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OFFICE OF DEFECTS  
INVESTIGATION

GM-648

PE03-057  
NVS-213gem

Dear Mr. Quandt:

This letter is General Motors (GM) response to your information request (IR), dated December 19, 2003, regarding allegations of parking brake ineffectiveness in certain Model Year (MY) 1999-2003 GMC Sierra, Chevrolet Silverado, Chevrolet Avalanche and Cadillac Escalade EXT pickup trucks built on the GMT800 platform, equipped with "drum-in-hat" parking brakes. 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. Model;
  - c. Transmission type;
  - d. Two wheel or four wheel drive;
  - e. Date of manufacture;
  - f. Date warranty coverage commenced; and
  - g. The zip code in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).

Provide this information in five separate files, each file corresponding to one of the subject model years in Microsoft Access 2000, or a compatible format, entitled "PE03-057 MY 20xx PRODUCTION DATA." See Enclosure 1, PE03-057 Data Collection Disc, for pre-formatted tables that provide further details regarding this submission.

General Motors produced 4,168,878 of the subject vehicles for sale or lease in the United States. An electronic summary of the production data is provided on the CD (disc 1, 2, 3, & 4) in Attachment 1; refer to the Microsoft Access 2000 file in the folder labeled "Response to Q1." The source of the vehicle production data, current as of January 13, 2004, is the GM Claims Analysis Reporting Database (CARD).

Table Q1 below shows the number of subject vehicles produced by model and model year:

MODEL	1999 MY	2000 MY	2001 MY	2002 MY	2003 MY	TOTAL
Chevrolet Silverado	429,881	628,283	622,807	642,078	709,703	3,030,562
Chevrolet Avalanche	N/A	N/A	N/A	128,437	85,181	214,618
GMC Sierra	143,484	188,475	180,711	199,771	193,411	899,852
Cadillac Escalade EXT	N/A	N/A	N/A	12,513	11,131	23,644
Total	573,365	812,758	803,518	979,799	1,000,426	4,168,878

Table Q1 Production Data Summary  
N/A - Not Applicable (not produced)



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:

- h. Consumer complaints, including those from fleet operators;
- i. Field reports, including dealer field reports;
- j. 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;
- k. Property damage claims; and
- l. Third-party arbitration proceedings where GM is or was a party to the arbitration; and
- m. 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.

Table Q2-1 below summarizes the reports to GM that could relate to the subject condition:

Type of Report	Count (Including duplicates)	GM Reports	GM Reports Corresponding to NHTSA Reports	Number Of Reports Alleging Property Damage	Number Of Reports Alleging A Crash	Number Of Reports Alleging Injuries/Fatalities*	Number of Reports with Fire	Location of Reports (Attachment)
Owner Reports	175	173	2	4	15	2	0	2A
Field Reports	162	161	1	11	25	4	0	2B
Not-in-Suit Claims	7	6	1	2	7	3	0	2C
Subrogation Claims	2	2	0	0	1	0	0	2D
3rd Party Arbitration Proceedings	—	—	—	—	—	—	—	—
Product Liability Lawsuits	0	0	0	0	0	0	0	2E
Total (Including Duplicates)	336	332	4	17	51	9	0	—
Total (Excluding Duplicates)	310	317	2	13	38	8**	0	—

Table Q2-1: Reports for GM848 / PE03-057

\* GM is not aware of any fatalities related to the subject condition.

\*\* For comments concerning these incidents, refer to the GM responses to Q14d-5 (page 13)

The sources of the requested information and the last date the information was gathered are tabulated in Table Q2-2 below:

SOURCE SYSTEM	LAST DATE GATHERED
Corporate Central File	1/14/04
Customer Assistance Center	1/22/04
Technical Assistance Center	1/28/04
Field Information Network Database (FIND)	1/08/04
Company Vehicle Evaluation Program (CVEP)	1/08/04
Captured Test Fleet (CTF)	1/08/04
Early Quality Feedback (EQF)	1/20/04
Legal / Employee Self Insured Services (ESIS)	1/23/04

Table Q2-2: 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 unintended movement of the vehicle occurred while the parking brake was engaged;
  - 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 2000, or a compatible format, entitled "PE03-057 REQUEST NUMBER TWO DATA." See Enclosure 1, PE03-057 Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

An electronic summary of the records included in item 2 is provided on the CD (disc 5) in Attachment 1; refer to the Microsoft Access 2000 file in the folder labeled "Response to Q3 - REQUEST NUMBER TWO DATA." GM has organized this summary by the GM file number within each attachment.

4. Produce copies of all documents related to each of items "c" through "i" within the scope of Request No. 2. Organize the documents separately by category (i.e., crash/injury/fatality reports, property damage claims, etc.) and describe the method GM used for organizing the documents.

Copies of the records identified in Question 2 above are provided in the attachments listed in Table Q2-1. 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 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) 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 "PE03-057 WARRANTY DATA." See Enclosure 1, PE03-057 Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

The 52,282 warranty claims that may be responsive to this request are summarized in Table Q5 below:

Chevrolet Silverado	7461	9798	11,288	6158	1961	36,062
Chevrolet Avalanche	N/A	N/A	N/A	4960	199	5059
GMC Sierra	2503	3055	3261	1743	416	10,978
Cadillac Escalade EXT	N/A	N/A	N/A	166	17	183
Totals	9864	12,851	14,547	14,929	3966	52,282

Table Q5: Warranty Summary

N/A - Not Applicable (not produced)

The warranty claims that may relate to the subject condition on GM vehicles for sale or lease in the U.S. are provided on the CD (disc 5) in Attachment 1; refer to the Microsoft Access 2000 files in the folder labeled "Response to Q5 - WARRANTY DATA." There are 52,282 regular and 8 extended warranty reports for the subject vehicles that may be related to the subject condition. GM searched its Claims Analysis Reporting System (CARD) database, and Motors Insurance Corporation (MIC) and Universal Warranty Corporation (UWC) extended warranty databases. Searches were completed on January 13, 2004.

GM's warranty database does not contain the following information: vehicle Owner's name or telephone number, replacement part number description, repairing dealer's city or ZIP code, customer concern statement, or dealer/technician comment. In addition to GM's warranty database exclusion, MIC database does not contain the following information: dealer's phone number, problem code, or part number. The verbatim text is an optional field, not required to be completed for every warranty claim. It is for the dealer to enter any additional comments that may be applicable to the 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 in Microsoft Access 2000, or a compatible format. 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 regular warranty data from the GM CARD database and the extended warranty data from MIC were collected by searching for the labor codes listed in Table Q6-1 below:

LABOR CODE	DESCRIPTION
H2800	Park Brake Adjust
H3052	Park Brake Shoe (Replace)

Table Q6-1: Labor Codes Used in CARD & MIC Search

UWC extended warranty data was collected by searching for any repair involving a subject vehicle using the UWC repair code 06096 - Brakes - Misc.

The subject vehicles are covered by a bumper-to-bumper new vehicle warranty for three years or 36,000 miles whichever occurs first. Many 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 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.

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 (including Service Bulletin 02-05-026-002A), 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.

The documents responsive to the subject condition are Technical Service Bulletins (TSB) #01-05-28-001 (03/18/01), #02-05-28-001 (08/17/02), and #02-05-28-002A (01/28/03). Additionally, copies of two Brand Quality Updates, (05/16/02 and 09/03/02), concerning park brake lining wear are being submitted. Attachment Q7A contains copies of the TSB's and attachment Q7B contains copies of the Brand Quality Updates to the field.

GM is not planning to issue within the next 120 days any additional service, warranty or other technical document or communication to its dealers, regional offices, zone offices or other entities regarding the subject condition on the subject vehicles.

The preceding information was collected from GM Service Operations. The data collection was completed on January 27, 2004.

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:
- Action title or identifier;
  - The actual or planned start date;
  - The actual or expected end date;
  - Brief summary of the subject and objective of the action;
  - Engineering group(s)/supplier(s) responsible for designing and for conducting the action; and
  - 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 following explanation is being provided to assist the review of the information supplied in this response: There are two basic drum-in-hat park brake designs, 1) a light duty (1500) version using a single piece brake shoe (PBR 210x30 mm) and, 2) a heavier duty (2500HD - 3500) version that uses a design consisting of two separate brake shoes (TRW 208x42 mm) with increased lining surface area. Although there are variations of these park brake assemblies, the variations are not related to park brake shoe configuration, retention or operation. A detailed description of the various GMT 800 brake systems, including the park brake designs, is provided on the CD in Attachment 1 in the folder labeled "Response to Q8" in the Microsoft Word file - "Brake System Definitions".

A listing of the actions that may relate to the subject condition are provided on the CD (disc 5) in Attachment 1; refer to the folder labeled "Response to Q8" - in the Microsoft Excel file "Park Brake Actions, and Park Brake Actions - PBR." Test Report documents referenced in the "Park Brake Actions" file are provided in the Test Report folder. Documents referenced in the Actions List file are included in Attachment 8.

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.

A listing of the modifications or changes that may relate to the subject condition are provided on the CD in attachment 1; refer to the Microsoft Excel file titled "Change List" in the folder labeled "Response to G8". The Engineering Work Orders (EWO's) identified in the Change List file (Park Brake Assembly Changes Tab) have been color coded by the two respective park brake designs, i.e., PBR coded as light green and TRW coded as light blue. The vehicle usage / EWO's / part number correlation for the two systems are identified on the "Park Brake History" tab and the EWO's can be directly referenced to the "Park Brake Assembly Changes" Tab. Hard copy EWO's are included as Attachment 9A for the PBR system and Attachment 9B for the TRW system. Drawings of the park brake system are included in the folder labeled "Drawings" in Response to G8 and are marked as GM Confidential.

10. Produce one of each of the following:

- a. Exemplar samples of each design version of the subject component;
- b. Field return samples of the subject component exhibiting the subject failure mode; and
- c. Any kits that have been released, or developed, by GM for use in service repairs to the subject component/assembly which relate, or may relate, to the alleged defect in the subject vehicles.

Samples responsive to a, b, & c, identified as Attachment 10, are being supplied as requested. Regarding request b, in the timeframe of this request, no samples of TRW park brake linings were available from the field. Samples of the PBR park brake linings exhibiting wear are being submitted.

11. State the number of each of the following that GM has sold that may be used in the subject vehicles by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of sale (including the cut-off date for sales, if applicable):

- a. Subject component; and
- b. Any kits that have been released, or developed, by GM for use in service repairs to the subject component/assembly.

For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number) Also identify by make, model and model year, any other vehicles of which GM is aware that contain the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

The requested information is provided on the CD in Attachment 1; refer to the Microsoft Excel file titled "GMBPO - Parking Brake" in the folder labeled, "Response to Q11." These sales numbers represent sales to dealers in the US and Canada. This data has limited analytical value in analyzing the field performance of a motor vehicle component because the records do not contain sufficient information to establish the reason for the part sale. It is not possible from this data to determine the number of these parts that have been installed in the subject vehicles or the number remaining in dealer or replacement part supplier inventory.

Monthly part sales information available for the most recent 24 months have been included.

The source of the requested information, current as of January 23, 2004, is GM Service Parts Operations.

Table Q11 below identifies other GM vehicles that use either the PBR 210x30 mm or the TRW 206x42 mm park brake systems.

MAKE / MODEL	2002 MY	2003 MY
Chevrolet Trailblazer	PBR	PBR
Chevrolet Trailblazer EXT	PBR	PBR
Chevrolet Express 1500	N/A	PBR
Chev Express 2500 & 3500	N/A	TRW
Chevrolet Astro	N/A	PBR
GMC Envoy	PBR	PBR
GMC Envoy XL	PBR	PBR
GMC Savana 1500	N/A	PBR
GMC Savana 2500 & 3500	N/A	TRW
GMC Safari	N/A	PBR
Oldsmobile Bravada	PBR	PBR
Hummer H2	N/A	TRW
Isuzu Ascender	PBR	PBR

Table Q11: Other GM Vehicle Uses of PBR or TRW Drum-in-Hat Park Brake System

N/A - Not Applicable (either vehicle not produced or vehicle did not use the subject parts)

12. Describe the parking brake systems used on other GMT800 platform vehicles (delineated by model and model year) that do not use the subject components, e.g. rear drum brakes whose service brake shoes may be actuated by the parking brake mechanism, or the drive shaft-mounted drum brake installed in certain C3500HD models.

For model years 1999 through 2004, all GMT 800 platform vehicles use a "drum-in-hat" parking brake design. Although there are variations in the parking brake design for specific vehicle applications (vehicle GVW and certain other parameters), the basic "drum-in-hat" parking brake concept is common.

13. State GM's design intent regarding the subject components in the subject vehicles:
- Expected service interval in terms of months in service and mileage;
  - Estimated holding power at the beginning and at the end of this interval; and
  - Its intended use (e.g., sole vehicle immobilization device, or parking assist device).



- a. The vehicle Owner's Manual recommends that the parking brake be checked at least once per year, or more often if driving habits result in frequent use.

No requirements are specifically stated in the GM Vehicle Technical Specification (VTS) or Sub-System Technical Specification (SSTS) for the parking brake linings in terms of either mileage or months in service.

The parking brake lining wear is affected by contact between the rotor/drum and the park brake shoe/lining. Several examples of typical customer usage which can result in incremental wear of the parking brake lining, that will eventually require readjustment of the parking brake shoe to drum clearance to maintain the design intent function of the park brake, are listed below.

1. Use of the parking brake as a dynamic / service brake. **Note:** This type of parking brake usage is expressly identified in the vehicle Owner's Manual as causing overheating and leading to brake replacement.
2. Insufficient application of the parking brake that allows the vehicle to roll before reapplying the parking brake.
3. Use of the parking brake as a manual transmission hill hold feature to prevent vehicle roll-back when engaging the clutch. When the vehicle is stopped on a grade, the parking brake is applied. As the clutch is engaged, the parking brake release lever is actuated by the operator which gradually releases the parking brake as the vehicle begins moving.
4. Overloading of the vehicle beyond the Rear Gross Axle Weight Rating (RGAWR) can result in increased deflection/bending of the rear axle shaft and incidental contact with the parking brake lining.

Paragraph VTS 3.2.1.1.3.7.1 Vehicle Parking Gradeability specifies that the park brake shall hold the vehicle stationary at GVW, with the transmission in neutral. Vehicles shall comply with the requirements specified in Table 3.2.1.1.3.7.1 - 1 Vehicle Parking Gradeability, after having completed 10,000 miles of the Phoenix City Traffic Brake Wear schedule.

Paragraph SSTS 3.2.3.3. Reliability is intended to address the structural durability requirements of the parking brake system and not parking brake hill hold performance based requirements. The parking brake lining is considered a wear-out item.

The paragraphs relating to the expected usage and service interval for the parking brake system were obtained from the 1999-2001 GMT800 Vehicle Technical Specification (VTS) GMT800 VTS, Rev. 74, and can be found in Attachment 1 CD (disc 5) in the folder labeled "Response to Q13 a" in the Microsoft Word file titled "VTS".

- b. The parking brake estimated holding power at the beginning of the expected service interval (i.e. vehicle as shipped from the assembly plant) can be defined as "sufficient to hold the vehicle on a 20% grade with green linings (pre-burnish) and on a 30% grade with burnished linings". After 10,000 miles on the Phoenix City Traffic Brake Wear Schedule, the park brake should develop sufficient torque to hold the vehicle stationary on a grade of at least 20%. Throughout the life of the vehicle, it may be necessary to adjust the parking brake linings to maintain the recommended park brake lining to drum-in-hat clearance. A means of adjusting the parking brake lining clearance has been provided within the parking brake assembly that is bolted to the rear axle assembly. Whenever the parking brake system does not provide sufficient torque to hold the vehicle stationary, adjustment of the parking brake lining to drum-in-hat rotor clearance is required and during this adjustment the remaining lining thickness is to be verified and compared to the

allowable service limits published in the GM Service Manual. If the lining has worn below the allowable service limit, the parking brake lining must be replaced.

- c. The GMT 800 "drum-in-hat" parking brake system is designed as a vehicle immobilization device that fully meets the requirements of FMVSS 105 and 135. As recommended in the Owner's Manual, the intended use of the parking brake system when parking a vehicle on level ground, or when parking on a hill, is as a parking assist device to be used in conjunction with the transmission, i.e., with "reverse" gear on vehicles equipped with a manual transmission, or "park" position on vehicles equipped with an automatic transmission. Additionally, the use of wheel "chocks" on trailer wheels is recommended when parking a trailer on a hill.

14. 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 at present and in the future;
- 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.

a. The causal or contributory factors are as follows:

1. Failing to follow the Owner's Manual instructions for proper use and checks of the parking brake can cause the alleged condition. Adhering to the following instructions and cautions, all included in the Owner's Manual, insure proper operation of the parking brake system:
  - Place the vehicle transmission in park (automatic) or reverse (manual) position.
  - The transfer case on 4WD vehicles must be engaged.
  - The park brake apply pedal must be sufficiently engaged. This is especially important when adding load to a vehicle parked after engagement of the parking brake.
  - When parking a trailer on a hill, the use of wheel chocks is recommended.
  - The vehicle owner should check for proper operation of the parking brake at least once per year per the described method.
  - Using the parking brake as a service brake (while the vehicle is in motion) can cause lining wear and adversely affect the ability of the parking brake to hold a vehicle stationary.

If these instructions are not followed, the parking brake may not secure the vehicle in a stationary position.

2. On certain 1500 series model trucks with the PBR 210x30 mm DIH (Drum-In-Hat) park brake system, rough road inputs may cause movement of the park brake shoe relative to the rotor, resulting in an intermittent contact condition between the park brake lining and the park brake surface of the rotor. A similar intermittent contact condition may also be caused by deflection of the shoe during certain vehicle cornering or vehicle loading conditions. Note: The design operating clearance between the lining and the contact surface of the rotor is .5-.82 mm. Intermittent contact of the park brake lining and the park brake contact surface of the rotor during vehicle operation may contribute to self-energization of the park brake and premature wear of the park brake lining.

3. On certain 2500-3500 series trucks with a GVWR > 9200 lbs. and the TRW 206x42mm DIH park brake system, insufficient cable return spring force (due to tolerance stack-ups) can cause the park brake lever to not return completely (spring imbalance) such that the park brake can remain partially applied, resulting in park brake lining wear.
4. On certain 2500-3500 series trucks with a GVWR > 9200 lbs. and the TRW 206x42mm DIH park brake system that incorporates Nishinbo D9097 linings, sustained ambient park brake temperatures in excess of 800 deg F under extreme usage can cause a deterioration of the park brake shoe lining material.
5. Excessive dirt and debris entering into the park brake environment (inside the rotor at the park brake linings) may cause lining wear over time under extreme conditions.
6. Private owner modification of wheels and tires to larger sizes beyond what was originally validated. Larger wheel and tire sizes can increase the torque required by the park brake to hold a vehicle stationary beyond the capabilities of the brake.
7. Private owner modification of lifting the truck to create extra ground clearance and clearance for oversized wheels and tires will result in a need for longer park brake cables. Any increase in cable length can result in increased efficiency losses in the cable system.
8. If the rotor surface is improperly serviced during servicing of the rear brakes, fluid and oil can coat the park brake surface of the rotor. Also, conditions described in #5 (dirt/debris intrusion) can damage the rotor surface over time. And finally, improper servicing (machining of the park brake surface of the rotor) can leave an irregular brake surface and grooves as described above.
9. Park brake cable length and routing not being considered when applying lift modification (lifting the truck to create extra ground clearance) can result in unintentional apply of the park brake at the limits of the revised range of suspension travel (i.e. full jounce and rebound) which may result in lining wear.

- b. The failure mechanisms: (Note: the responses in this section are correlated to the causal and contributing factors identified in 14a above.)

**Factors 2, 3, 4, 5, 6 & 9:** Lining wear and/or deterioration. Wear or deterioration of the park brake linings can increase the clearance between the park brake shoes (linings) and the rotor park brake surface such that the required park brake assembly apply lever travel and associated park brake shoe travel exceeds the capabilities of the apply system and as such the park brake torque is reduced. The park brake linings are designed and positioned to function such that there is no excessive or prolonged contact with the rotor while it is in motion. Any condition in which the linings are in contact with the rotor as described in Causal Factors #2, 3, 5 & 9 (unintentional apply conditions) can result in premature lining wear. In the case of Causal Factor #4, heat from heavy and repeated service brake usage for a sustained period of time may result in a deterioration of the lining at the outer surfaces. As the lining deteriorates, the same effect as wear is produced in that the shoe to rotor clearance is increased beyond design intent. In the case of Causal Factor #5, the introduction of dirt and debris inside the park brake environment can deteriorate the lining surface. Under extreme conditions the debris can act as a bridge between the rotor and the linings and result in a self-energized apply condition.

**Factor 7:** Required torque beyond design intent. The park brake is designed to deliver a required torque (brake torque) given a design intent wheel/tire static load radius and GVW of the vehicle. An increase in the wheel radius will increase the required torque of the brake for all given ballast conditions. This will have the same effect as loading the vehicle to a point beyond the recommended GVW rating.

**Factor 8:** Loss of cable efficiency. Cable efficiency can be described as the difference between the force applied to the brake lever (pedal) compared to the resultant force on the lever at the park brake. Efficiency is affected by the amount of friction within the park brake cables. Friction is increased in the event of lengthening the cables due to the increased contact area between the cable strand & the sleeve and the resulting change in cable routing (bend radii, etc.). In the event that longer cables are introduced to a given vehicle, a given force on the park brake pedal may not produce the same amount of force at the park brake lever as it did when the shorter (design intent) cables were installed. Thus a lesser amount of torque may be generated for the same amount of pedal input/force.

**Factor 9:** Improper surface condition inside the rotor on the park brake surface can result in a loss of friction between the rotor and the park brake linings and a decrease in available brake torque. Deep machining grooves (from brake repair service), damage from debris or any irregular surface condition can result in loss of contact area between the linings and the rotor and the loss of friction. Also, the presence of any oil, grease or brake fluid will result in the loss of friction as the linings are designed to produce friction (and thus brake torque) through direct and generally clean contact with the rotor.

- c. The failure modes: (Note: the responses in this section are correlated to the causal and contributing factors identified in 14a above.)

**Factors 2, 3, 4, 5, 8 & 9:** Lining wear and/or deterioration can lead to a decreased capability of the park brake to hold a vehicle at a given grade, at a given ballast (load) condition, for a given pedal input (force and travel). Also, in the case of #2 & 8 (self energization and debris inside the park brake), there may be an audible noise from the park brake.

**Factor 7:** Modification (increased size) of wheels and tires can lead to a decreased capability of the park brake to hold a vehicle at a given grade, at a given ballast (load) condition, for a given pedal input (force and travel).

**Factor 8:** Adding longer park brake cables due to raising the truck to increase the ground clearance can lead to a decreased capability of the park brake to hold a vehicle at a given grade, at a given ballast (load) condition, for a given pedal input (force and travel).

**Factor 9:** Improper rotor surface conditions can lead to a decreased capability of the park brake to hold a vehicle at a given grade, at a given ballast (load) condition, for a given pedal input (force and travel). In the event of dirt intrusion, there may also be an audible noise from the park brake as well.

- d. GM does not believe the alleged defect presents a risk to motor vehicle safety at the present or in the future for the following reasons:

1. In some cases, contact of the parking brake shoe to the drum area of the rotor causes an audible noise (scraping / grinding). This noise is indication to the vehicle operator that service or adjustment is needed prior to degradation of the parking brake performance.
2. If the park brake shoe wears because of contact, adjustment will, in most cases, return the parking brake to sufficient holding power to hold a vehicle stationary.
3. Recommended usage of the park brake is as a parking asset, to be used in conjunction with the vehicle transmission to hold a vehicle stationary. The Owner's Manual recommendations for proper park brake operation are included in Attachment 1 CD (disc 5) in the folder labeled "Response to Q14d" in the Microsoft Word file labeled "Owner's Manual - Park Brake Operation". Park brake systems are variable systems in that holding capability is a function of the park brake pedal apply force. A pedal apply force just adequate to hold a vehicle on a hill

may become inadequate if the vehicle operator subsequently adds weight to the vehicle (payload, passengers, trailer, etc.). As stated in the vehicle Owner's Manual, an operator should always use the park brake in conjunction with transmission gearing and trailer wheel chocks to insure the vehicle remains stationary.

4. Sufficient application of the parking brake to maintain a vehicle stationary position is obvious to the vehicle operator at the time of initial application. The vehicle will remain stationary unless vehicle loading is subsequently changed (see #3 above).
  5. The six (6) injuries (Table Q2-1) associated with the alleged condition are all of a minor nature. In some cases, these incidents, appear to be associated with improper operation of the parking brake system per the Owner's Manual recommendations.
- a. The primary warning or indication that the parking brake is malfunctioning would be the observation that the vehicle does not remain stationary after applying the parking brake, shifting the transmission shift lever into the recommended parking gear position (depending on manual or automatic transmission), insuring the transfer case is engaged (if so equipped), and then releasing the service brakes.

Some customers may comment on a scraping noise from the rear of the vehicle while driving. This noise may be intermittent. This noise may be caused by the parking brake shoe contacting the drum-in-hat rotor without the parking brake being applied, causing premature wear on the shoe lining.

The operator should assess the ability of the vehicle's parking brake and the vehicle's transmission parking position (Park (P) position with automatic transmission equipped vehicles or Reverse (R) gear position with manual transmission equipped vehicles), and insuring the transfer case is engaged (if so equipped), to hold the vehicle stationary before leaving the vehicle. If the vehicle does not remain stationary after shifting the transmission shift lever into the recommended parking gear position and applying the vehicle's parking brake, the operator would either reapply the park brake or apply more pedal force or pedal travel to the park brake pedal to increase the park brake hill hold capability. If the vehicle still does not remain stationary, the vehicle's operator should not attempt to park the vehicle in that location or position as the vehicle could roll.

Proper application of the parking brake should be performed by the driver/operator before leaving the vehicle. For manual transmission equipped vehicles, the Owner's Manual states;

"Before you get out of your vehicle, move the shift lever into REVERSE (R), and firmly apply the parking brake. Once the shift lever has been placed into REVERSE (R) with the clutch pedal pressed in, you can turn the ignition key to OFF, remove the key and release the clutch."

or for automatic transmission equipped vehicles, the Owner's Manual states;

"Caution - It is dangerous to get out of your vehicle if the shift lever is not fully in Park (P) with the parking brake firmly set. Your vehicle can roll."

General Motors does not recommend that the parking brake be used as the sole method to park and hold the vehicle. The Owner's Manual clearly states that the parking brake is to be applied and the transmission shifted to Reverse (manual transmission) or Park (automatic transmission). In addition, operators of vehicles equipped with four-wheel drive are cautioned that the vehicle's four-wheel drive transfer case should not be shifted into Neutral when the vehicle is parked as the vehicle could roll even if the shift lever is in Park (P) or if the vehicle has a manual transmission, even if the shift lever is in gear.

Regular usage of the parking brake allows the vehicle operator to assess any changes in the operation and function of the parking brake and identify if service is required on the parking brake system.

**Note:** The Owner's Manual recommendations for proper park brake operation are included in Attachment 1 CD (disc 5) in the folder labeled "Response to Q14c" in the Microsoft Word file labeled "Owner's Manual - Park Brake Operation".

- f. Table Q14f below details GM's assessment of the VOQ reports included with this inquiry:

VOQ #	MY/VEHICLE/TRANS	GM's Assessment
8017007	1999 C 1500 (manual)	Multiple park brake replacement may be consistent with premature wear; vehicle service history does not indicate park brake service
8015392	1999 K 1500 (manual)	May be consistent with premature wear, however; not enough information to determine if the report is due to park brake lining wear, adjustment, improper usage or other factors
10026539	2000 Silverado VIN not provided (manual)	Report indicates that the vehicle operator is adding weight to the vehicle on a hill (loading boat); not enough information to determine if alleged failure to hold is due to inadequate pedal apply force, wear due to driving with the park brake on, need for park brake adjustment or whether the operator is following the Owner's Manual recommendations for proper usage of the park brake
8012971	2000 K 1500 (manual)	May be consistent with premature wear, however not enough information to determine if alleged failure to hold is due to inadequate pedal apply force, wear due to driving with the park brake on, need for park brake adjustment or whether the operator is following the Owner's Manual recommendations for proper usage of the park brake; no record of park brake service on vehicle; the VOQ states that the dealer declared the park brake to be operable
10003580	2000 K 1500 (manual)	Unable to assess the issue because the VOQ comments do not sound reasonable; the park brake shoe can not become disengaged and drop into the drum wearing the drum out unless the mechanism was misassembled; if the park brake does move, the shoes will contact the inner surface of the rotor drum resulting in wear of the lining; no record of park brake service in vehicle claim history
10026595	2000 C 1500 (auto)	Appears to be consistent with the premature wear of the park brake lining; vehicle had 1 service report of park brake adjust (~29k miles)
882780	2001 C 1500 (manual)	May be consistent with premature wear, however not enough information to determine if alleged failure to hold is due to inadequate pedal apply force, wear due to driving

		with the park brake on, need for park brake adjustment or whether the operator is following the Owner's Manual recommendations for proper usage of the park brake; no record of park brake service on vehicle; Vehicle has 1 record of park brake adjust service (3384 miles)
8013814	2002 Silverado VIN not provided (manual)	Minimal information makes the assessment difficult; may be consistent with premature wear but other usage factors may also explain the condition

Table Q14f - GM Assessment of VOQ Reports

\* \* \*

General Motors requests that the document stamped "GM Confidential" included in Attachment 1 (disc 5) and "TRW" be afforded confidential treatment by the NHTSA. This information is not customarily made public by General Motors and contains trade secrets and commercial information which is privileged or confidential under 5 U.S.C. Section 552(b)(4), 49 CFR Part 512 and 49 U.S.C. Section 30167(a).

Attachment 1 contains engineering drawings in the folder identified as Drawings - Confidential. These drawings have commercial value that can only be obtained independently at considerable cost. This information can be used by competitors to identify quality and performance problems or differences, thereby enabling them to improve their own products, without the expenditures associated with the evaluation of products, all at the expense of General Motors. Attachments 1 & "TRW" contain commercial information the disclosure of which would likely result in substantial competitive harm.

General Motors treats the above material as confidential proprietary information available only to authorized General Motors personnel and not otherwise available to the public. The document is maintained under a record-keeping system which is intended to control dissemination of this material within General Motors, and to assure that it is not disseminated outside the Corporation, except as described in the attached certification made pursuant to 49 CFR Part 512.4(e).

To the best of our knowledge, no prior determinations of the confidentiality of this document has been made by the NHTSA, other Federal Agencies, or the Federal Courts. Documents such as contained in Attachment 1 and "TRW" however, have, to the best of our knowledge, normally been granted confidential treatment by the NHTSA in the past. The drawings in Attachment 1 (disc 5) are of a type for which a class determination of confidentiality has been made under 49 CFR Part 512, Appendix B.

The document subject to this request for confidentiality has been clearly stamped "GM CONFIDENTIAL". If a request for disclosure of any or all of this information is received by the NHTSA, General Motors requests notification of receipt of each such request and, if necessary, an opportunity to further explain the reasons why such material is trade secret and commercial information which should not be disclosed under the applicable statutes and regulations.

GM claims that certain information, in documents that are part of 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 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.

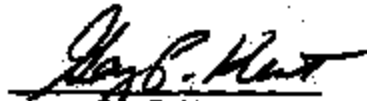
This response is based on searches of General Motors Corporation (GM) locations where documents determined to be responsive to your request would ordinarily be found. As a result, the scope of this search did not include, nor could it reasonably include, "all of its past and present officers and employees, whether assigned to its principal office 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, 1996, 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,



Jay P. Kent  
Director  
Product Investigations

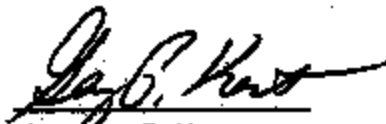
Attachments



**CERTIFICATE IN SUPPORT OF REQUEST FOR CONFIDENTIALITY**

I, Gay P. Kent, pursuant to the provisions of 49 CFR Part 512 state as follows:

- (1) I am the Director of Product Investigations, and I am authorized by General Motors Corporation (GM) to execute documents on its behalf;
- (2) The information stamped "GM Confidential" contained in Attachments 1 (disc 5), and "TRW" to this document is confidential and proprietary data and is being submitted with the claim that it is entitled to confidential treatment of 5 USC §552(b)(4), 49 U.S.C. Section 30167(a) and implemented in 49 CFR Part 512;
- (3) I, or members of my staff, have personally inquired of the responsible GM personnel who have authority in the normal course of business to release the information for which a claim of confidentiality has been made to ascertain whether such information has ever been released outside GM;
- (4) Based upon such inquiries to the best of my knowledge, information and belief, the information for which GM has claimed confidential treatment has never been released or become available outside GM, except as hereinafter specified: None.
- (5) I make no representations beyond those contained in this certificate and in particular, I make no representations as to whether this information may become available outside GM because of unauthorized or inadvertent disclosure except as stated in Paragraph 4; and,
- (6) I certify under penalty of perjury that the foregoing is true and correct. Executed on this the 18th day of February 2004.



Gay P. Kent

Director

Product Investigations