GENERAL MOTORS NORTH AMERICA
Structure & Safety Integration

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GM-679

June 24, 2005

Jeffrey L. Quandt, Chief
Vehicle Control Division
Office of Defects Investigation
National Highway Traffic Safety Administration
Room #5320
400 Seventh Street, S.W.
Washington, D.C. 20590

NVS-213cla
PE05-020

Dear Mr. Quandt:

This letter is General Motors (GM) response to your information request (IR), dated May 10, 2005, regarding allegations of increased stopping distance or ineffective braking during low speed brake applications, due to corrosion of the front wheel speed sensor mounting surface in certain 1999 through 2002 model year (MY), C/K series GMT800 pickup trucks and sport utility vehicles manufactured for sale or lease in the United States by General Motors Corporation.

Your questions and our corresponding replies are as follows:

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. **Date of manufacture;**
   f. **Date warranty coverage commenced; and**
   g. **The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).**

   General Motors is providing the number of subject vehicles produced for sale or lease in the United States by model and model year in Table 1 and Table 2 below:

Make	Model	1999	2000	2001	2002	Total
Cadillac	ESCALADE & ESCALADE EXT	N/A	N/A	N/A	23,341	23,341
Chevrolet	INCOMP CHEV CK PICKUP	22	213	5,520	6,982	12,537
Chevrolet	SILVERADO	170,605	237,708	209,822	237,887	856,222
Chevrolet	SUBURBAN	N/A	24,670	42,906	43,982	111,548
Chevrolet	TAHOE & AVALANCHE	N/A	26,701	53,770	107,878	188,349
GMC	INCOMP GMC CK PICKUP	77	69	2,177	3,213	5,536
GMC	SIERRA	53,373	68,771	60,080	73,615	255,819
GMC	YUKON	N/A	9,444	22,051	22,984	54,479
GMC	YUKON XL	N/A	10,468	21,742	23,823	56,033
	Total	224,277	378,044	418,138	543,706	1,564,164

TABLE 1 - VEHICLE PRODUCTION (CORROSION STATES)
VEHICLE PRODUCTION DATED JUNE 7, 2005.

Product Investigations
Mail Code: 480-111-E18 • 30200 Mound Road • Warren, MI 48090-9010

Make	Model	1999	2000	2001	2002	Total
Cadillac	ESCALADE & ESCALADE EXT	N/A	N/A	N/A	43,178	43,178
Chevrolet	INCOMP CHEV CK PICKUP	22	548	11,073	11,815	23,558
Chevrolet	SILVERADO	259,032	387,725	396,092	385,394	1,428,243
Chevrolet	SUBURBAN	N/A	80,717	119,879	104,291	284,887
Chevrolet	TAHOE & AVALANCHE	N/A	45,727	140,662	227,764	414,043
GMC	INCOMP GMC CK PICKUP	84	198	2,444	2,219	4,925
GMC	SIERRA	89,870	117,437	119,030	116,724	440,161
GMC	YUKON	N/A	17,422	48,798	52,945	119,165
GMC	YUKON XL	N/A	21,109	48,327	44,484	113,920
	Total	349,088	680,983	883,205	988,804	2,872,080

TABLE 2 - VEHICLE PRODUCTION (NON-CORROSION STATES)
VEHICLE PRODUCTION DATED JUNE 7, 2005.

Vehicles equipped with traction control systems cannot exhibit the subject condition and are excluded from Tables 2-1, 2-2, 5-1a, b and 5-2a, b.

The production information requested in 1a-1g is provided on the CD in Attachment 1, in the folder labeled Response to Q1; refer to the Microsoft Access 2000 file labeled "PRODUCTION DATA. The GM database that contains Vehicle Identification Number (VIN) information does not include information on the state where an individual vehicle was sold. GM is providing the state where the vehicle was shipped in response to request 1g. For some of the subject vehicles, which have incomplete warranty files, the GM warranty system does not contain a warranty start date or state where the vehicle was shipped and therefore these fields are blank in the Microsoft Access 2000 file.

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, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
d. Reports involving a fire, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
e. Property damage claims; and
f. Third-party arbitration proceedings where GM is or was a party to the arbitration; and
g. Lawsuits, both pending and closed, in which GM is or was a defendant or codefendant.

For subparts "a" through "e" state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

In addition, for items "c" through "g," provide a summary description of the alleged problem and causal and contributing factors and GM's assessment of the problem, with a summary of the significant underlying facts and evidence. For items f and g, identify the parties to the action, as well as the caption, court, docket number, and date on which the complaint or other document initiating the action was filed.

Table 2-1 below summarizes records that could relate to the subject condition. GM has organized the records by the GM file number within each attachment.

TYPE OF REPORT	COUNT (INCLUDING DUPLICATES)	GM REPORTS	GM REPORTS CORRESPONDING TO NHTSA REPORTS	LOCATION OF REPORTS (ATTACHMENT)	NUMBER OF PROPERTY DAMAGE	NUMBER OF REPORTED INJURIES*	CRASHES	FIRES
Owner Reports	403	396	7	2A	107	8	184	0
Field Reports and Technical Assistance System Reports	145	145	0	2B	0	0	1	0
Not-In-Suit Claims	20	20	0	2C	11	3	20	0
Subrogation Claims	26	24	2	2D	22	1	24	0
Third Party Arbitration Proceedings	0	0	0	N/A	0	0	0	0
Product Liability Lawsuits	1	1	1	2E	1	0	1	0
Total (Including Duplicates)	595	586	10	N/A	141	12	230	0
Total (Excluding Duplicates)	553	554	9	N/A	120	9	202	0

TABLE 2-1: REPORT BREAKDOWN 1999 – 2002 MY GMT800 PLATFORM C/K TRUCKS AND UTILITY VEHICLES (CORROSION STATES)

* GM IS NOT AWARE OF ANY FATALITIES REPORTED FOR THE SUBJECT CONDITION

Type of Report	Count (Including Duplicates)	GM Reports	GM Reports Corresponding to NHTSA Reports	Location of Reports (Attachment)	Number of Property Damage	Number of Reported Injuries*	Crashes	Fires
Owner Reports	53	53	0	2A	8	1	20	0
Field Reports and Technical Assistance System Reports	99	99	0	2B	0	0	1	0
Not-In-Suit Claims	3	3	0	2C	1	0	3	0
Subrogation Claims	2	2	0	2D	2	0	2	0
Third Party Arbitration Proceedings	0	0	0	N/A	0	0	0	0
Product Liability Lawsuits	1	1	0	2E	0	0	1	0
Total (Including Duplicates)	158	158	0	N/A	12	1	27	0
Total (Excluding Duplicates)	155	155	0	N/A	11	1	26	0

TABLE 2-2: REPORT BREAKDOWN 1999 – 2002 MY GMT800 PLATFORM C/K TRUCKS AND UTILITY VEHICLES (NON-CORROSION STATES)

* GM IS NOT AWARE OF ANY FATALITIES REPORTED FOR THE SUBJECT CONDITION

To date, GM's investigation of the alleged defect has not included an assessment of the cause(s) of each incident responsive to Request No. 2. Some incident reports may not contain sufficient reliable information to accurately assess cause. Assessments of other incidents (from lawsuits and claims) may be attorney work product and/or privileged. Therefore, information and documents provided in this response, if any, consist only of non-attorney work product and/or non-privileged material for incidents that have been investigated and assessed.

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

Source System	Last Date Gathered
Corporate Central File	6/5/2005
Customer Assistance Center	5/24/2005
Technical Assistance Center	5/24/2005
Field Information Network Database (FIND)	5/24/2005
Company Vehicle Evaluation Program (CVEP)	5/26/2005
Field Product Report Database (FPRD)	5/24/2005
Legal / Employee Self Insured Services (ESIS)	6/6/2005

TABLE 2-2: DATA SOURCES

3. **Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:**

   a. **GM's file number or other identifier used;**
   b. **The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);**
   c. **Vehicle owner or fleet name (and fleet contact person), address, and telephone number;**
   d. **Vehicle's VIN;**
   e. **Vehicle's make, model and model year;**
   f. **Vehicle's mileage at time of incident;**
   g. **Incident date;**
   h. **Report or claim date;**
   i. **Whether a crash is alleged;**
   j. **Whether a fire is alleged;**
   k. **Whether property damage is alleged;**
   l. **Number of alleged injuries, if any; and**
   m. **Number of alleged fatalities, if any.**

   Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

   The requested information is provided on the CD in Attachment 1, in a folder labeled Response to Q3; refer to the Microsoft Access 2000 file in the labeled, "REQUEST NUMBER TWO DATA".

4. **Produce copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method GM used for organizing the documents.**

   Copies of the records identified in Item 2 are provided in the attachments listed in Table 2-1. GM has organized the records by the GM file number within each attachment.

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 the procedure specified in technical service bulletin 03-05-25-007A or customer satisfaction campaign.**

   Separately, for each such claim, state the following information:
   a. **GMs 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. **Replacement part number(s) and description(s);**

j. Concern stated by customer; and
k. Comment, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

The regular and extended warranty claims for the subject vehicles in corrosion and non-corrosion states that may be responsive to this request, are summarized in Tables 5-1 and 5-2 below. A summary of these warranty reports is provided in Attachment 1 CD; refer to the folder labeled, "Response for Q5".

Make	Model	1999	2000	2001	2002	Total
Chevrolet	INCOMP CHEV CK PICKUP	0	1	23	11	35
Chevrolet	SILVERADO	1636	3042	2726	2453	9857
Chevrolet	SUBURBAN	0	146	349	334	829
Chevrolet	TAHOE & AVALANCHE	0	184	540	1271	1975
GMC	INCOMP GMC CK PICKUP	1	0	3	10	14
GMC	SIERRA	661	1163	833	804	3461
GMC	YUKON	0	79	162	147	388
GMC	YUKON XL	0	92	143	109	344
	Total	2298	4687	4779	5139	16903

TABLE 5-1a Regular Warranty Claims (Corrosion States)

Make	Model	1999	2000	2001	2002	Total
Chevrolet	INCOMP CHEV CK PICKUP	0	3	4	6	13
Chevrolet	SILVERADO	1266	1358	1064	1294	5000
Chevrolet	SUBURBAN	0	379	578	828	1785
Chevrolet	TAHOE & AVALANCHE	0	289	673	2175	3137
GMC	INCOMP GMC CK PICKUP	2	0	10	1	13
GMC	SIERRA	422	445	353	493	1713
GMC	YUKON	0	142	299	444	885
GMC	YUKON XL	0	144	282	404	800
	Total	1710	2758	3263	5615	13346

TABLE 5-1b Regular Warranty Claims (Non-Corrosion States)

Make	Model	Canadian	1999	2000	2001	2002	Total
	Canadian VIN w/ U.S. repairs	126	0	0	0	0	126
Chevrolet	SILVERADO	0	1335	2039	1282	518	5184
Chevrolet	SUBURBAN	0	0	163	275	160	598
Chevrolet	TAHOE & AVALANCHE	0	0	172	369	436	979
GMC	INCOMP GMC CK PICKUP	0	0	0	1	0	1
GMC	SIERRA	0	501	902	388	221	2010
GMC	YUKON	0	0	90	122	50	262
GMC	YUKON XL	0	0	94	109	62	265
	Total	126	1836	3460	2554	1449	9455

TABLE 5-2a Extended Warranty Claims (Corrosion States)

Make	Model	Canadian	1999	2000	2001	2002	Total
	Canadian VIN w/ U.S. repairs	51	0	0	0	0	51
Chevrolet	INCOMP CHEV CK PICKUP	0	1	3	3	5	12
Chevrolet	SILVERADO	0	719	1271	1454	1000	4444
Chevrolet	SUBURBAN	0	0	358	463	423	1244
Chevrolet	TAHOE & AVALANCHE	0	0	239	614	881	1634
GMC	INCOMP GMC CK PICKUP	0	0	1	5	0	6
GMC	SIERRA	0	244	386	455	298	1385
GMC	YUKON	0	0	97	190	117	404
GMC	YUKON XL	0	0	103	188	162	453
	Total	51	964	2440	3272	2886	9613

TABLE 5-2b Extended Warranty Claims (Non-Corrosion States)

GM searched the GM North America Claim Adjustment Retrieval Database (CARD-regular warranty), the Motors Insurance Corporation (MIC – extended warranty), and the Universal Warranty Corporation (UWC – extended warranty) databases to collect the warranty data for this response. The warranty data was last gathered on June 1, 2005.

A summary of warranty claims that may relate to the subject condition is provided on the CD in Attachment 1, in the folder labeled Response to Q5; refer to the Microsoft Access 2000 file labeled "REQUEST NUMBER FIVE - WARRANTY DATA."

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

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

6. **Describe in detail the search criteria used by GM to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State, by make and model year, the terms of the new vehicle warranty coverage offered by GM on the subject vehicles (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that GM offered for the subject vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.**

The GM regular warranty, MIC and Universal Warranty Corporation (UWC) claims that may relate to the subject condition were collected by searching for the labor codes listed in Tables 6-1 below. GM has included regular warranty claims when either the wheel speed sensor or

bearing and hub assembly was replaced. The list of trouble codes used during the search is included in Table 6-2 below

LABOR CODE	DESCRIPTION:
H2410	Sensor, Wheel Speed - Front - Right - Replace
H2411	Sensor, Wheel Speed - Front - Left - Replace
H2412	Sensor, Wheel Speed - Front - Both - Replace
E2320	Bearing And Hub Assembly, Front Wheel - Right - Replace
E2321	Bearing And Hub Assembly, Front Wheel - Left - Replace
E2327	Bearing And Hub Assembly, Front Wheel - Both - Replace

TABLE 6-1 LABOR CODES USED IN WARRANTY SEARCH

TROUBLE CODE	DESCRIPTION:
1B	CASTING DEFECT
1Y	FOREIGN MATERIAL
2E	CLEARANCE-EXCESSIVE
2N	INSUFFICIENT LUBRICATION
2T	INCORRECT TORQUE
3A	MISADJUSTED/MISALIGNED
3L	OUT OF CALIBRATION
3X	REGISTERS INCORRECTLY
5T	POOR METAL FINISH
5W	RUSTED/CORRODED
6C	COMPONENT-INOPERATIVE
6D	COMPONENT-INTERMITTENT

TABLE 6-2 TROUBLE CODES USED IN WARRANTY SEARCH

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

The subject vehicles are covered by a bumper-to-bumper new vehicle warranty for three years or 36,000 miles whichever occurs first. Many different extended warranty options are available through GM dealerships. They are offered at different prices and for varying lengths of time, based on customer's preference, up to 7 years from the date of purchase or up to a total of 100,000 vehicle miles. The General Motor's warranty system does not contain information on the number of vehicles that have extended warranty coverage.

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 has found four past service or warranty documents that relate to the subject condition that have been issued to dealers, regional or zone offices, field offices, fleet purchasers or other entities.

GM is not aware of documents or communications to dealers regarding the subject condition that may be incorporated into vehicle production within the next 120 days.

The bulletins are included in the Attachment 1 CD, Response to Q7. The data collection was completed on June 7, 2005. The preceding information was collected from GM Service Operations.

8. Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, GM. For each such action, provide the following information:

a. Action title or identifier;
b. The actual or planned start date;
c. The actual or expected end date;
d. Brief summary of the subject and objective of the action;
e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
f. A brief summary of the findings and/or conclusions resulting from the action.

For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

The information listed in Table 8-1 below is a summary of actions performed by GM regarding the subject condition on the 1999-2002 MY GMT 800 C/K Truck vehicles. Documents and additional supporting information is included in the Attachment 2 CD GM Confidential, Response to Q8 files.

Action: PRTS N114221 **Start Date:** October 2002 **End Date:** January 2003 **Engineering Group:** GM Engineering **Attachment:** Attachment 2 CD GM Confidential, Response to 8a (PRTS Document and other Information) **Description:** Database and information that initialized the efforts relating to the subject condition **Summary of Action:** Parts returned under warranty were verified for customer concerns. BOB and WOW parts were analyzed and the root cause was determined.
Action: Bearing Corrosion Test Report **Start Date:** 2/2003 **End Date:** 4/2003 **Engineering Group:** Bearing Supplier **Attachment:** Attachment 2 CD GM Confidential, Response to 8b (8 Bearing Corrosion Testing.PDF) **Description:** Corrosion Engineering Test Report **Summary of Action** Corrosion testing and summary of 8 hub and bearing assemblies for corrosion of the the mounting surface for the wheel speed sensor. It was determined that lubrication improves the resistance to corrosion build up at the sensor mounting surface.
Action: Red X Study for High Warranty on GMT 800 Front Bearing **Start Date:** Sept. 2002 **End Date:** December 2002 **Engineering Group:** GM Engineering Red X Team **Attachment:** Attachment 2 CD GM Confidential, Response to 8c (Red X gmt800 Bearing ReplaceDec102002.ppt) **Description:** Determine high warranty costs on GMT800 K series associated with low speed ABS activation that required hub and bearing replacement. **Summary of Action:** Bearing and hub assembly replacement was occuring to address corrosion build up affecting speed sensor to tone ring clearance. Determined that a rust prohibiting coating is required between sensor and hub to prevent corrosion.

Action: Supplier timeline for ABS software change Start Date: TBD End Date: August 2004 Engineering Group: GM Supplier Attachment: Attachment 2 CD GM Confidential, Response to 8d (ABS Software Update timeline. PDF) Description: MS Project timeline for implementation of MSA software. Summary of Action: Project timeline developed for program implementation.
Action: Corrosion Test Report Start Date: April 14, 2004 End Date: November 4, 2004 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8e (STR14785.doc) Description: Corrosion Engineering Test Report Summary of Action: Evaluated corrosion performance of GMT800 hub assemblies with various corrosion inhibiting coatings in corrosion lab simulating one to three years in a severe corrosion environment.
Action: Corrosion Inspection Start Date: April 2004 End Date: September 2004 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8f (GM Inspection 9_15_04.xls)) Description: Inspection results for components that completed 80 cycles (10 years) of corrosion test GM9540P Summary of Action: Testing and inspection results of components that completed corrosion testing.
Action: GM Engineering TC Presentation Start Date: July 2004 End Date: July 2004 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8g (TC unwanted ABS PP_7_04_A.ppt) Description: MS Power Point presentation Summary of Action: GM Engineering information regarding wheel speed sensor mounting surface corrosion and the number of reported incidents.
Action: Bearing ABS signal comparison Start Date: September 2004 End Date: Ongoing Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8j (Bearing ABS Signal Comparisons.xls) Description: Wheel speed sensor output waveforms from various hub and bearing assemblies Summary of Action: Several Hub/Bearing and wheel speed sensor assemblies were tested and the sensor output signals were measured.
Action: GM Corrosion Sample Start Date: April 2004 End Date: March 2005 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8k (GM Corrosion Sample Parts 03 24 2005 20 yrs GM9540P.xls) Description: Spreadsheet with summary of hub and bearing assemblies used to identify the best corrosion inhibitor. Summary of Action: Inspection results for hub and bearing assemblies that completed 160 cycles (20 yrs) of validation test GM 9540P.
Action: Final Field Corrosion Matrix Start Date: April 2004 End Date: May 2005 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8l (Final Field Corrosion Matrix.xls) Description: Spreadsheet of several hub and bearing assemblies used during corrosion testing. Summary of Action: Test results from several hub and bearing assemblies using various corrosion inhibitor treatments.
Action: GM Engineering TC Presentation – Update Start Date: October 2004 End Date: October 2004 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8m Description: MS Power Point presentation Summary of Action: GM Engineering information update regarding wheel speed sensor mounting surface corrosion and the number of reported incidents

Action: FPE Investigation Status Report Start Date: October 2004 End Date: October 2004 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8n Description: MS Word Document Summary of Action: GM Engineering report explaining the condition, number of incidents and proposed repair solution
Action: GM Supplier Corrosion Test Data Start Date: Approx. September 2004 End Date: June 2005 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8p (hub and bearing corrosion test results) Description: Data files Summary of Action: Results from corrosion tests on hub and bearing assemblies
Action: TREAD Data Summary Start Date: December 2004 End Date: December 2004 Engineering Group: GM Engineering Attachment: Attachment 2 CD GM Confidential, Response to 8r (TREAD Data Summary. PDF) Description Data summary of issues reviewed by GM in fourth quarter of 2004 Summary of Action: GM reviewed TREAD data regarding C/K Truck service brake system.

TABLE 8-1 SUMMARY OF ACTIONS RELATED TO THE SUBJECT CONDITION

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 numbers (service and engineering) of the original component;
e. The part number (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.

Summary documents of the component modifications, information and process changes responsive to items 9 a-h are included on the Attachment 2 CD GM Confidential; refer to the folder labeled "Response to Q9".

GM is not aware of any other modification or change with the subject components that may be incorporated into vehicle production within the next 120 days.

10. Produce one of each of the following:

a. Exemplar samples of each design version of the subject component;

b. Three field return samples of the subject component exhibiting the subject failure mode;
c. Three field return samples of the subject components in the associated wheel bearing assembly and exhibiting the subject condition; and
d. Any kits that have been released, or developed, by GM for use in service repairs to the subject component/assembly which relate, or may relate, to the alleged defect in the subject vehicles.

As requested, GM is providing one field return sample of the hub, bearing and ABS wheel speed sensor assembly that exhibits the subject condition. GM is also providing three new hub, bearing and ABS wheel speed sensor assemblies.
To date, GM has not released and does not plan to release any kits for use in service repairs other than the service bulletin included in response to Question 7.

11. State the number of subject components that GM has sold that may be used in the subject vehicles by state, 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)*. If part sales data cannot be provided by state, provide it by part distribution center with a description of the region covered by each center.

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.

An electronic summary table of the requested service part information for the subject component is provided on the Attachment 1 CD; refer to the Microsoft Excel file in the folder labeled "Response for Q11." GM does not record the state where the individual components are sold. Additionally, when the subject components are sent to the distribution center, GM is unaware of the final retail destination.

12. Provide a detailed description of the following aspects of subject component and ABS system design and operation in the subject vehicles:

a. The electrical specifications for the wheel speed sensor output signal;
b. The vehicle speed at which ABS is enabled;
c. The relationship between wheel speed sensor voltage signal amplitude and vehicle speed;
d. The speed range where unwanted ABS activation can occur due to the mounting surface corrosion issue with explanations for the upper and lower limits;
e. The durability specifications for the wheel speed sensor;
f. The material compositions of the sensor housing, the sensor seating surface, and the sensor fasteners;
g. The corrosion prevention measures for the sensor seating surface and the type of corrosion that is occurring there;
h. The design dimension and tolerance for the air gap between the speed sensor and the hub reluctor ring; and
i. A comparison of the ABS system in the subject vehicles and those used in MY 2003 C/K series vehicles.

GM's responses to Question 12a – 12l, are as follows:

a) The electrical specifications for the variable reluctance wheel speed sensor are included in the Attachment 2 CD GM Confidential, Response to Q12a file – Wheel Speed Sensor. PDF.

b) The Anti-lock Braking System (ABS) operation on the subject vehicles is enabled at approximately 3.7 mph.

c) The relationship between the wheel speed sensor voltage signal amplitude and the vehicle speed is included in the Attachment 2 CD GM Confidential, Response to Q12a file – Wheel Speed Sensor. PDF (refer to Sections 3.2.1.4 and 3.2.1.5)

d) GM has determined that the subject condition can occur between 3.7 mph and 10 mph when the air gap between the wheel speed sensor and tone ring mounted in the hub and bearing assembly increases to a distance greater than 0.031 in., due to mounting surface corrosion:

- Above 10 mph, the amplitude of the wheel speed sensor signal is large enough that the Electronic Control Unit (ECU) on the ABS module can recognize and interpret the speed signal.
- Below 10 mph and above 3.7 mph, the wheel speed sensor signal amplitude is reduced such that the ECU can not recognize the wheel speed sensor signal.
- The ABS is deactivated below 3.7 mph.

e) Durability specifications for the wheel speed sensor are included the Attachment 2 CD GM Confidential, Response to Q12a file – Wheel Speed Sensor. PDF (refer to Section 3.2)

f) The composition of the sensor housing, mounting screw, and sensor mounting surface are as follows:
- The material used for the wheel speed sensor housing is nylon 6-6.
- The wheel speed sensor fastener material is steel and the finish is phosphate zinc organic.
- GM has three suppliers of hub and bearing assemblies for the subject vehicles. Each supplier uses a different material for the sensor mounting surface (bearing cup): 1080 forged steel, JIS S55C/SAE1055 steel, or 1070 steel.

g) GM has three suppliers of hub and bearing assemblies for the subject vehicles. Each supplier uses a different method for mounting the wheel speed sensor on the hub and bearing assembly.

1. The wheel speed sensor boss is placed into a fixture that applies a specified amount of marine grease to the wheel speed sensor mounting flange, stem and the o-ring. The wheel speed sensor is then installed on the bearing cup mounting surface.
2. The wheel speed sensor boss is placed into a fixture that pumps a small amount of Nickel anti-seize on the sensor mounting surface. The sensor is then installed on the bearing cup mounting surface.
3. No material is applied between the wheel speed sensor and the bearing cup mounting surface.

GM has determined that over an extended period of time, subject vehicles that are operated in harsh environments (exposed to salt, water, dirt and other corrosive materials) may experience corrosion of the wheel speed mounting surface. The type of corrosion occurring at the wheel speed sensor and sensor mounting surface interface is crevice corrosion. Over extended periods of time, the lubricant is flushed away and the crevice corrosion initiates at the sensor mounting surface and sensor interface. Crevice corrosion is an intense, localized corrosion that occurs typically at joints (crevices) on metal surfaces. The corrosion is characterized by a long incubation period (months to years) and includes an increasing reaction rate that may be ten times faster than cosmetic corrosion. During the incubation period, chemical reactions occur in the oxygen depleted crevice region that results in a build-up of positively charged metal ions. As the area seeks to restore charge neutrality, negatively charged chloride ions (road salts common in vehicle operating environments) are drawn into the crevice and increase the corrosion rate. During the chemical reaction in the crevice area, additional hydrogen ions are built-up which lowers the pH (more acidic) and increases the corrosion rate. The corrosion may be reduced by routine underbody washes, commonly available at automatic car washes. Photos of the crevice corrosion at the wheel speed sensor mounting surface are included in Response to Question 8f, 8m and the exemplar components.

h) The designed air gap between the tone ring (target wheel) and the wheel speed sensor is a minimum of 0.346 mm (0.0136") and a maximum of 0.437 mm (0.0172").

i) The design specifications for the tone ring and the wheel speed sensor in the 1999-2002 MY GMT800 C/K Trucks and the 2003 MY GMT800 C/K Trucks is similar. The ABS control software differences are described below.

The ABS software for the 1999-2002 MY GMT800 C/K trucks includes a split μ algorithm. Split μ refers to a condition in which a vehicle is riding on surfaces of different friction coefficients (example: left side is on dry pavement and the right side is on ice). The split μ algorithm monitors the front wheel speed difference and determines if there is a significant enough difference between the surface μ's. The algorithm controls the vehicle brake pressure as required to prevent yawing of the vehicle during braking applications. Between 3.7 and 10 mph, the split μ algorithm reduces the brake fluid pressure to the affected front wheel (impending wheel lockup) and modulates the brake fluid pressure to the opposite front wheel and rear wheels (see split mu plot). The ABS ECU modulates the brake line pressure (as a step function up to system pressure) to the opposite front wheel until the front wheel speed differential is within software limits or the vehicle is stopped. A graph of the ABS split μ operation is included in the Attachment 2 CD GM Confidential, Response to Q12b file – Split Mu plot2. PDF

The ABS software for the 2003 MY GMT800 C/K trucks have Minimum Speed Split μ Activation (MSA) software that deactivates the split μ algorithm below 20 mph for 1500 series vehicles and below 15 mph for 2500 and 3500 series vehicles. The algorithm controls the vehicle brake pressure as required to prevent yawing of the vehicle during braking applications. Between 3.7 and 10 mph on surfaces of different friction coefficients, the MSA algorithm reduces the brake fluid pressure to the front wheel experiencing reduced velocity (impending wheel lockup) and permits full system pressure to the opposite front wheel and the rear wheels.

The Electronic Control Unit (ECU) on the 2003 MY 2500 and 3500 series vehicles above 9200 lb. GVW and some alternative fuel vehicles below 9200 lb. are

reprogrammable. The ECU for 1999 through 2002 MY 1500 series C/K vehicles is not reprogrammable.

13. **Upon receipt of this letter, coordinate with ODI to establish a test procedure for assessing ABS wheel speed sensor function in randomly selected samples of subject vehicles.**

    In May 2005, GM provided ODI with a test procedure for assessing the ABS wheel speed sensor function in the subject vehicles.

14. **Furnish GM's assessment of the alleged defect in the subject vehicle, including:**

    a. **The causal or contributory factor(s), including a detailed assessment of the factors affecting the occurrence of corrosion on the wheel speed sensor mounting surface;**
    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 has determined that crevice corrosion between the wheel speed sensor and sensor mounting surface may cause an increase in the air gap between the wheel speed sensor and the tone ring located in the hub and bearing assembly. Vehicles exhibiting crevice corrosion are most often operated in regions where extreme winter weather (ice and snow) conditions occur. In these areas, large quantities of various salts are used to combat the build up of snow and ice on roadways. The exemplar component supplied in Response to Question 10, exhibits the crevice corrosion associated with the subject condition. When the mounting surface crevice corrosion occurs, the wheel speed sensor is pushed away from the mounting surface. This movement increases the air gap between the wheel speed sensor and the tone ring.

    At vehicle speeds between 3.7 mph and 10 mph when the air gap is increased due to corrosion, by approximately 0.014 in. (resulting in a total air gap of approximately 0.031 in.), the voltage drops to a level that may not be detected by the ABS module. Thus, the ABS module calculates a wheel speed of zero or near zero. When a vehicle with the subject condition is driven at low speeds, such as parking lot maneuvers and the brakes are lightly applied, the amplitude of the output signal from the wheel speed sensor is reduced such that the ABS module ECU is unable to detect the individual wheel speed. When a wheel speed is sensed to be 0 mph (slip condition), the ECU activates the split μ algorithm. The split μ control algorithm reduces the brake fluid pressure to the affected front wheel and modulates the brake fluid pressure to the opposite front wheel and rear wheels (as a step function up to system pressure). GM has determined that during the subject condition, the wheel speed signal remains at a low level and extended stopping distance occurs.

    The ABS split μ algorithm technology has been used throughout the industry for several years. The split μ algorithm was designed to reduce yawing of the vehicle while stopping on surfaces of dissimilar friction coefficients (μ). Consumer comments related to unwanted ABS noise on rough roads prompted the MSA software update for GM vehicles. The improvement deactivated the split μ control below 20 mph for the 1500 series C/K vehicles and below 15 mph for 2500 and 3500 series C/K vehicles. Refer to Attachment 2 CD GM Confidential, Response to 8d for software implementation timing.

When the subject condition occurs, the driver will hear the ABS valves buzz and chatter, and feel the brake pedal pulsate. To date, the minor crashes associated with the subject condition include minor vehicle and property damage and have involved zero airbag deployments. While reviewing customer complaints that may be responsive to this investigation, GM has found many individuals that acknowledged experiencing low speed extended stopping distances for some period of time prior to any minor impact. Events of unwanted ABS activation at low speeds involving extended stopping distances should be diagnosed and serviced by certified technicians soon after the first event as described in the Attachment 1CD, Response to Q7.

GM's evaluation of the risk to motor vehicle safety is continuing. Significant factors in that evaluation include: common usage of similar ABS technology (software algorithms, speed sensor mounting interface and tone ring design and location) in the industry, the geographic profile of occurrences, low frequency, randomness of occurrences and the relatively minor consequences of impacts at less than 10 mph. Unwanted ABS activation at low speed and brake system noises may occur and be misdiagnosed as the subject condition. Nonetheless, GM is committed to continuously improving the safety of our products and improving customer satisfaction. Therefore, GM intends to further inform its risk assessment by initiating the following actions:

- Survey vehicle users and inspect field return parts to determine if a pattern exists for vehicle usage versus crevice corrosion rate of growth.
- Continue to research crevice corrosion growth rates in the lab and how they relate to field performance.

GM has reviewed the 231 Vehicle Owner Questionnaires (VOQs) that may be responsive to this investigation. GM has determined that 171 of the VOQs describe a condition that may be related to crevice corrosion of the front wheel speed sensor mounting surface or a severely worn hub and bearing assembly. Several of the VOQs describe the condition, but also note the repair costs associated with a brake system repair. The remaining 60 VOQs do not include enough information for GM to determine if they are related to the subject condition.

* * *

GM claims that certain information, in documents that are part of lawsuit and claims files maintained by the GM Legal Staff, is attorney work product and/or privileged. That information includes notes, memos, reports, photographs, and evaluations by attorneys (and by consultants, claims analysts, investigators, and engineers working at the request of attorneys). GM is producing responsive documents from claims files that are neither attorney work product nor privileged, and withholding those that are attorney work product and/or privileged.

This response is based on searches of General Motors Corporation (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 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 January 1, 1994, 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,

Gay P. Kent
Director
Product Investigations

Attachments:
Attachment 1 CD
Attachment 2 CD GM Confidential

GM-679

U.S. Department of Transportation
National Highway Traffic Safety Administration

MAY 10 2005

400 Seventh Street, S.W.
Washington, D.C. 20590

Original Received 5-17-05

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

NVS-213cla w/CD
PE05-020

Ms. Gay P. Kent, Director
Product Investigations
General Motors Corporation
30200 Mound Road - Mail Code 480-111-E18
Warren, MI 48090-9010

Dear Ms. Kent:

This letter is to inform you that the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) has opened a Preliminary Evaluation (PE05-020) to investigate allegations of unwanted antilock brake system (ABS) activation in certain model year (MY) 1999 through 2002 C/K series trucks manufactured by General Motors, and to request certain information.

In November 2004, GM notified ODI that it was recalling approximately 150,000 MY 1999 through 2002 C/K series trucks in eastern Canada to correct a condition in the ABS that may result in unwanted ABS activation and increased stopping distances during low-speed brake applications. GM reported a failure rate of 0.32 incidents per thousand vehicles in the vehicles covered by the recall in Canada. GM indicated that the corresponding rate in U.S. corrosion states was 0.03 IPTV and that it would continue to monitor that experience. This office has received 120 reports of unwanted ABS activation at low speeds (10 mph or less) from vehicle owners who reside in "Salt Belt" corrosion states. A copy of each of the reports is enclosed for your information - see Enclosure 1, "Data Collection Disk and VOQ Files", file "PE05-020 VOQs".

Unless otherwise stated in the text, the following definitions apply to these information requests:

- Subject vehicles: all MY 1999 through 2002 C/K series GMT800 platform pickup trucks and sport utility vehicles manufactured for sale or lease in the United States.
- Subject component: ABS wheel speed sensors.
- GM: General Motors Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all

agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of GM (including all business units and persons previously referred to), who are or, in or after January 1, 1994, 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.

- **Alleged defect:** the alleged defect is defined as any one or more of the following symptoms or conditions: (1) unwanted ABS activation during low-speed brake applications; (2) increased stopping distance or ineffective brakes during low-speed brake applications; (3) wheel speed sensor mounting surface corrosion; or (4) ABS wheel speed sensor failure/malfunction.

- **Document:** "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all non-identical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services, resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by GM, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a non-identical

copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)"also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by GM or not. If a document is not in the English language, provide both the original document and an English translation of the document.

- Other Terms: To the extent that they are used in these information requests, the terms "claim," "consumer complaint," "dealer field report," "field report," "fire," "fleet," "good will," "make," "model," "model year," "notice," "property damage," "property damage claim," "rollover," "type," "warranty," "warranty adjustment," and "warranty claim," whether used in singular or in plural form, have the same meaning as found in 49 CFR 579.4.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Insofar as GM has previously provided a document to ODI, GM may produce it again or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the organization of this information request letter (including all individual requests and subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

Please repeat the applicable request verbatim above each response. After GM's response to each request, identify the source of the information and indicate the last date the information was gathered.

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. Date of manufacture;
   f. Date warranty coverage commenced; and
   g. 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 2000, or a compatible format, entitled "PRODUCTION DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

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, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
   d. Reports involving a fire, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
   e. Property damage claims; and
   f. Third-party arbitration proceedings where GM is or was a party to the arbitration; and
   g. Lawsuits, both pending and closed, in which GM is or was a defendant or codefendant.

   For subparts "a" through "e" state the total number of each item (e.g., consumer complaints, field reports, etc.) separately. Multiple incidents involving the same vehicle are to be counted separately. Multiple reports of the same incident are also to be counted separately (i.e., a consumer complaint and a field report involving the same incident in which a crash occurred are to be counted as a crash report, a field report and a consumer complaint).

   In addition, for items "c" through "g," provide a summary description of the alleged problem and causal and contributing factors and GM's assessment of the problem, with a summary of the significant underlying facts and evidence. For items f and g, 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.

3. Separately, for each item (complaint, report, claim, notice, or matter) within the scope of your response to Request No. 2, state the following information:

   a. GM's file number or other identifier used;
   b. The category of the item, as identified in Request No. 2 (i.e., consumer complaint, field report, etc.);
   c. Vehicle owner or fleet name (and fleet contact person), address, and telephone number;
   d. Vehicle's VIN;
   e. Vehicle's make, model and model year;
   f. Vehicle's mileage at time of incident;
   g. Incident date;
   h. Report or claim date;
   i. Whether a crash is alleged;
   j. Whether a fire is alleged;
   k. Whether property damage is alleged;
   l. Number of alleged injuries, if any; and
   m. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

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.

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 the procedure specified in technical service bulletin 03-05-25-007A 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) 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. Replacement part number(s) and description(s);
   j. Concern stated by customer; and
   k. Comment, if any, by dealer/technician relating to claim and/or repair.

   Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

6. Describe in detail the search criteria used by GM to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State, by make and model year, the terms of the new vehicle warranty coverage offered by GM on the subject vehicles (i.e., the number of months and mileage for which coverage is provided and the vehicle systems that are covered). Describe any extended warranty coverage option(s) that GM offered for the subject vehicles and state by option, model, and model year, the number of vehicles that are covered under each such extended warranty.

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.

8. Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, GM. For each such action, provide the following information:

   a. Action title or identifier;
   b. The actual or planned start date;
   c. The actual or expected end date;
   d. Brief summary of the subject and objective of the action;
   e. Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
   f. A brief summary of the findings and/or conclusions resulting from the action.

   For each action identified, provide copies of all documents related to the action, regardless of whether the documents are in interim, draft, or final form. Organize the documents chronologically by action.

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 numbers (service and engineering) of the original component;
   e. The part number (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.

10. Produce one of each of the following:

   a. Exemplar samples of each design version of the subject component;
   b. Three field return samples of the subject component exhibiting the subject failure mode;
   c. Three field return samples of the subject components in the associated wheel bearing assembly and exhibiting the subject condition; and

d. Any kits that have been released, or developed, by GM for use in service repairs to the subject component/assembly which relate, or may relate, to the alleged defect in the subject vehicles.

11. State the number of subject components that GM has sold that may be used in the subject vehicles by state, 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)*. If part sales data cannot be provided by state, provide it by part distribution center with a description of the region covered by each center.

    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.

12. Provide a detailed description of the following aspects of subject component and ABS system design and operation in the subject vehicles:
    a. The electrical specifications for the wheel speed sensor output signal;
    b. The vehicle speed at which ABS is enabled;
    c. The relationship between wheel speed sensor voltage signal amplitude and vehicle speed;
    d. The speed range where unwanted ABS activation can occur due to the mounting surface corrosion issue with explanations for the upper and lower limits;
    e. The durability specifications for the wheel speed sensor;
    f. The material compositions of the sensor housing, the sensor seating surface, and the sensor fasteners;
    g. The corrosion prevention measures for the sensor seating surface and the type of corrosion that is occurring there;
    h. The design dimension and tolerance for the air gap between the speed sensor and the hub reluctor ring; and
    i. A comparison of the ABS system in the subject vehicles and those used in MY 2003 C/K series vehicles.

13. Upon receipt of this letter, coordinate with ODI to establish a test procedure for assessing ABS wheel speed sensor function in randomly selected samples of subject vehicles.

14. Furnish GM's assessment of the alleged defect in the subject vehicle, including:
    a. The causal or contributory factor(s), including a detailed assessment of the factors affecting the occurrence of corrosion on the wheel speed sensor mounting surface;
    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.

This letter is being sent to GM pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49 and to request reports and the production of things. It constitutes a new request for information. GM's failure to respond promptly and fully to this letter could subject GM to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. (Other remedies and sanctions are available as well.) Please note that maximum civil penalties under 49 U.S.C. § 30165 have increased as a result of the recent enactment of the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Public Law No. 106-414 (signed November 1, 2000). Section 5(a) of the TREAD Act, codified at 49 U.S.C. § 30165(b), provides for civil penalties of up to $5,000 per day, with a maximum of $16,050,000 for a related series of violations, for failing or refusing to perform an act required under 49 U.S.C. § 30166. *See* 49 CFR 578.6 (as amended by 69 Fed. Reg. 57864 (Sept. 28, 2004). This includes failing to respond to ODI information requests.

If GM cannot respond to any specific request or subpart(s) thereof, please state the reason why it is unable to do so. If on the basis of attorney-client, attorney work product, or other privilege, GM does not submit one or more requested documents or items of information in response to this information request, GM must provide a privilege log identifying each document or item withheld, and stating the date, subject or title, the name and position of the person(s) from, and the person(s) to whom it was sent, and the name and position of any other recipient (to include all carbon copies or blind carbon copies), the nature of that information or material, and the basis for the claim of privilege and why that privilege applies.

GM's response to this letter, in duplicate, together with a copy of any confidentiality request, must be submitted to this office by June 24, 2005. Please refer to PE05-020 in GM's response to this letter. If GM finds that it is unable to provide all of the information requested within the time allotted, GM must request an extension from me at (202) 366-5207 no later than five business days before the response due date. If GM is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information GM then has available, even if an extension has been granted.

If GM claims that any of the information or documents provided in response to this information request constitute confidential commercial material within the meaning of 5 U.S.C. § 552(b)(4), or are protected from disclosure pursuant to 18 U.S.C. § 1905, GM must submit supporting information together with the materials that are the subject of the confidentiality request, in accordance with 49 CFR Part 512, as amended (69 Fed. Reg. 21409 et seq; April 21, 2004), to the Office of Chief Counsel (NCC-113), National Highway Traffic Safety Administration, Room 5219, 400 Seventh Street, S.W., Washington, D.C. 20590. GM is required to submit two copies of the documents containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted.

If you have any technical questions concerning this matter, please call Chris Lash of my staff at (202) 366-2370.

Sincerely,

Jeffrey L. Quandt, Chief
Vehicle Control Division
Office of Defects Investigation

Enclosure 1: One CD ROM titled Data Collection Disc and VOQs containing four files

GM679
PE05-020

ATTACHMENT "1"

GM NON-CONFIDENTIAL MATERIAL

GM679
PE05-020

ATTACHMENT "2"

GM CONFIDENTIAL MATERIAL HAS BEEN REMOVED FROM THIS ATTACHMENT AND SUPPLIED TO THE OFFICE OF THE CHIEF COUNSEL