



GENERAL MOTORS LLC
Global Vehicle Safety

November 14, 2019

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

VIA EMAIL

NEF-101jx
PE19-013

Re: General Motors LLC's Responses to NHTSA's September 25, 2019 Information Request in Investigation PE19-013

Dear Mr. Magno:

This letter contains General Motors LLC's ("GM") responses (the "**Responses**") to the information requests in your September 25, 2019 letter (the "**Requests**" and "**Letter**") relating to National Highway Traffic Safety Administration ("NHTSA") Preliminary Evaluation 19-013, which is a NHTSA investigation of "allegations of Passenger Sensing System (PSS) malfunction in certain model year (MY) 2012-2013 Chevrolet Volt vehicles." Unless otherwise defined herein, GM's Responses rely on the defined terms in the Requests.

PRELIMINARY STATEMENT

GM's document production is contained on the enclosed compact disc titled ATT_1_GM. 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 that were collected in the ordinary course of business, as more fully described in the Responses below. GM's document production does not contain: (i) attorney-client privileged information or information protected as attorney-work product; and (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)) ("**FOIA**") 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 (on a compact disc titled ATT_2_GM_CONF) to the NHTSA Office of Chief Counsel under 49 C.F.R. part 512.

Some of the documents in GM's production contain personally identifiable information ("**PII**") (e.g., vehicle registration information or VIN, employee names, and customer/employee contact information). GM today submits documents with unredacted 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:

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 part number(s) and design version(s) installed as original equipment;
- f. Software version;
- g. Date of manufacture (in “yyyy/mm/dd” date format);
- h. Date warranty coverage commenced (in “yyyy/mm/dd” date format); and
- i. 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 “[s]tate, by model and model year, the number of subject vehicles (as defined in the Letter, the “**Subject Vehicles**”) GM has manufactured for sale or lease in the United States,” GM provides the following table:

		MODEL YEAR					TOTAL
MAKE	MODEL	2011	2012	2013	2014	2015	
Chevrolet	Volt	4,369	18,365	27,505	21,840	12,052	84,131

TABLE 1-1: SUBJECT VEHICLES

GM has produced the information requested in subparts (a) through (i) on the ATT_1_GM disc in the folder labeled “Q_01”. Refer to the Microsoft Access 2010 file labeled “Q_01_PRODUCTION_DATA.”

GM does not possess VIN-level part-traceability records for the subject component (as defined in the Letter, the “**Subject Component**”) and therefore cannot respond to subpart (e).¹ In response to subpart (f) there was only one software version for MY11-15; however, there were several calibrations based on different seat trim levels. GM’s Response to Request 9 provides a summary of the part-number history and changes for the Subject Component in the Subject Vehicles, including calibration changes.

REQUEST 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. Field reports, including dealer field reports;
- c. Reports involving a crash, injury or fatality;
- d. Property damage claims;
- e. Third-party arbitration proceedings where GM is or was a party to the arbitration; and
- f. 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 “c” through “f” 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:

In response to subparts (a) through (f) for the Subject Vehicles, GM provides Table 2-1, which GM prepared by conducting a reasonable keyword search for potentially responsive claims

¹ The part number information is stored by the seat assembly supplier.

in several databases.²

In response to subparts “c” and “d,” GM is not aware of any relevant incidents involving a crash, injury, fatality or property damage claims. With respect to subparts “e” and “f,” GM is not aware of any third-party arbitration proceedings or lawsuits related to the alleged defect (as defined in the Letter, the “**Alleged Defect**”) in the Subject Vehicles.

TYPE OF REPORT	GM REPORTS	SUBCATEGORIES				
		CORRESPONDING TO NHTSA REPORTS	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH INJURIES	NUMBER WITH FATALITIES
Owner Reports	108	5	0	0	0	0
Field Reports	42	1	0	0	0	0
Not-In-Suit 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)	150	6	0	0	0	0
Total Vehicles with Reports (Unique VIN)	131	5	0	0	0	0

TABLE 2-1: SUMMARY OF CLAIMS FOR “SERVICE AIRBAG LIGHT ON” THAT MAY BE RESPONSIVE TO REQUESTS 2A-2F

As summarized above in Table 2-1, GM is aware of 131 unique claims for a “Service Airbag Light” issue involving the Subject Vehicles that may be responsive to Request 2.³ NHTSA defined the Alleged Defect broadly to include any alleged malfunction of the Subject Component regardless of cause. For this reason, GM’s response also includes complaints that were likely caused or substantially affected by factors other than an inherent malfunction of the PPS system—e.g., customer abuse/interference. For example, these other factors include aftermarket seat modifications (7 claims) and instances where liquid was spilled on the seat and affected the PPS function (7 claims). Note that GM warns customers that modification to the passenger seat and liquid spills could affect the operation of the PPS system.⁴

² These databases include: Customer Assistance Center (CAC), Product Assistance Center (PAC), Business Resource Center (BRC), Technical Assistance Center (TAC), Field Information Network Database (FIND), Company Vehicle Evaluation Program (CVEP), Captured Testing Fleet (CTF), COMPASS, Early Quality Feedback (EQF), Problem Resolution Tracking System (PRTS), Field Product Report Database (FPRD), Global Incident Management System (GIMS), and GM Legal records.

³ General claims of “airbag light on” or “service airbag message” with no reference to a DTC or component that could not be tied back (warranty, part sales or other diagnostics) to the source of the light or message were not included as responsive records.

⁴ GM’s Owner Manual (“OM”) for the Chevrolet Volt includes a section called “Adding Equipment to the Airbag-Equipped Vehicle” that warns the customer about replacing the original seat trim or adding an aftermarket seat heater. See Volt OM section Adding Equipment to the Airbag-Equipped Vehicle (“[T]he vehicle has a passenger sensing system for the right front passenger position, which includes sensors that are part of the passenger seat. The passenger sensing system may not operate properly if the original seat trim is replaced with non-GM covers, upholstery or trim, or with GM covers, upholstery or trim designed for a different vehicle. Any object, such as an aftermarket seat heater or a comfort enhancing pad or device, installed under or on top of the seat fabric, could also

GM did not include claims in Table 2-1 where the customer was dissatisfied with what appeared to be the normal operation of the PPS. Based on GM's current understanding of these claims, the PPS operated as intended and the claim was not related to a malfunctioning PPS. These complaints are related to:

- Object in Seat: items in the front passenger seat that turn the Passenger Airbag Status indicator ON. The Subject Vehicles' owner manual states that "[t]he on indicator may be lit if an object, such as a briefcase, handbag, grocery bag, laptop or other electronic device, is put on an unoccupied seat. If this is not desired remove the object from the seat." Bulletins #08-09-41-007 and #12-09-41-002 also inform the dealers to "advise the customer to avoid placing the electronic device or conductive object in the front passenger seat in the future to eliminate unwanted activation of the seatbelt reminder light/chime."
- Unexpected Classification: when an occupant perceives an unexpected status from the Passenger Airbag Status indicator. Either the light is ON for a child passenger⁵ or the light is OFF due to additional cushions or support in the seat.⁶

In determining the responsiveness of a claim, GM erred on the side of coding the claim as responsive even if the evidence in GM's possession linking the claim to the Alleged Defect was implausible, inconclusive, or circumstantial. Accordingly, the claim totals in Table 2-1 are likely conservative and over-inclusive.

Additional information about these claims is available in the document production that GM is providing in response to Request 4 and in GM's assessment of the Alleged Defect provided in its Response to Request 12.

REQUEST 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;

interfere with the operation of the passenger sensing system. This could either prevent proper deployment of the passenger airbag(s) or prevent the passenger sensing system from properly turning off the passenger airbag(s)."). The Volt OM also notifies customers that a "wet seat can affect the performance of the passenger sensing system," in the Passenger Sensing System section.

⁵ Because the Subject Vehicles are equipped with low-risk passenger airbags, the PPS system is designed to turn the airbag on for most front seat occupants and turn the airbag off for small children in child seats. The owner manual states in the "Seats and Restraints - Child Restraints – Older Children" section that "children and infants are safer when properly restrained in a child restraint system or infant restraint system secured in a rear seating position."

⁶ The Volt OM states in the Passenger Sensing System section that if the OFF indicator is lit for an adult-sized occupant, "[r]emove any additional material from the seat, such as blankets, cushions, seat covers, seat heaters, or seat massagers."

- 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), street address, email address and telephone number;
- d. Vehicle's VIN;
- e. Vehicle's model year;
- f. Vehicle's mileage at time of incident;
- g. Incident date in ("yyyy/mm/dd" date format);
- h. Report or claim date (in "yyyy/mm/dd" date format);
- i. The stature (weight and height) of the occupant in the passenger seat, if known;
- j. Whether a crash 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

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, nonprivileged documents associated with responsive claims listed in Table 2-1 in the Microsoft Access file labeled "Q_03_REQUEST NUMBER TWO DATA" in the folder labeled "Q_03" on the ATT_1_GM disc. GM has organized the records by the GM file number.

This response is based on a reasonable keyword search 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] 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), who are or, in or after 2006, 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

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 (in “yyyy/mm/dd” date format);
- 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 codes;
- i. Diagnostic trouble codes;
- 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 conducted a reasonable keyword search of the GM Global Analysis and Reporting Tool (“**GART**”), GM’s primary repository of potentially responsive warranty claim information used in the ordinary course of business.

Table 5-1, below, summarizes the warranty claims for the Subject Vehicles that may relate to the Alleged Defect.⁷ There are a total of 796 warranty claims (728 unique VINs) that were categorized as responsive.⁸ This total includes: (i) 13 claims for wet seat; (ii) 1 claim with aftermarket seat covers and (iii) 72 claims that were also reported as a claim in Table 2-1.

MAKE	MODEL	MODEL YEAR					TOTAL
		2011	2012	2013	2014	2015	
Chevrolet	Volt	29	205	445	88	29	796

TABLE 5-1: SUMMARY OF WARRANTY CLAIMS FOR THE SUBJECT VEHICLES

Table 5-2, below, summarizes the Incidents Per Thousand Vehicles (“**IPTV**”) for the Subject Vehicles at 36 and 60 Months in Service (“**MIS**”) compared to the average warranty rate for the Subject Components for all GM Vehicles with a similar design (an A-surface capacitive PPS). The rate for the Subject Vehicles is consistent with the average.

Vehicle	IPTV @ 36 MIS	IPTV @ 60 MIS
2011-2015 Chevrolet Volt	6.2	9.1
Average for 2011-2015 GM Vehicles with an A-Surface Capacitive PPS	6.1	8.1

TABLE 5-2: WARRANTY CLAIM RATE COMPARISON⁹

⁷ GART does not contain the vehicle owner’s name or telephone number. Additionally, some replacement part numbers, part descriptions and customer concern code descriptions are not included in the GM warranty database. In response to subpart (j), the diagnostic trouble code (DTC) is not captured separately and, if available, is included in one of the verbatim fields.

⁸ 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.

⁹ The rates in Table 5-2 do not include claims involving a wet seat or an aftermarket seat modification.

GM has produced the requested information in subparts (a) through (n) on the ATT_1_GM disc in the folder labeled “Q_05”. Refer to the Microsoft Access 2010 file labeled “Q_05_WARRANTY_DATA.” In response to subparts (l) and (m), 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

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, diagnostic trouble 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, diagnostic trouble codes and diagnostic trouble 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 in the Subject Vehicles. These labor codes are summarized in Table 6-1, below. 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.

LABOR CODE	LABOR CODE DESCRIPTION
2810605	Passenger Presence System Reprogramming with SPS
5430840 (N6650)	Terminal Replacement
5430902 (N6653)	Wire-to-Wire Repair
5430922 (N6654)	Connector Reconnection
5430940 (N6655)	Harness Replacement
6450910	Airbag Front Passenger Presence Module Replacement
6450950	Airbag Front Passenger Presence Sensor Replacement
6459939	Airbags/Electronics - Customer Concern Not Duplicated (CCND)

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

Table 6-2, below, summarizes the relevant diagnostic trouble codes that may be related to the Alleged Defect in the Subject Vehicles. Please note that the diagnostic trouble codes are manually entered into the warranty database in one of the five verbatim fields and may be subject

to technician input error or omission.

DTC CODE	DTC CODE DESCRIPTION¹⁰
B0074	Passenger Presence Sensor Circuit Malfunction
B0081	Passenger Presence Module Malfunction
B101D	Electronic Control Unit Hardware Malfunction
B101E	Electronic Control Unit Software Malfunction
U0170	Lost Communication with Passenger Presence Detection Sensor Module

TABLE 6-2: DTC CODES USED IN GART WARRANTY SEARCH

Table 6-3, below, summarizes the terms of new vehicle warranty coverage offered by GM on the Subject Vehicles:

MODEL YEAR	MAKE	WARRANTY TYPE	WARRANTY TERMS
2011-2015	Chevrolet	Limited Bumper-To-Bumper	3 year / 36,000 miles

TABLE 6-3: NEW VEHICLE WARRANTY COVERAGE OFFERED BY GM ON SUBJECT VEHICLES

Many different 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

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:

The documents that are responsive to Request 7 are located on the ATT_1_GM disc in the folder labeled "Q_07".

REQUEST 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;

¹⁰ The DTC description may vary based on the symptom code associated with the fault.

- 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 Table 8-1 is a summary of actions that GM is aware of that are responsive to Request 8.

<u>Action 8-A: GM Internal Investigation N16-206799</u>	
Start/End Dates	November 29, 2016 – March 15, 2017
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of “airbag light on” due to alleged passenger presence sensor (“PPS”) malfunctions in the Subject Vehicles.
Outcome	On March 15, 2018, upon review of the collected data, GM’s Safety Field Action Decision Authority (SFADA) closed the investigation without field action.
Associated Documents	Information and documents contained in GM’s Global Vehicle Safety-Case Observation Review & Evaluation (“GVS-CORE”) database related to investigation N16-206799. The files are on the ATT_1_GM and ATT_2_GM_CONF discs labeled as 8A 206799 in the index file.
<u>Action 8-B: GM Internal Investigation N18-217765</u>	
Start/End Dates	August 28, 2018 – October 11, 2018
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of “airbag light on” due to alleged PPS malfunctions in the Subject Vehicles.

Outcome	On October 11, 2018, upon review of the collected data, GM's SFADA closed the investigation without field action.
Associated Documents	Information and documents contained in GM's GVS-CORE database related to investigation N18-217765. The files are on the ATT_1_GM and ATT_2_GM_CONF discs labeled as 8B 217765 in the index file.
<u>Action 8-C: GM Internal Investigation N19-226487</u>	
Start/End Dates	June 19, 2019 – August 29, 2019
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of "airbag light on" due to alleged PPS malfunctions in the Subject Vehicles.
Outcome	On August 29, 2019, upon review of the collected data, GM's SFADA closed the investigation without field action.
Associated Documents	Information and documents contained in GM's GVS-CORE database related to investigation N19-226487. The files are on the ATT_1_GM and ATT_2_GM_CONF discs labeled as 8C 226487 in the index file.
<u>Action 8-D: GM Engineering/IEE Studies</u>	
Start/End Dates	August 2011 – August 2016
Involved Engineering Groups	GM Engineering and IEE S.A. ("IEE") (the supplier of the Subject Component in the Subject Vehicles)
Description	IEE analyzed returned parts from the field. Investigation activities involved root cause analysis of the alleged failures.
Outcome	The conclusions are consistent with GM's Response to Request 12 as it relates to causal or contributory factors, failure mechanisms, and failure modes.
Associated Documents	IEE documents that GM has in its possession, custody, or control presented during GM meetings and reviews. The files are on the ATT_2_GM_CONF disc labeled as IEE in the index file.
<u>Action 8-E: Magna Engineering Information</u>	
Start/End Dates	July 2012 – November 2014
Involved Engineering Groups	Magna Seating Detroit
Description	Production Part Approval Package (PPAP) documents for engineering change and Job Element Sheets.

Outcome	Magna did not make any conclusions related to the Alleged Defect.
Associated Documents	Magna documents that GM has in its possession, custody, or control presented during GM meetings and reviews. The files are on the ATT_2_GM_CONF disc labeled as Magna in the index file.

TABLE 8-1: GM INVESTIGATIONS OF THE ALLEGED DEFECT IN THE SUBJECT VEHICLES

GM is producing the documents that are responsive to Request 8 on the ATT_1_GM and ATT_2_GM_CONF discs in the folders labeled “Q_08”. The index files (_PE19-013_Q8_Index_CONF.xlsx and _PE19-013_Q8_Index_NON-CONF.xlsx) provided are a directory of the files with the original file names and are labeled as listed in Table 8-1.

REQUEST 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:

A spreadsheet summary of GM engineering work order history on the Subject Component in the Subject Vehicles is provided in the ATT_2_GM_CONF disc; folder labeled “Q_9”.

REQUEST 10

Produce one of each of the following:

- a. Exemplar samples of each design version of the subject component; and
- b. Field return samples of the subject component exhibiting the subject failure mode.

GM RESPONSE:

The requested exemplar service kits are listed below along with their status. Two of the kits will be shipping on November 14, 2019. Two of the kits have been ordered and should be available within 1-2 weeks. The final two kits are on order. GM is working with the supplier to obtain samples of just the sensor which will be shipped as soon as they are available.

Model Years	Part Number	Description	Options	Status
2011	22902561	MODULE KIT-AIRBAG FRT PASS PRESENCE (W/ SEN)	Cloth Seat (EEY)	Shipping on 11/14
2011	22902562	MODULE KIT-AIRBAG FRT PASS PRESENCE (W/ SEN) (W/HEATER)	Leather Seat (EAL) with Heat	Shipping on 11/14
2011-2012	22744679	MODULE KIT-AIRBAG FRT PASS PRESENCE (W/ SEN) (W/HEATER)	Leather Seat (EAL) with Heat	On order
2011-2012	22744680	MODULE KIT-AIRBAG FRT PASS PRESENCE (W/ SEN)	Cloth Seat (EEY)	On order
2013-2015	22968437	MODULE KIT-AIRBAG FRT PASS PRESENCE (W/ SEN)	Leather (EW4), Suede (05N) or Cloth Seat (EEY)	On order
2013-2015	22968438	MODULE KIT-AIRBAG FRT PASS PRESENCE (W/ SEN) (W/HEATER)	Leather (EW4), Suede (05N) or Cloth Seat (EEY) with Heat (KA1)	On order

TABLE 10-1: EXEMPLAR SUBJECT COMPONENT SAMPLES FOR THE SUBJECT VEHICLES

Field return samples of the Subject Component are currently not available. A warranty part return program has been in place since July 2019; however, no parts have been received back through the process yet. GM will leave the warranty part return on for the duration of the investigation. If GM receives a part back through the process, it will be shipped to NHTSA at that time.

REQUEST 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. 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 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 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 and one for customer paid repairs. The dealer RO file summarizes the sale volume by make, model and model year and date of sale. The make, model and model year are not provided in the customer paid file since VIN information is not available.

This data has limited analytical value in analyzing the field performance of the Subject Component because the records do not contain sufficient information to establish the reason for the part sale. For example, the service kit for the Subject Component also includes the seat heater (where applicable) and seat cushion. Seat damage or issues with the cushion or heater, which may be (and likely are) unrelated to a malfunction in the PPS, may also require the replacement of the Subject Component. In addition, it is not possible from this data to determine the number of these parts sales that have been installed in the Subject Vehicles or the number remaining in dealer inventory. Therefore, it is difficult to draw any conclusions regarding the performance of the PPS, or malfunctions thereof, from this data.

REQUEST 12:

Furnish GM's assessment of the alleged defect in the subject and peer 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.

GM RESPONSE:

Background on the PPS Sensor Technology in the Subject Vehicles:

The IEE-supplied PPS system in the Subject Vehicles is a capacitance-based system (as opposed to a weigh-based system). A capacitance-based system is comprised of flexible sensor mats that measure the change in capacitance caused by occupants in the seat. These flexible sensor mats are embedded within the seat cushion on the top surface of the seat foam.

By measuring capacitance rather than weight, the system is better able to detect lighter adults and out-of-position occupants. For example, capacitance-based systems are sensitive to conductive objects in the seat (e.g., human occupants) and can be very effective at enabling the airbag in edge cases (e.g., a 5th percentile female).¹¹ Because the Subject Vehicles are equipped with low-risk passenger airbags, the PPS system is designed to turn the airbag on for most front seat occupants and turn the airbag off for small children in child seats.

The capacitance-based PPS system in the Subject Vehicles meets GM's general performance requirements for all GM PPS designs, and the warranty rate for the Subject Components in the Subject Vehicles is consistent with the average warranty rate for the Subject Components in all 2011-2015 GM Vehicles.

GM's Assessment of the Alleged Defect in the Subject Vehicles:

- a. Installation variability during manufacture of the seat assembly can impact the durability of the PPS. Other contributing factors may be unusual occupant seating positions that can cause additional stress on the PPS sensor mats (e.g., feet on the dashboard).
- b. Although failures are rare, the main failure mechanism is an increase in the electrical resistance of the sensor mat in the Subject Component. This failure may be caused by misalignment of the sensor mat to the seat foam during installation by the seat assembly plant. In rare cases, misalignment, as well as unusual occupant seating positions, can cause the sensor mat to bunch in the seat trench. The bunching of the sensor mat could cause the sensor mat to repeatedly fold in the same location over time during occupant usage which may cause the observed increase in sensor resistance and trigger a DTC. Based on a DTC analysis, roughly 60-70% of the PPS failures were the result of this type of sensor fault.
 - i. GM has observed other failure mechanisms in the Subject Components that are not related to a sensor fault, which include internal electronic failures and lack of serial data communication with the Sensing and Diagnostic Module ("SDM").

¹¹ The tradeoff with capacitance-based systems is that other, non-human conductive objects can cause the airbag to be enabled—e.g., cell phones and metal objects—which can be an annoyance for customers because, the passenger seatbelt reminder may chime.

- c. When high resistance is detected by the passenger presence electronics module, a fault is communicated to the SDM which will suppress the front passenger airbag (“PAB”). When the passenger presence system detects an active fault, a DTC is set and the occupants are alerted to the malfunction by an Airbag Readiness Light, a DIC message and chime, and the Passenger Airbag Status Display (which indicates the passenger airbag is “Off”). If the fault clears, then the system can recover. The below chart illustrates both the normal operation of the PPS—when it detects an adult passenger or an infant in a child seat—and the faulted state (“Fail Soft Operation”). As shown below, when the system detects a fault, the Airbag Readiness light is “On,” a DIC message is displayed and a chime sounds, and the Passenger Airbag Status display indicates the PAB is “Off.” In this faulted state, the PAB is suppressed.

Operational State	Airbag Readiness Light	DIC Message & Chime	Passenger Airbag Status Display	PAB Actual Status
Normal Operation - Adult	OFF	OFF	“ON” Indicator Illuminated	PAB Enabled
Normal Operation – (Infant in Child Seat)	OFF	OFF	“OFF” Indicator Illuminated	PAB Suppressed
Fail Soft Operation - Faulted	ON	ON	“OFF” Indicator Illuminated	PAB Suppressed

TABLE 12-1: Normal v. Faulted Operation - PAB Status

- d. If there is a malfunction of the PPS and an adult is occupying the passenger seat, the passenger airbag will be suppressed and will not deploy in a crash. GM decided to suppress the airbag in the event of a fault (i.e., “Fail Soft Operation”) for the benefit of children.

In addition to suppressing the PAB, in the event of a PPS malfunction, the passenger seat will appear to the system as unoccupied and the passenger seat belt reminder will not be provided for the passenger.

It is important to note that GM has not received any reports of asymmetric deployment where a passenger air bag deployment would be required, nor have any injuries or fatalities been reported as a result of the alleged defect. In addition, GM’s analysis of the relevant field data shows that there is no defect trend with respect to any malfunction in the Subject Component. For at least these reasons and the additional reasons listed below, GM does not believe this condition poses an unreasonable risk to motor vehicle safety.

- i. There are no accidents, injuries, fatalities or fires associated with this condition.
 - ii. There are no known cases of asymmetric deployment.
 - iii. The condition is highly detectable with multiple warnings to the customer (see Table 12-1 above).
 - iv. The design and the average warranty rate are consistent with other similar suppression systems in use between 2011 and 2015.
 - v. The condition has a low combined rate of occurrence of 10.8 Rate Per Thousand Vehicles¹² (RPTV) at 85 MIS for 2011-2015MY. This rate includes all claims, which are attributable to multiple root causes, none of which when viewed separately or together indicate a defect trend.
 - vi. The Subject Vehicles are four door passenger cars with two additional passenger seats in the back row. If the PPS malfunctions, the driver and passenger are notified of the malfunction in multiple ways as explained below in response to Request 12(e) and as outlined in Table 12-1 above. With that information, the passenger can choose not to occupy the front passenger seat or to sit in one of the rear passenger seats. GM's owner manual for the Subject Vehicles warns customers not to occupy the front passenger seat when the Airbag Readiness Light is lit.¹³
- e. The operator and persons inside the vehicle are alerted to the malfunction, and the malfunction is detectable in the following ways (see also Table 12-1):
- i. an Airbag Readiness Light (telltale) is illuminated;
 - ii. a warning chime will sound, and a Service Airbag System message is displayed in the Driver Information Center (DIC); and
 - iii. the Passenger Airbag Status indicator in the overheard console will display as "OFF."
- f. Please reference the "Passenger Sensing System" excerpt from the Subject Vehicles' owner manual which describes the system and warnings to the customer provided on the ATT_1_GM disc in the folder labeled "Q_12." The reports included with this inquiry are produced in response to question 8.

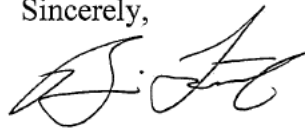
¹² This rate includes both claims from Table 2-1 and warranty claims. This rate also includes duplicate VINs (more than 1 claim from a VIN).

¹³ For example, the Passenger Sensing System section of the Volt OM includes a warning that states: "[i]f the airbag readiness light is lit, do not install a child restraint or allow anyone to occupy the seat."

CONCLUSION

While GM will continue to monitor the performance of the Subject Component in the Subject Vehicles in the field, GM believes, based on current data, that the Subject Component in the Subject Vehicles do not contain a safety-related defect. 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 'B. Latouf', written over a horizontal line.

Brian Latouf, Executive Director
Global Safety and Field Investigations

cc: Mr. Chris Lash
Ms. Jisan Xue
ODI_IRresponse@dot.gov

Enclosures

ATT_1_GM – Public copy of GM's document production