customer satisfaction field action N17-211561.

---

[4] GART does not contain the vehicle owner's name or telephone number. In response to subpart "i," the Diagnostic Trouble Code (DTC) is captured separately and, if available, is included in one of the verbatim fields.

[5] GM identified responsive records based on the information supplied to GM by the servicing dealerships, which can contain material errors and omissions. Warranty records, for example, do not always accurately or completely describe the condition of the allegedly defective part at the time of the warranty correction, and service personnel may not consistently classify warranty repairs using the correct labor and trouble codes.

[6] We used the total vehicle population numbers provided in our response to Request 1 to calculate these rates for the Subject Vehicles.

Excluding Field Action Population	IPTV	MIS
MY 2015	7.9	@ 52

TABLE 5-3: IPTV for MY2015 Excluding the Population and Claims from the Safety Recall and non-safety GM Field action population

GM has produced the requested information on the ATT_1_GM disc in the folder labeled "Q_05." Refer to Microsoft Access 2010 database labeled "Q_05_WARRANTY_DATA." In response to subparts "k" and "n," GM has included in these records all available dealer-provided "verbatim text" in the GART database relating to the responsive claims that are currently in GM's possession.

REQUEST 6:

6. Describe in detail the search methods and search criteria used by GM to identify the claims 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 whether the diagnostic trouble codes are automatically reported to the warranty database electronically or manually entered into the warranty database by a claims administrator.

   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.

GM RESPONSE:

To populate Table 5-1, GM searched the GART warranty database for the labor codes that GM identified as potentially related to the Alleged Defect. These labor codes are summarized in Table 6-1. Each warranty record may have up to five verbatim fields. All verbatim claim fields were read and a claim was determined to be responsive if the verbatim indicated that the claim may have been related to the Alleged Defect in the Subject Component. The diagnostic trouble codes are manually entered into the warranty database by the dealer in one of the five verbatim fields.

LABOR CODE	LABOR CODE DESCRIPTION
2810135	Transfer Case Control Module Reprogramming with SPS
2810625	Power Steering Control Module Reprogramming with SPS
4041510	Battery Replacement

4041820	Battery Negative Cable Replacement
5430840	Terminal Replacement
5430902	Wire-to-Wire Repair
5430922	Connector Reconnection
5430940	Harness Replacement
7420270	Electric Belt Drive Rack and Pinion Steering Gear Replacement
7429949	Steering – Customer Concern Not Duplicated (CCND)

TABLE 6-1: LABOR CODES USED IN GART WARRANTY SEARCH

Table 6-2 summarizes the terms of new vehicle warranty coverage offered by GM on the Subject Vehicles:

MODEL YEAR	MAKE	WARRANTY TYPE	WARRANTY TERMS
2015-2016	Chevrolet	Limited Bumper-To-Bumper	3 year / 36,000 miles
2015-2016	GMC	Limited Bumper-To-Bumper	3 year / 36,000 miles

TABLE 6-2: NEW VEHICLE WARRANTY COVERAGE OFFERED BY GM ON SUBJECT VEHICLES FOR THE SUBJECT COMPONENT

Complete new vehicle warranty coverage details are provided on the ATT_1_GM disc in the folder labeled "Q_06."

Several optional extended warranty plans were available for the Subject Vehicles through GM dealerships. These plans were offered at different prices and for varying lengths of time based on a customer's preference.

REQUEST 7:

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 RESPONSE:

All service, warranty and other documents that may relate to the subject condition and have been issued to dealers, regional or zone offices, fleet purchasers or other entities are included in ATT_1_GM disc; folder labeled "Q_07." This information was collected from GM Service Operations and completed on May 30, 2019.

REQUEST 8:

8. 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.

GM RESPONSE:

The information listed in the following Table 8-1 is a summary of actions that GM is aware of as of June 27, 2019, that are responsive to Request 8. Documents and additional supporting information will be included in GM's supplemental responses, which GM will submit to NHTSA on or before July 26, 2019.

Action 8-A: GM Internal Investigation N19-221949	
Start/End Dates	March 21, 2019 – May 16, 2019
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of power steering loss of assist in 2015-2017 Chevrolet Colorado and GMC Canyon sending notification "Service Power Steering – Drive with Care" to the driver for the duration of the key cycle.
Brief Summary of Findings / Conclusions	On May 16th 2019, upon review of the collected data, GM's Safety and Field Action Decision Authority (SFADA) decided to close the investigation with no field action due to the low rate of occurrence, with many of the issues occurring at start up, and an extremely low rate of alleged accidents. The issue declares and notifies the driver with DIC message and chimes.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N19-221949.

Action 8-B: GM Internal Investigation N18-217855	
Start/End Dates	October 16, 2018 - November 29, 2018
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of Loss of Power Steering Assist with DTC code C0545 for 2015-2016 Subject Vehicles due to fretting corrosion caused by the pin and wire movement within the torque harness sensor connector.
Brief Summary of Findings / Conclusions	On November 29, 2018, upon review of the collected data, GM's SFADA decided to close the investigation with no field action. The higher frequency build month was covered under a previous customer satisfaction campaign.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N18-217855.
Action 8-C: GM Internal Investigation N18-217226	
Start/End Dates	May 30, 2018 – Oct 17, 2018
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	This Investigation was opened for the purpose of tracking directed monitor investigation N18-211561
Outcome	On Oct 17, 2018, the monitor phase was closed.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N18-217226

Action 8-D: GM Internal Investigation N17-211561	
Start/End Dates	July 20, 2017 – January 25, 2018
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of loss of power steering assist and a message of "Service Power steering" in 2015 Chevrolet Colorado and GMC Canyon vehicles from a suspected supplier quality spill.

Brief Summary of Findings / Conclusions	On January 25, 2018, upon review of the collected data, GM's SFADA decided to do a customer satisfaction field action. This field action covered vehicles built in October 2014 due to higher field rates.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N17-211561.
Action 8-E: GM Internal Investigation N17-210070	
Start/End Dates	April 21, 2017 – August 24, 2017
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of power steering gear loss of assist with DTC codes C0800 and or C0460 while turning left.
Brief Summary of Findings / Conclusions	On August 24, 2017, upon review of the collected data, GM's SFADA decided to close the investigation with no field action due to a low rate of occurrence, only 1 minor (low-speed) accident, and no defect trend found.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N17-210070.
Action 8-F: GM Internal Investigation N15-165038 (also documented as GFPE 150595)	
Start/End Dates	May 12, 2015 – January 20, 2016
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of a loss of steering power assist with DIC message "Service Power Steering – Drive with care", creating manual steer operation during a key cycle on the 2015 Chevrolet Colorado and GMC Canyon vehicles. This was due to a supplier build issue inducing damage to the electrical connection.
Brief Summary of Findings / Conclusions	On January 20, 2016, upon review of the collected data, GM's SFADA conducted a product safety recall for the vehicles subjected to the build timeframe, established through traceability.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N15-165038.
Action 8-G: GM Internal Investigation N14-164725	
Start/End Dates	April 8, 2015 – August 3, 2015

Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims for the 2015 Chevy Colorado and GMC Canyon - EPS Gear Loose Power Connection.
Brief Summary of Findings / Conclusions	On August 3, 2015, upon review of the collected data, GM's SFADA closed the Investigation without further field action, as this issue was found to be a one-time occurrence on a GM durability vehicle and no field data was found.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N14-164725.
Action 8-H: GM Internal Investigation N14-164618	
Start/End Dates	November 12, 2014 – April 7, 2015
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims for the 2015 Chevrolet Colorado and GMC Canyon - IP Wiring Harness Chafe. Depending on the extent of the damage to the body harness, there could be a fault in the condition that would lead to a potential loss of power steering assist.
Brief Summary of Findings / Conclusions	On April 7, 2015, upon review of the collected data, GM's SFADA issued a Service Update Bulletin to address this inspection and remedy at the same time.
Associated Documents	Information and documents contained in GM's Global Vehicle Safety-Case Observation Review & Evaluation ("**GVS-CORE**") database related to investigation N14-164618.
Action 8-I: GM Engineering Studies	
Start/End Dates	April 2015 – December 2018
Involved Engineering Groups	GM Engineering
Description	Investigation activities involved root cause analysis of the failure, remedy development, and validation testing, including system-level and vehicle-level evaluations at GM test facilities in Warren, MI and its Milford Proving Grounds regarding failure modes and mechanisms to a potential loss of power steering assist.
Brief Summary of Findings / Conclusions	The test results are consistent with GM's response to Request 12.

Associated Documents	Information, documents and emails related to a loss of power steering assist testing and studies. GM will produce these documents in its supplemental response on or before July 26, 2019.
Action 8-G: Mando Engineering Studies	
Start/End Dates	March 2017 – December 2018
Involved Engineering Groups	Mando American Corp, Supplier for the Electric Power Steering Rack
Description	Mando analyzed returned parts from the field.
Brief Summary of Findings / Conclusions	Mando's conclusions were consistent with GM's response to Request 11 as it relates to causal or contributory factors, failure mechanisms and failure modes.
Associated Documents	Mando documents that GM has in its possession, custody, or control presented during GM meetings and reviews.

REQUEST 9:

9. 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 number(s) (service and engineering) of the original component;
   e. The part number(s) (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 RESPONSE:

Documents relating to Engineering Work Order ("EWO") history are provided in the ATT_2_GM_CONF disc; folder labeled "Q_09."

REQUEST 10:

10. Produce two of each of the following:
    a. Exemplar samples 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.

GM RESPONSE:

The requested components will be provided via shipment on or before June 28, 2019.

Provided in the shipment are the following parts and components:

1. PN94771254 – represents the oldest available revision of part. This part is an engineering sample and was not a production part itself.
2. PN84670792 – represents the exemplar and current production part.
3. Subcomponents 23228019 and 23228017 are subcomponent packs that were returned to warranty from LOA claims.
4. PN84411663 – is a returned warranty full assembly that had a LOA claim at start-up.
5. Three packs that represent continuous improvement engineering changes:
    a. one that is a DEMO (The plastic cover comes off to view the pin plating)
    b. one that has TIN plating on the pins and
    c. one that has GOLD plating on the pins

REQUEST 11:

11. 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. Add any further requests or delete all, including requests for similar or substantially similar components; and
    c. Any kits that have been released, or developed, by GM for use in service repairs to the subject components/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 the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

GM RESPONSE:

The requested sales information for the Subject Component in both the production and service versions is provided on the ATT_1_GM disc; folder labeled "Q_11." There are two files, one for dealer repair orders (RO) and one for customer pay (PT). The RO file summarizes the sales volume by make, model, model year, and month of sale.[7] The make, model and model year are not provided in the customer-pay (PT) file since VIN information is not available.[8] The files also provide all available detailed sales information of the production, service, and remedy versions of the Subject Component, including its use in production or service, as well as supplier name, address, and point of contact information.

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.

REQUEST 12:

12. Furnish GM's assessment of the alleged defect in the subject vehicle models, 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.

[7] This file includes only the Subject Vehicles.
[8] This file may also include non-Subject Vehicles and non-GM vehicles.

GM RESPONSE:

GM's assessment of the Alleged Defect in the Subject Vehicles is as follows:

a. Causal or Contributing Factors: The Power Steering Rack Assembly in the subject vehicles converts the rotational motion of the steering wheel into the linear motion needed to turn the wheel. The system provides a converted output, reducing the necessary excerpted motion needed to turn the steering wheel. Under certain conditions the power steering sensor exhibited an error causing the power steering system to inhibit the application of power, putting the steering system into a manual mode. For those subject vehicles included in the population for Recall 16V-054, there was an identified supplier quality spill on a component (Po-Go-Pin) within the power steering gear assembly that would cause this error and inhibit the application of power steering. Specifically, a poor electrical connection within the steering gear connector may cause a loss of power steering assist.

   Outside of the recall population, our current assessment is that there may be multiple potential contributing factors across the small population of warranty claims, including, but not limited to, fretting corrosion of the torque sensor, cold-relay frozen ECU hardware, ECU software calibration, and low battery voltage. Many of these other contributing factors declare themselves at start-up with a DIC and chime notification to the operator.

b. Failure Mechanism: For the vehicles subject to Recall 16V-054, as stated in recall bulletin, they may experience loss of power steering assist at startup, or while driving, due to a poor electrical connection within the torque-sensor harness connector. If power steering assist is lost or reduced, steering control can still be maintained, but would require an increased steering effort, particularly at lower speeds.

   Outside of the recall population, our current assessment is that there may be multiple potential failure mechanisms across the small population of warranty claims, but no single failure mechanism demonstrates a defect trend.

c. Failure Mode: For the vehicles subject to Recall 16V-054, the loss of power steering assist was the result of a poor electrical connection within the torque-sensor harness connector, which was attributed to a manufacturing quality spill during a specific timeframe. This component (Po-Go-Pin) has a traceability history, and the quality spill duration was traced back to a specific population of vehicles that were built with this timeframe.

   Outside of the recall population, our current assessment is that there may be multiple potential failure modes across the small population of warranty claims, but no single failure mode demonstrates a defect trend.

d. GM performed Safety Recall 16V-054 specifically for an identified population, because there was a traceable known quality issue for those vehicles that posed a safety risk.

For the non-recall population, GM does not believe there is a defect condition that poses an unreasonable risk to motor vehicle safety for at least the following reasons:

(i) The low number of warranty claims does not support a conclusion that there is a defect trend.

(ii) The driver receives warning in the display either prior to or during driving or prior to or at the time of loss of assist that notifies them of the potential condition of loss of power steering assist.

(iii) A number of the issues are declared at start-up of the vehicle and the driver is notified.

(iv) There have been 5 minor low-speed accidents, zero injuries and zero fatalities associated with any of the claims. Of these accidents, as it was identified in Q2, 3 of these vehicles were associated with either the safety recall population or a GM non-safety field action. One vehicle had a known LOA prior to driving, where the operator proceeded to drive with the known condition. One vehicle was in a low-speed, minor collision with no additional LOA information. This field performance does not support LOA as a safety hazard.

(v) There are multiple contributing factors to a potential loss of power steering assist, and no defect trend found other than the recall that was performed regarding a supplier manufacturing quality issue.

e. The operator and persons inside the vehicle are alerted to the malfunction, and the malfunction is detectable, in the following ways:

(i) Driver Information Center notification is visually seen on the instrument cluster display of a steering service message. Any malfunction detected that disables steering assist will cause the SERVICE POWER STEERING or STEERING ASSIST IS REDUCED DRIVE WITH CARE message to be displayed on the driver information center.

(ii) There is an audible warning of an error for reduced power steering or loss of assist.

(iii) The driver will feel an increased amount of force needed to turn the steering wheel.

f. The test data will be produced in response to Request 8, which will be provided in the supplementary response on or prior to July 28, 2019.

CONCLUSION

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

Sincerely,

[redacted]

Brian Latouf, Executive Director
Global Safety and Field Investigations

cc: Mr. Antonio Moore
ODI_IRresponse@dot.gov

Attachments
ATT_1_GM: Public copy of GM's document production
ATT_2_GM_CONF: Nonpublic copy of GM's document production