GENERAL MOTORS LLC
Vehicle Safety and Crashworthiness

August 16, 2013

Scott Yon, Chief
Vehicle Integrity Division
Office of Defects Investigation
National Highway Traffic Safety Administration
1200 New Jersey Ave, SE, Room W48-314
Washington, DC 20590

N120261

NVS-212mjl
RQ13002

Dear Mr. Yon:

This letter completes General Motors' (GM) response to your Recall Query (RQ13-002), dated June 13, 2013, to investigate the scope of two General Motors recalls relating to a driver air bag connector (shorting bar) defect in some model year (MY) 2012 Chevrolet Camaro, Cruze and Sonic, and Buick Verano vehicles.

This letter contains GM's responses to request numbers 1(a-j), 8, 10, 11, 14 and 15, and additional information for request number 5. The remainder of the response was provided on August 2, 2013.

Your questions and our corresponding replies are as follows:

1. **State, by make, model and model year, the number of the subject vehicles that 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. **Date of manufacture;**
   e. **Date warranty coverage commenced;**
   f. **The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease);**
   g. **Whether or not the vehicle was included in either of the two subject recalls;**
   h. **Vehicle's driver inflator serial number;**
   i. **Vehicle's driver inflator manufacture date; and**
   j. **Production line number/designation that the driver inflator was built on.**

   **Provide the table in Microsoft Access 2010, or a compatible format, entitled "PRODUCTION DATA."**

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

| MAKE | 2012 MODEL | TOTAL |
|---|---|---|
| CHEVROLET | Camaro | 80,685 |
| | Cruze | 270,583 |
| | Sonic | 83,969 |
| BUICK | VERANO | 32,639 |
| | TOTAL | **467,876** |

TABLE 1-1: SUBJECT VEHICLE PRODUCTION

The production information requested in 1a – 1j is provided on the ATT_1_GM disk; folder labeled "Q_01." Refer to the Microsoft Access 2010 file labeled "Q_01_PRODUCTION DATA."

**5. State, by model, 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 including all claims for repairs of the subject components: 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 (TSB) or customer satisfaction campaign. Also, state, by model, a total count for all claims that relate to repairs related to any TSBs involving the subject components. Exclude in your response claims related to the subject recalls.**

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

**a. GM's claim number;**
**b. Vehicle owner or fleet name (and fleet contact person) and telephone number;**
**c. VIN;**
**d. Repair date;**
**e. Vehicle mileage at time of repair;**
**f. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;**
**g. Labor operation number;**
**h. Problem code;**
**i. Diagnostic trouble code;**

**j. Whether or not the repair is related to a TSB (and if so, identify the TSB number);**
**k. Replacement part number(s) and description(s);**
**l. Concern stated by customer; and**
**m. Comment, 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 is submitting an additional five warranty claims which were not submitted with the partial response on August 2. These claims were found by searching for a new global labor code (6450370) for airbag module replacement that has been in use since approximately May 1, 2013. See ATT_1_GM, folder Q_05. The updated list of all labor codes and part numbers for which GM searched for this response is now shown in the table below.

| Labor Codes: | Labor Code Description |
|---|---|
| C8800 | Steering Wheel Airbag Coil Replacement |
| C8835 | Airbag Steering Wheel Module Replacement |
| 6450010 (replaced C8800) | Steering Wheel Airbag Coil Replacement |
| 6450370 | Steering Wheel Inflatable Restraint Module Replacement |
| **Inflator Module Part Numbers:** | **Inflator Module Description** |
| 22887909 | MY2012 Camaro Jet Black Dual |
| 22943125 | MY2012 Camaro Jet Black Dual rattle change |
| 20986955 | MY2012 Verano Jet Black |
| 20986956 | MY2012 Verano Cocoa |
| 95181997 | MY2012 T300 Jet Black |
| 95214734 | MY2012 Cruze Jet Black |
| 95214735 | MY2012 Cruze Cocoa |
| 95461940 | My2012 Sonic Jet Black (North America) |

TABLE 5-1: LABOR CODES AND PART NUMBERS USED IN WARRANTY SEARCH

**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. This includes, but is not limited to, any and all actions by the subject component manufacturer relating to the alleged defect. 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. If an action is not complete, provide a detailed schedule for the work to be done, tentative findings and/or conclusions, and provide an update within 10 days of completion of the action.**

A copy of these documents may be found in ATT_1_GM, ATT_2_GM_CONF, and ATT_3_TAKATA_CONF; folders labeled "Q_08."

| |
|---|
| **Action 8-A:** GM Investigation prior to Recalls 12V522 and 13V023<br>**Start Date:** Sep 2012<br>**End Date:** Jan 2013<br>**Engineering Group:** GM Engineering, GM Product Investigation<br>**Attachments:** ATT_1_GM disk; folder labeled "Q_08-A"<br>ATT_2_GM_CONF disk, folder labeled "Q_08-A"<br>**Description:** GM Investigation of the alleged defect in the subject vehicles, analysis of warranty data and GM reports and analysis of part returns.<br>**Summary:** This investigation resulted in recalls 12V522 and 13V023. |
| **Action 8-A:** Takata Investigation prior to Recalls 12V522 and 13V023<br>**Start Date:** Sep 2012<br>**End Date:** Jan 2013<br>**Engineering Group:** Takata Engineering<br>**Attachments:** ATT_1_GM disk; folder labeled "Q_08-B"<br>ATT_3_TAKATA_CONF disk, folder labeled "Q_08-B"<br>**Description:** Takata's Investigation of the alleged defect in the subject vehicles, analysis of warranty data and GM reports and analysis of part returns.<br>**Summary:** This investigation resulted in recalls 12V522 and 13V023. |
| **Action 8-C:** GM Investigation 2013<br>**Start Date:** June 2013<br>**End Date:** August 2013<br>**Engineering Group:** GM Engineering, GM Product Investigation<br>**Attachments:** ATT_1_GM disk; folder labeled "Q_08-C"<br>**Description:** GM's investigation of the alleged defect in the subject vehicle with the assistance of Takata Corporation.<br>**Summary:** GM Investigation of the alleged defect in the subject vehicles, analysis of warranty data and GM reports, and analysis of part returns indicates a low rate of occurrence; which continues the trends found in the analysis of similar data prior to recalls 12V522 and 13V023. |

**10. Describe in detail the process(es) used in the manufacture, assembly, and installation of the subject components in the subject vehicles. Identify the specific processes and/or tooling that lead to, or were involved in the defect conditions identified in the subject recalls. State the number of production lines used to manufacture the driver air bag inflators in the subject vehicles. Also, provide the name and address of the supplier(s) for the driver inflators in the subject vehicles.**

Attached is a document from Takata that shows in detail the processes used in the manufacture, assembly, and installation of the subject components that were used in the subject vehicles. See slides 1-20 and 26-31 in the document "Production Line F.PPT" in ATT_3_TAKATA_CONF, folder "Q_10."

Based on this information supplied by Takata, the specific processes and/or tooling that led to, or were involved in the defect conditions identified in the subject recalls, are shown in slides 20-25 in the document "Production Line F.PPT".

Lines F and V were used to manufacture the driver air bag inflators that were used in the subject vehicles. Line F and V are identical production lines.

The name and address of the supplier for the driver inflators in the subject vehicles is:

Takata de México, S.A. de C.V.
Libramiento Carlos Salinas de Gortari # 198 Norte
Col. Aviación
Frontera, Coahuila C.P. 25610
México

**11. Produce copies of all driver air bag inflator related manufacturing and quality control records, which relate to, or may relate to, the alleged defect in the subject vehicles, or which GM relied on to determine that the subject recalls were needed or to determine their scope.**

GM requested copies of all driver air bag inflator related manufacturing and quality control records from Takata. GM has included the documents that Takata provided. Quality control records for the driver airbag inflator lines F and V are in ATT_3_TAKATA_CONF; folder labeled "Q_11."

These documents indicate quantity, characteristics and frequency of checking the specified items related to the alleged defect.

Document "GM Intermittent issue PSDI-X update 10 26 12 .pptx", also included in ATT_3_TAKATA_CONF, folder Q_11, documents the timeline of events, root cause analysis, initial controls and current corrective action controls for the alleged defect.

**14. Produce the following:**

**a. An exemplar sample of each design version of the subject components originally installed in the subject vehicles and those supplied to GM dealers as replacement components for the subject vehicles; and**
**b. Two field-returned samples of the subject components exhibiting the alleged defect condition.**

An exemplar part, number 20986955, an airbag inflator module assembly for the Buick Verano, will be sent to NHTSA.

Two field returned samples will be sent to the NHTSA as part of this response.

The recall repair for both recalls was to replace the 2012 MY clock spring, which plugs into the airbag module, with a 2013 MY clock spring, which has a modified connector design. The recalls did not involve replacing the airbag module assembly.

The 3 samples being provided in response to 14(a) and 14(b), will be shipped to NHTSA the week of August 19.

**15. Furnish GM's assessment of the alleged defect in the subject vehicles, 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; and**
**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.**

The driver airbags in the subject vehicles are dual stage airbags, so each airbag has a primary and secondary stage and a connector for each stage. The connectors are equipped with connector position assurance (CPA). Within each male portion of the connector is a shorting bar clip, which will short together the male terminals when

the CPA is not engaged, to prevent unwanted deployment of the steering wheel air bag during handling.

To install the shorting clip into the inflator, the operator at the supplier places the inflator on the station nest and the shorting clips on the insertion tools. A vision system on the bottom side of the station verifies the correct (primary/secondary) shorting clips are located on the tools and an optic fiber verifies the correct shorting clip insertion on the tool. After insertion, another vision system verifies the correct insertion of the shorting clips into the inflator. The shorting clip insertion tools are designed so that only the primary or secondary clip will fit on the tool and have a mechanical stop so the clip is not over-pressed during insertion. The shorting clip installation tools have an actuation finger that, when inserted into the shorting clip, retracts the shorting bars so they do not contact the terminals during insertion. The shorting clip installation tool drawing specifies that the actuation finger length shall be 0.255 +0.00 and –0.02 inches.

On June 13, 2012, 15 consecutive vehicles in the Lordstown Assembly Plant set diagnostic trouble code B0012 0E, which indicates low resistance in the primary stage of the airbag. Takata reviewed the traceability data of the suspect inflators and found that all the 15 airbags had passed the electrical test in the Monclova and Acuna plants. Takata Auburn Hills found witness marks on the bottom part of the shorting clip bars of the suspect airbags. These witness marks indicated that the male terminals had contacted and bent the shorting bars during shorting bar clip installation.

GM subject matter experts and Takata Engineering personnel traveled to the Lordstown Assembly Plant to investigate the issue. On June 14, 2012, a Red X Team assembled at Takata Auburn Hills, MI, with technical experts from the connector suppliers. On June 15, 2012, the root cause was identified: the measured length of the primary stage actuation finger was only 0.236 inches. The length of the primary stage actuation finger was too short to consistently retract the shorting bars to prevent contact with the airbag terminals during shorting bar clip insertion.

If both shorting bars contact both terminals simultaneously, the airbag deployment circuit will be shorted. The Sensing and Diagnostic Module (SDM) will request the instrument cluster to illuminate the AIRBAG indicator. If a crash event occurs the SDM will attempt deployment, but if the shorting bar is in contact with the airbag terminals, the associated airbag stage will not deploy. Vibration or other movement may cause contact between a bent shorting bar and the male terminal, so the condition may be intermittent.

On June 16, 2012, the assembly tool was repaired. The parts made on the repaired tool were in production on June 22, 2012. On July 17, 2012, GM sent a Preliminary Information bulletin to dealers to aid in diagnosis of this issue.

The root cause of the driver airbag issue in vehicles built in December 2011 and January 2012 was not determined. Warranty reports indicated that the vehicles set diagnostic trouble code B0013 0E, which indicates low resistance in the secondary stage of the airbag Analysis of warranty parts found similar witness marks indicating that the male terminals had contacted and bent the shorting bars during shorting bar clip installation.

As discussed in GM's response to request 12 of this IR, which was sent to NHTSA on August 2, 2013, GM has issued two safety recalls for this condition. These recalls included some vehicles which were built with inflators built by Takata on suspect inflator build days. GM has examined the recent warranty data for the subject vehicles. Details on this data can be found in ATT_1_GM, in folder "Q_8."

The circumstances of the shorting bar issue, and the recent warranty data, show the risk to motor vehicle safety for the subject vehicles that were not part of either recall to be very low for the following reasons.

- Warranty data show that the recalls targeted the appropriate vehicle population. This is demonstrated by the low warranty rate which is seen in the non-recalled vehicles.
    - For recall 12V522, which included some vehicles built in April, May and June of 2012, the issue occurred very early in the vehicle's service. In fact, many of the vehicles were repaired before they were delivered to customers. In addition, since the recall, there has been a low rate of warranty for the subject condition (0.5 IPTV) for non-recalled vehicles manufactured in these months. The rate of claims has declined over time.
    - For recall 13V023, which involved vehicles built in December 2011 and January 2012, GM recalled all vehicles built with inflators from the two suspect inflator build days. Since the recall, there has been a low rate of warranty claims for the subject condition (0.4 IPTV) for non-recalled vehicles manufactured in these months. The rate of claims has declined over time.
    - Since the recalls, the warranty rate for the subject condition in the non-recalled subject vehicles is only 0.2 IPTV for the entire 2012 Model Year.

- If the shorting bar contacts the terminal in the connector, the airbag warning light will illuminate. The warning light is an overt signal to the operator that the airbag needs to be serviced. The light remains on in front of the operator to warn the operator of the condition.

- For most of the subject vehicles, a "SERVICE AIRBAG" message will appear in the Driver Information Center (DIC).

- The OnStar vehicle diagnostic report, which is a monthly email communication from OnStar, will remind the vehicle owner that the airbag warning light is on and that the vehicle needs to be serviced. This communication is delivered to vehicle owners with active OnStar service who have signed up for the diagnostic service.

- The subject vehicles are under warranty. There is no cost to a vehicle owner to who brings the vehicle in for service when the airbag light is illuminated.

- NHTSA did not send any VOQ's related to this issue to GM. GM conducted a search for VOQ's and found none.

- There have been no reported crashes or injuries related to this condition.

- Of the GM reports which GM sent with its partial response on August 2, 2013, which occurred at a low rate of 0.5 IPTV, it should be noted that over half of these could not be definitively attributed to the shorting bar issue. Some of these reports are likely to have involved an airbag light illuminating with no impact on airbag performance.

Therefore, the risk to motor vehicle safety in the subject vehicles which were not recalled is extremely low.

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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 its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of their 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 2007, were involved in any way with any of the following related to the alleged defect in the subject vehicles:

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

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

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

Sincerely,

M. Carmen Benavides, Director
Product Investigations and Safety Regulations

Attachments