September 30, 2022

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National Highway Traffic Safety Administration
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VIA EMAIL
G237837

NEF-101smo
PE22-006

Subject: General Motors LLC's Supplemental Responses to NHTSA's July 28, 2022, Information Request in Investigation PE22-006

Dear Ms. Yukevich:

This letter contains General Motors LLC's ("**GM**") supplemental responses (the "**Responses**") to the information requests in your July 28, 2022, letter (the "**Requests**") relating to National Highway Traffic Safety Administration ("**NHTSA**") Preliminary Evaluation 22-006, which is a NHTSA investigation of "allegations of failure of the rear-view camera image to display properly in certain model year (MY) 2020-2021 Cadillac XT5, XT6 and GMC Acadia vehicles." The initial GM response submitted on September 9, 2022, addressed Requests 1, 9-11 and 13. GM incorporates by reference its initial response to PE22-006 from September 9, 2022, herein. The Responses included in this supplemental letter address Requests 2-8, 12 and 14-15[1]. Unless otherwise defined herein, GM's Responses rely on the defined terms in the Requests.

PRELIMINARY STATEMENT

GM prepared its Responses by: (i) identifying, in consultation with the appropriate GM business personnel, the primary electronic databases and document repositories in GM's custody and control that store potentially responsive documents and information in the ordinary course of business, as more fully identified in the Responses below; and (ii) conducting a reasonable search, as appropriate, of these databases and document repositories for responsive documents and information. GM objects to the definitions of "document" and "GM" in the Requests as overbroad, unreasonably burdensome, and not reasonably tailored to records that might be expected to bear relevant and responsive information. 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. GM construes the Information Request as pertaining to vehicles manufactured for sale

[1] GM's request for an extension was granted by Sharon Yukevich in an e-mail dated September 2, 2022.

in the United States and its territories.

GM's document production is contained in the folder titled [redacted]GM. 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 in the folder. GM has submitted the unredacted nonpublic copy of its document production (in the folder titled [redacted]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 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 a crash, injury or fatality;

d. Property damage claims; and

e. Third-party arbitration proceedings, both pending and closed, 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 (as defined in the Requests, the "**Subject Vehicles**"), GM provides the following tables, which GM prepared by conducting a reasonable keyword search for potentially responsive claims in several databases[2].

The tables are broken up into RPO UV2 and RPO UVB. The Subject Vehicles contain either a 360-surround vision camera (RPO UV2), or a standard rear vision camera (RPO UVB). The subject component (as defined in the Requests, the "**Subject Component**") is part of assembly to a coaxial cable. The camera and modules related to the rear vision system are interconnected through coaxial cable assemblies conformed by coaxial cables and FAKRA connectors. The rear camera feed is different between the UV2 and the UVB. The UV2 camera feed is routed through the Video Processing Module (VPM) to the Center Stack Module and includes more circuits and more inline connections which can potentially degrade the signal quality. The UVB camera is routed directly from the rear camera to the center stack through a series of inline connections. (*see* schematic from the Request 13 PE22-006 Part Changes_CONF excel file).

		SUBCATEGORIES					
TYPE OF REPORT	*GM REPORTS*	*CORRESPONDING TO NHTSA REPORTS (VOQ)*	*NUMBER WITH PROPERTY DAMAGE*	*NUMBER WITH CRASH*	*NUMBER WITH FIRE*	*NUMBER WITH INJURIES*	*NUMBER WITH FATALITIES*
Consumer Complaint	*688*	*3*	*2*	*3*	*0*	*0*	*0*
Field Reports	*1216*	*1*	*0*	*1*	*0*	*0*	*0*
Third Party Arbitration Proceedings	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Product Liability Lawsuits	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total Reports (Including Duplicates)	*1904*	*4*	*3*	*4*	*0*	*0*	*0*
Total Vehicles with Reports (Unique VIN)	***1836***	***2***	***2***	***3***	***0***	***0***	***0***

TABLE 2-1: SUMMARY OF CLAIMS RESPONSIVE TO REQUEST 2A-2F FOR THE SUBJECT VEHICLES FOR RPO UV2

[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), COMPASS, Field Product Report Database (FPRD), and GM Legal records.

		SUBCATEGORIES					
TYPE OF REPORT	GM REPORTS	CORRESPONDING TO NHTSA REPORTS (VOQ)	NUMBER WITH PROPERTY DAMAGE	NUMBER WITH CRASH	NUMBER WITH FIRE	NUMBER WITH INJURIES	NUMBER WITH FATALITIES
Consumer Complaint	*42*	*0*	*0*	*0*	*0*	*0*	*0*
Field Reports	*54*	*0*	*0*	*0*	*0*	*0*	*0*
Third Party Arbitration Proceedings	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Product Liability Lawsuits	*0*	*0*	*0*	*0*	*0*	*0*	*0*
Total Reports (Including Duplicates)	*96*	*0*	*0*	*0*	*0*	*0*	*0*
Total Vehicles with Reports (Unique VIN)	*93*	*0*	*0*	*0*	*0*	*0*	*0*

TABLE 2-2: SUMMARY OF CLAIMS RESPONSIVE TO REQUEST 2A-2F FOR THE SUBJECT VEHICLES FOR RPO UVB

As summarized in Table 2-1 and Table 2-2, GM is aware of 1836 unique claims for RPO UV2 and only 93 claims for RPO UVB involving the Subject Vehicles that may be responsive to Request 2. 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 (as defined in the Requests, the "**Alleged Defect**") was implausible, inconclusive, or circumstantial. Accordingly, the claim totals in Table 2-1 and Table 2-2 are conservative.

With respect to subparts "e" and "f," GM is not aware of any third-party arbitration proceedings or lawsuits related to the Alleged Defect in the Subject Vehicles.

There were no alleged crashes in Table 2-2 for RPO UVB. A summary of each alleged crash listed in Table 2-1 is below. Additional information about these claims is available in the document production that GM is providing in response to Request 4, and GM's assessment of the Alleged Defect is provided in its Response to Request 15. Only 1 claim could be conclusively tied to the Alleged Defect. None of the alleged crashes were related to a back over incident and there were no injuries.

1. **2020 Cadillac XT6 VIN [redacted] (RPO UV2)**

The claimant alleged that on October 20, 2020, her Cue screen went out as she was backing out of a parking space and another vehicle hit her. There was minor damage to the left taillight. There were no injuries, and this was not a back over event. The vehicle was taken to a dealer on October 21, 2020, for diagnosis. The issue was diagnosed, and the Subject Component was replaced on January 29, 2021. Please refer to the documents included in SR [redacted]

2. **2021 GMC Acadia VIN [redacted] (RPO UV2)**

The claimant called the Customer Assistance Center (CAC) on December 8, 2020, and alleged that the camera did not work properly and that he backed into a chair. There were approximately 275 miles on the vehicle at the time of the incident. There was minor damage to the side door. With the damage to the side of the vehicle, it is unclear how the rear camera is related

to or would have prevented this incident. There were no injuries, and this was not a back over event. The vehicle was serviced over 6 months after the alleged incident on June 23, 2021, and there was found to be high resistance in the Subject Component which was replaced at 4,640 miles. It is unknown if the Subject Component was a causal or contributing factor due to the timing between the incident and the repair and the location of the damage. Therefore, this claim is inconclusive and may be wholly without merit. Please refer to the documents associated with SR's [redacted], [redacted], [redacted] and [redacted].

3. 2020 GMC Acadia VIN [redacted] (RPO UV2)

The claimant alleges that, on February 24, 2021, the camera in her vehicle did not work and that she hit a van around 7,028 miles. She also claims that she did not receive a warning that there was another vehicle nearby. There were no injuries, and this was not a back over event. After contacting GM, the claimant advised that her insurance was handling the matter and no inspection was completed. The vehicle was later serviced at the dealer on June 20, 2021, around 14,691 miles, for the camera going out. It was diagnosed as a loose connection, but the specific connection is not documented in the warranty claim. It is unknown if this claim is related to the Alleged Defect. Therefore, this claim is inconclusive and may be wholly without merit. Please refer to the documents associated with SR [redacted] and claim [redacted].

VOQ Analysis

There were 12 VOQs listed in the Request, only five[3] of which can be conclusively linked to the Alleged Defect (all RPO UV2). One report, 11463901, alleged a crash, but was not related to the Alleged Defect and was not included in the crash counts listed above. Please see GM's analysis of these reports in the [redacted] GM folder in the Q_02 subfolder.

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;

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 owner of fleet street address, city, state (postal abbreviation), and ZIP code (please use distinct fields for each data type);

e. Vehicle Identification Number (17-character VIN);

[3] There were five VOQs related to the Alleged Defect (all RPO UV2), two inconclusive (no VIN or not enough information) and five not related to the Alleged Defect.

f. Vehicle's make, model and model year (please use distinct fields for each data type);

g. Vehicle's mileage at time of incident;

h. Incident date (MM/DD/YYYY);

i. Report or claim date (MM/DD/YYYY);

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." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

GM RESPONSE:

GM has produced the requested information for the Subject Vehicles in the [redacted] GM folder in the subfolder 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:

With respect to Request 4, GM CAC, PAC, TAC and Legal records are GM's primary repositories of potentially responsive documents in the ordinary course of business. GM identified responsive documents by conducting a keyword search of these records for potentially responsive claims and reviewed the associated claim file to confirm the responsiveness of the claim. GM is producing the responsive, nonprivileged documents associated with responsive claims listed in Table 2-1 and 2-2 in the Microsoft Access file labeled "Q_03_REQUEST NUMBER TWO DATA" in the subfolder labeled "Q_03" in the [redacted] GM folder. GM has organized the records by the GM file number.

Additionally, this response was compiled and prepared upon review of documents produced by various GM sources. This response does not include documents generated or received at those GM sources 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), email address and telephone number (please use distinct fields for each data type);

c. Vehicle owner or fleet street address, city, state (postal abbreviation), and ZIP code (please use distinct fields for each data type);

d. Vehicle Identification Number (17-character VIN);

e. Repair date (MM/DD/YYYY);

f. Vehicle mileage at time of repair;

g. Repairing dealer's or facility's name, telephone number, city and state or ZIP code (please use distinct fields for each data type);

h. Labor operation number(s);

i. Problem codes;

j. Diagnostic trouble codes;

k. Replacement part number(s) and description(s);

l. Concern stated by customer;

m. Cause as stated on the repair order;

n. Correction as stated on the repair order; and

o. 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." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

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 in the ordinary course of business.

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 5-1 are conservative.

Table 5-1, below, summarizes the regular warranty claims for the Subject Vehicles that may relate to the Alleged Defect.[4] There are a total of 9,695 warranty claims (8435 unique VINs) which were categorized as responsive.[5]

	Acadia	XT5	XT6	Grand Total
RPO UV2	**3,092**	**2,239**	**4,084**	**9,415**
MY2020	2,188	1,599	3,490	7,277
MY2021	904	640	594	2,138
RPO UVB	**81**	**76**	**123**	**280**
MY2020	48	52	103	203
MY2021	33	24	20	77
Grand Total	**3,173**	**2,315**	**4,207**	**9,695**

TABLE 5-1: SUMMARY OF SUBJECT VEHICLE REGULAR WARRANTY CLAIMS

GM has produced the requested information in subparts (a) through (o) in the G237837_1_GM folder in the subfolder labeled "Q_05". Refer to the Microsoft Access 2010 file labeled "Q_05_WARRANTY DATA." In response to subparts (m) 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.

RPO	MY	Acadia	XT5	XT6	Combined
UV2	2020	136 @ 33 MIS	182 @ 33 MIS	200 @ 33 MIS	172 @ 33 MIS
	2021	45 @ 22 MIS	71 @ 22 MIS	74 @ 22 MIS	55 @ 22 MIS
UVB	2020	1.2 @ 33 MIS	2.4 @ 33 MIS	9.8 @ 33 MIS	3.0 @ 33 MIS
	2021	0.9 @ 22 MIS	1.2 @ 22 MIS	2.0 @ 22 MIS	1.1 @ 22 MIS

TABLE 5-2: IPTV RATE COMPARISON BETWEEN RPO UV2 AND RPO UVB

[4] 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.

[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.

Table 5-2 shows the rate difference between the Subject Vehicles with RPO UV2 and RPO UVB. The Subject Vehicles with RPO UV2 have a rate that is on average over 50 times higher than the Subject Vehicles with RPO UVB.

REQUEST 6

State, by model and model year, a total count for all of the following pre-delivery categories of claims, collectively, that have been paid to GM to date that relate to, or may relate to, the alleged defect in the subject vehicles: pre-delivery warranty claims; pre-delivery claims for good will services that were provided: filed, zone, or similar adjustments and reimbursements; and pre-delivery 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), email address and telephone number (please use distinct fields for each data type);

c. Vehicle owner or fleet street address, city, state (postal abbreviation), and ZIP code (please use distinct fields for each data type);

d. Vehicle Identification Number (17-character VIN);

e. Repair date (MM/DD/YYYY);

f. Vehicle mileage at time of repair;

g. Repairing dealer's or facility's name, telephone number, city and state or ZIP code (please use distinct fields for each data type);

h. Labor operation number(s);

i. Problem codes;

j. Diagnostic trouble codes;

k. Replacement part number(s) and description(s);

l. Concern stated by customer;

m. Cause as stated on the repair order;

n. Correction as stated on the repair order; and

o. Additional comments, if any, by dealer/technician relating to claim and/or repair.

GM RESPONSE

To collect warranty data responsive to this request, GM conducted a reasonable keyword search of GART, GM's primary repository of potentially responsive warranty claim information in the ordinary course of business. The repair date was then compared to the warranty start date to determine whether the claim occurred in the pre-delivery phase.

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 6-1 are conservative.

The GM assembly plants have an End of Line (EOL) check for the rearview camera to confirm it is working properly prior to shipment. GM only identified 168 warranty claims that appear to be completed in the pre-delivery phase shown in Table 6-1. This is less than 2% of the total warranty claims for the Alleged Defect and less than 1% of the warranty claims for all camera failures. As described in the response to Request 15, the Alleged Defect is dependent on temperature cycling and vibration and the field data indicates the condition presents after delivery. The average time to repair for the combined warranty was around 1 year and 10,000 miles.

	Acadia	XT5	XT6	Grand Total
RPO UV2	**38**	**49**	**74**	**161**
MY2020	21	35	63	119
MY2021	17	14	11	42
RPO UVB	**4**	**2**	**1**	7
MY2020	3	1	1	5
MY2021	1	1	0	2
Grand Total	**42**	**51**	**75**	**168**

TABLE 6-1: SUMMARY OF SUBJECT VEHICLE PRE-DELIVERY WARRANTY CLAIMS

GM has produced the requested information in subparts (a) through (o) in the G237837_1_GM folder in the subfolder labeled "Q_06". Refer to the Microsoft Access 2010 file labeled "Q_06_WARRANTY DATA." In response to subparts (m) 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 7

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.

GM RESPONSE:

To collect warranty data responsive to this request, GM conducted a reasonable keyword search of the GM GART, GM's primary repository of potentially responsive warranty claim information in the ordinary course of business.

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.

REQUEST 8

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.

GM RESPONSE:

To populate Table 8-1, GM searched the GART warranty database for focus areas 7G – Infotainment, 7J – PSDS and 7T – Active Safety that GM identified as potentially related to the Alleged Defect in the Subject Vehicles. The labor codes identified with relevant claims are summarized in Table 8-1. 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.

LABOR CODE	LABOR CODE DESCRIPTION
1020160	Headlining Trim Panel Harness Replacement
1021122	Connector Reconnection - Headliner
1036122	Connector Reconnection - Instrument Panel and Console
1414640	Liftgate Wiring Harness Replacement
2810845	Video Processing Control Module Reprogramming with SPS
3420180	Radio Antenna Base Replacement
3420840	Radio Replacement
3422000	Auxiliary Wireless Communication Interface Antenna Coaxial Cable Replacement
3423070	Digital Radio Antenna and Navigation Antenna Coaxial Cable Replacement
3423800	Antenna Coaxial Cable Replacement - Body
3423810	Antenna Coaxial Cable Replacement - Headlining
3423820	Antenna Coaxial Cable Replacement - Instrument Panel
3423830	Antenna Coaxial Cable Replacement - Communication Interface Module to Navigational Signal Splitter
3423840	Antenna Coaxial Cable Replacement - Navigational Signal Splitter to Human Machine Interface Module
3429969	Entertainment/Radio/Navigation/USB/Bluetooth - Customer Concern Not Duplicated (CCND)

3450030	Night Vision Camera Bracket Replacement
3450060	Rearview Driver Information Camera Replacement
3450140	Video Processing Module Replacement
3450420	Rearview Driver Information Camera Rear Closure Coaxial Cable Extension Cable Replacement
3487248[6]	Overlay Body Coax Cable from VPM to In-line Connector and Replace the IP Coax Cable to the A11 Radio
3487258[6]	Replace (IP) Coax Cable from In-line Connector to the A11 Radio
4029912	Connector Reconnection - Engine Controls and Fuel
5430840	Terminal Replacement
5430902	Wire-to-Wire Repair
5430922	Connector Reconnection
5430930	Cable Replacement
5430940	Harness Replacement
5430962	Ground Connection Repair
6639959	Parking Assistance Systems - Customer Concern Not Duplicated (CCND)
7422402	Wire to Wire Repair - Steering

TABLE 8-1: LABOR CODES WITH RELEVANT WARRANTY CLAIMS

Table 8-2 summarizes the diagnostic trouble code that may be related to the Alleged Defect in the Subject Vehicles. This DTC will set due to a malfunction of the Rearview Camera and is not necessarily due to the Alleged Defect. Additional diagnostics are done by the dealer to determine the specific component causing the DTC to set.

DTC CODE[7]	**DTC CODE DESCRIPTION[8]**
B395A	Rearview Camera

TABLE 8-2: DTC CODE

REQUEST 12

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;

[6] This is a unique Labor Operation from Technical Service Bulletin 21-NA-048.
[7] 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.
[8] The DTC description may vary based on the symptom code associated with the fault.

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:

GM identified responsive production investigations by conducting a reasonable search in GM's Global Vehicle Safety-Case Observation Review and Evaluation ("**GVS-CORE**") database, which is the primary electronic records database for GM's Safety and Field Investigations organization. GM is aware of the following product investigations conducted by GM or at GM's direction that relate to the Alleged Defect:

Action 12-A: GM Internal Investigation N20-231041	
Start/End Dates	July 21, 2020 – October 22, 2020
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering
Description	GM investigated claims of rear vision camera failure in the Subject Vehicles and certain other GM vehicles.
Outcome	On October 22, 2020, upon review of the collected data, GM's Safety Field Action Decision Authority (SFADA) decided to close the investigation without field action. GM closed this investigation based on, among other evidence, its field-data analysis, which indicated that the rate of relevant field complaints involving the Subject Vehicles was low and there were no relevant alleged crashes in the Subject Vehicles. Additionally, rear view camera performance is checked both at the end of the assembly line and at dealer pre-delivery inspection.
Associated Documents	Information and documents contained in GVS-CORE related to investigation N20-231041. The files are in the G[redacted]GM_CONF folders labeled as 12A-231041 in the index file.
Action 12-B: GM Internal Investigation N22-237838	
Start/End Dates	July 23, 2022 – September 15, 2022
Involved Engineering Groups	GM Global Safety and Field Investigations, GM Global Engineering

Description	GM investigated claims of rear vision camera failure in the Subject Vehicles.
Outcome	On September 15, 2022, upon review of the collected data, GM's Safety Field Action Decision Authority (SFADA) decided to conduct a Safety Recall on the Subject Vehicles with RPO UV2.
Associated Documents	Information and documents contained in GVS-CORE related to investigation N22-237383. This investigation just recently closed. The files will be provided by October 14, 2022.
Action 12-C: GM Engineering Studies	
Start/End Dates	2020 - 2021
Involved Engineering Groups	GM Engineering, Red X Engineering
Description	Investigation activities involved root cause analysis of the failure, remedy development, and Red X testing.
Outcome	The conclusions are consistent with GM's Response to Request 15 as it relates to causal or contributory factors, failure mechanisms, and failure modes.
Associated Documents	Information, documents, PRTS (Problem Resolution Tracking System), CTF (Captured Test Fleet) reports and emails related to root cause analysis and testing. The files are in the [redacted] GM and [redacted] GM_CONF folder labeled as 12C-ENG DOCS in the index file.
Action 12-D: Supplier Engineering Information	
Start/End Dates	2020 - 2021
Involved Engineering Groups	Amphenol Adronics, Leoni, Rosenberger, TE Connectivity, Valeo and Yazaki (collectively the "**Suppliers**").
Description	The Suppliers either analyzed returned parts from the field, provided engineering drawings or other documents to support the Red X study.
Outcome	The Suppliers who supported the Red X study with documents or drawings did not make any conclusions related to the Alleged Defected. The Suppliers who performed testing and analysis had conclusions consistent with GM's Response to Request 12 as it relates to causal or contributory factors, failure mechanisms, and failure modes.
Associated Documents	Supplier documents, e-mails, and engineering drawings that GM has in its possession, custody, or control presented during GM meetings and reviews. The files are in the [redacted] CONF folder labeled as Supplier CBI in the index file with the supplier's name(s) in the comments field.

TABLE 12-1: GM INVESTIGATIONS OF THE ALLEGED DEFECT IN THE SUBJECT VEHICLES

GM is producing the nonprivileged documents that are responsive to Request 12 in the [redacted] GM and [redacted] GM_CONF folders in the subfolders labeled "Q_12". The index file PE22-006 Q12 Index provided is a directory of the files with the original file names and is labeled as listed in Table 12-1.

REQUEST 14:

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 or production or service usage.

GM RESPONSE:

The requested sales information for the Subject Component in both production and service versions is provided in the [redacted] GM folder; subfolder labeled "Q_14." There are two files, one for non-warranty dealer repair orders and one for customer paid part ticket sales. The dealer RO file summarizes the sales 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 a motor vehicle component, because the records do not contain sufficient information to establish the reason for the part sale or, in the case of a dealer sale, whether the part was actually used to repair a customer vehicle or is being held as dealer stock. The Subject Component may be replaced for other reasons such as a cut or frayed wire, a broken connector or CPA or a broken or bent terminal. Therefore, it is difficult to draw any conclusions regarding the performance of the Subject Component, or malfunctions thereof, from this data. However, the non-warranty dealer repair order data does show the Subject Component part sales for the Subject Vehicles with RPO UV2 make up 96% of the total.

REQUEST 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;

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:

On September 15, 2022, upon review of the collected data, GM's Safety Field Action Decision Authority decided to conduct a Safety Recall on the Subject Vehicles with RPO UV2. GM identified 3 minor accidents in the field data. Only 1 claim could be conclusively tied to the Alleged Defect. None of the alleged crashes were related to a back over incident and there were no injuries. The operator and persons inside the vehicle are alerted to the malfunction, and the malfunction is detectable by either an error icon that appears on the integrated center stack view screen, a pink flickering of the video stream, or a fully blacked out screen when the vehicle is in reverse with no video. The inside rearview mirror and outside rearview mirrors are still available.

The Subject Vehicles contain either a 360-surround vision camera (RPO UV2), or a standard rear vision camera (RPO UVB). The Subject Component is part of assembly to a coaxial cable. The camera and modules related to the rear vision system are interconnected through coaxial cable assemblies conformed by coaxial cables and FAKRA connectors. The rear camera feed is different between the UV2 and the UVB. The UV2 camera feed is routed through the Video Processing Module (VPM) to the Center Stack Module and includes more circuits and more inline connections which can potentially degrade the signal quality. The UVB camera is routed directly from the rear camera to the center stack through a series of inline connections. (*see* schematic from the Request 13 PE22-006 Part Changes_CONF excel file).

The main failure mode is a black screen with a red triangle and a red camera with a circle and slash through it that appears when shifting into reverse (*see* Figure 1 below).

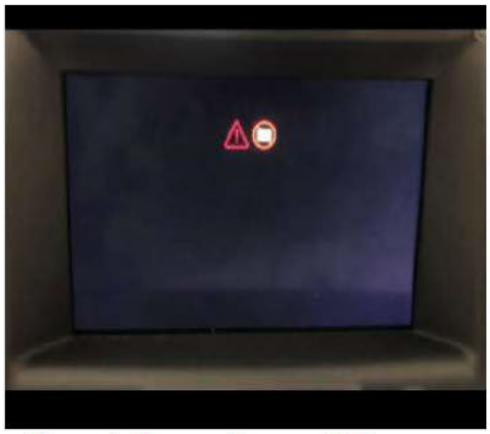

Figure 1: Camera Screen with Error

There are several root causes for the failure mode. The main failure mechanism for the Alleged Defect was determined through an engineering analysis and a Red X study, described in Request 12C, which presents as excessive resistance in the coaxial cable that interrupts the video feed and causes the black screen. The excessive resistance was found to be caused by improper crimp specifications used by the supplier of the coaxial cable assembly during the crimp of the connector to the cable. The coaxial cables, supplied by TE in the instrument panel wiring harness, were not properly validated. The crimp specifications were defined by using surrogate data from an Amphenol cable. The production coaxial cable was a Condumex cable, with a different construction. The crimp specifications for the Condumex cable were not validated to establish the correct crimp parameters for this specific cable with a different construction. The Red X study found that the coaxial cables in the main body wiring harness were not affected.

The contributing factors were found to be temperature cycling and vibration near the connection. The variation of air gap in the crimp of the coaxial cable connector is also a contributing factor as it is indicative of a loose crimp. Cables with a crimp at the high end of the specification may be more susceptible to the Alleged Defect than those at the low end of the specification.

The majority of the complaints are on the UV2 camera, rather than the UVB camera, due to the nature of the camera feed routing as described above. The field data shows the rate of failure in the Subject Vehicles with RPO UV2 is on average over 50 times higher than the Subject Vehicles with RPO UVB. There were no alleged accidents found in the UVB population and none of the 5 relevant VOQs from Request 2 were from the UVB population.

The supplier started producing parts with the correct crimp specifications starting in October 2020 with a final breakpoint on January 16, 2021. There was a significant drop in warranty starting in the November 2020 build month and continuing through January 2021, consistent with the initial and final breakpoint dates. Specifically, there was a 98% drop in the IPTV from October 2020 build month to January 2021 build month. Several Technical Service Bulletins were released starting in November 2020, specific to the UV2 camera, documenting how to diagnose the coaxial cable issue with cables being available for service starting in March 2021. The reports included with this inquiry are produced in response to Request 12.

CONCLUSION

GM's Responses are based upon its investigation to date and reflect its current information and assessment. GM reserves the right to supplement or amend its Responses as appropriate. Please contact me if you require further information about this response or the nature or scope of our searches.

Sincerely,

[redacted]

Sabrina Groshek, Executive Director
Global Systems and Product Investigations

cc: Stefanie Oldenburg
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Enclosures

G537837_1_GM – Public copy of GM's document production