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November 7, 2014

Mr. Frank S. Borris, Director  
Office of Defects Investigation  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue SE, Room W45-302  
Washington, D.C. 20590

Dear Mr. Borris:

Subject: PE14-027:NVS-213cni

The Ford Motor Company (Ford) response to the agency's September 9, 2014 letter concerning reports of alleged failure of front jounce brake hose resulting in brake fluid leakage, extended brake pedal travel and/or extended stopping distance in Ford Explorer Police Interceptor vehicles is attached.

As part of this investigation, Ford performed a comprehensive search of its database to identify allegations that may relate to front brake jounce hose leak. Based on the analysis and testing conducted by Ford, the low number of front brake jounce hose leak reports (24) on a population of approximately 390,000 vehicles, and overt indication of a low brake fluid condition, Ford does not believe that this condition presents an unreasonable risk to motor vehicle safety. This is further supported by no reports of accidents or injuries alleged to be attributed to this issue.

If you have any questions concerning this response, please feel free to contact me.

Sincerely,

A handwritten signature in blue ink that reads "S. M. Kenner".

*for* Steven M. Kenner

Attachment

FORD MOTOR COMPANY (FORD) RESPONSE TO PE14-027

Ford's response to this Preliminary Evaluation information request was prepared pursuant to a diligent search for the information requested. While we have employed our best efforts to provide responsive information, the breadth of the agency's request and the requirement that information be provided on an expedited basis make this a difficult task. We nevertheless have made substantial effort to provide thorough and accurate information, and we would be pleased to meet with agency personnel to discuss any aspect of this Preliminary Evaluation.

The scope of Ford's investigation conducted to locate responsive information focused on Ford employees most likely to be knowledgeable about the subject matter of this inquiry and on review of Ford files in which responsive information ordinarily would be expected to be found and to which Ford ordinarily would refer. Ford notes that although electronic information was included within the scope of its search, Ford has not attempted to retrieve from computer storage electronic files that were overwritten or deleted. As the agency is aware, such files generally are unavailable to the computer user even if they still exist and are retrievable through expert means. To the extent that the agency's definition of Ford includes suppliers, contractors, and affiliated enterprises for which Ford does not exercise day-to-day operational control, we note that information belonging to such entities ordinarily is not in Ford's possession, custody or control.

Ford has construed this request as pertaining to vehicles manufactured for sale in the United States, its protectorates, and territories.

Ford notes that some of the information being produced pursuant to this inquiry may contain personal information such as customer names, addresses, telephone numbers, and complete Vehicle Identification Numbers (VINs). Ford is producing such personal information in an unredacted form to facilitate the agency's investigation with the understanding that the agency will not make such personal information available to the public under FOIA Exemption 6, 5 U.S.C. 552(b)(6).

Answers to your specific questions are set forth below. As requested, after each numeric designation, we have set forth verbatim the request for information, followed by our response. Unless otherwise stated, Ford has undertaken to provide responsive documents dated up to and including September 9, 2014, the date of your inquiry. Ford has searched within the following offices for responsive documents: Ford Customer Service Division, Office of the General Counsel, and North American Product Development.

Request 1

State, by model and model year, the number of subject and peer vehicles Ford has manufactured for sale or lease in the United States. Separately, for each subject vehicle manufactured to date by Ford, state the following:

- a. Vehicle identification number (VIN);
- b. Make;
- c. Model;
- d. Model Year;
- e. Date of manufacture;
- f. Police Interceptor variant;

- g. Part number of the left/right front jounce hoses as originally equipped;
- h. Date warranty coverage commenced; and
- i. The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).

Provide the table in Microsoft Access 2007, or a compatible format, entitled "PE14-027 PRODUCTION DATA." See Enclosure, a Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

#### Answer

Ford records indicate that the approximate total number of subject vehicles sold in the United States, (the 50 states and the District of Columbia) protectorates, and territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands) is 13,776.

The number of subject vehicles sold in the United States by model and model year is shown below:

Model	2011 MY	2012 MY	2013 MY
Ford Explorer	Not Offered	Not Offered	13,776
Police Interceptor			

Ford records indicate that the approximate total number of peer vehicles sold in the United States, (the 50 states and the District of Columbia) protectorates, and territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands) is 393,798.

The number of peer vehicles sold in the United States by model and model year is shown below:

Model	2011 MY	2012 MY	2013 MY
Ford Explorer	82,479	86,485	224,834
Non-Police Interceptor			

For the subject and peer vehicles, only two front brake jounce hose assemblies have been used on production. From 2011 model year Job #1 to June 20, 2012, the BB53 level was used; after which, an updated DB53 part level was used. For the Agency's convenience, Ford is providing the brake system configuration used for each vehicle. The requested data is provided in Appendix A.

#### Request 2

State the number of each of the following, received by Ford, or of which Ford is otherwise aware, which relate to, or may relate to, the alleged defect in the subject and peer vehicles:

- a. Consumer complaints, including those from fleet operators;
- b. Field reports, including dealer field reports;
- c. Reports involving a crash, injury, or fatality, 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. Property damage claims;
  - e. Third-party arbitration proceedings where Ford is or was a party to the arbitration; and
  - f. Lawsuits, both pending and closed, in which Ford is or was a defendant or codefendant.

For subparts "a" through "d," 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 Ford'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.

#### Answer

For purposes of identifying reports of incidents that may be related to the alleged defect and any related documents, Ford has gathered "owner reports" and "field reports" maintained by Ford Customer Service Division (FCSD), and claim and lawsuit information maintained by Ford's Office of the General Counsel (OGC).

Descriptions of the FCSD owner and field report systems and the criteria used to search each of these are provided in Appendix B.

The following categorizations were used in the review of reports located in each of these searches:

Category	Allegation
A1	Brake fluid leakage due to failure of the Front Jounce Hose
A2	Extended brake pedal travel due to failure of the Front Jounce Hose
A3	Extended stopping distance due to failure of the Front Jounce Hose
A4	Other symptom due to failure of the Front Jounce Hose
B1	Brake fluid leakage, causal part not identified
B2	Extended brake pedal travel, causal part not identified
B3	Extended stopping distance, causal part not identified

We are providing electronic copies of reports categorized as "B" as "non-specific allegations" for your review because of the broad scope of the request. Based on our engineering judgment, the information in these reports is insufficient to support a determination that they pertain to the alleged defect.

Owner Reports: Records identified in a search of the FMC360 database, as described in Appendix B, were reviewed for relevance and sorted in accordance with the categories

described above. The number and copies of relevant owner reports identified in this search that allege failure of the front jounce brake hose resulting in brake fluid leakage, extended brake pedal travel, and/or extended stopping distance in a subject or peer vehicle are provided in the FMC360 portion of the database contained in Appendix C. The categorization of each report is identified in the "Category" field.

When we were able to identify that responsive (i.e., not ambiguous) duplicate owner reports for an alleged incident were received, each of these duplicate reports was marked accordingly, and the group counted as one report. In other cases, certain vehicles may have experienced more than one incident and have more than one report associated with their VINs. These reports have been counted separately.

Legal Contacts: Ford is providing, in Appendix B, a description of Legal Contacts and the activity that is responsible for this information. Ford has not identified any Legal Contacts that are responsive to the agency's request.

Field Reports: Records identified in a search of the Common Quality Indicator System (CQIS) database, as described in Appendix B, were reviewed for relevance and sorted in accordance with the categories described above. The number and copies of relevant field reports identified in this search that allege failure of the front jounce brake hose resulting in brake fluid leakage, extended brake pedal travel, and/or extended stopping distance in a subject or peer vehicle are provided in the CQIS portion of the database contained in Appendix C. The categorization of each report is identified in the "Category" field.

When we were able to identify that responsive duplicate field reports for an alleged incident were received, each of these duplicate reports was marked accordingly, and the group counted as one report. In other cases, certain vehicles may have experienced more than one incident and have more than one report associated with their VINs. These reports have been counted separately. In addition, field reports that are duplicative of owner reports are provided in Appendix C but are not included in the field report count.

VOQ Data: This information request had an attachment that included one Vehicle Owner Questionnaire (VOQs) containing 11 VINs. Two VINs had two front jounce brake hose repairs on separate dates. Ford made inquiries of its FMC360 database for customer contacts, and its CQIS database for field reports regarding the vehicles identified on the VOQs.

In April 2014, the Washington D.C. Metropolitan Police Department contacted Ford's fleet representative at the Chicago Assembly Plant regarding 13 leaking front jounce hose repairs on 11 vehicles (two of the 11 vehicles had both front jounce hoses replaced at separate times.) The D.C. Metro Police reported these repairs to the Agency in a single Vehicle Owner Questionnaire (VOQ #1061634). Four vehicle repairs reported a low or fading pedal, five vehicle repairs reported a lack of braking performance, and two vehicle repairs reported a brake fluid leak. One vehicle was repaired due an issue with the front brake jounce hose being twisted and one vehicle repair did not identify a cause.

Crash/Injury Incident Claims: Ford has not identified any allegations of accidents or injuries that may have resulted from the alleged defect.

Claims, Lawsuits, and Arbitrations: For purposes of identifying incidents that may relate to the alleged defect in a subject vehicle, Ford has gathered claim and lawsuit information maintained by Ford's OGC. Ford's OGC is responsible for handling product liability lawsuits, claims, and consumer breach of warranty lawsuits and arbitrations against the Company.

Lawsuits and claims gathered in this manner were reviewed for relevance and sorted in accordance with the categories described above. Ford has also located other lawsuits, claims, or consumer breach of warranty lawsuits, each of which is ambiguous as to whether it meets the alleged defect criteria. We have included these lawsuits and claims as "non-specific allegations" for your review because of the broad scope of the request. Based on our engineering judgment, the information in these lawsuits and claims is insufficient to support a determination that they pertain to the alleged defect.

We are providing the requested detailed information, where available, on the responsive and ambiguous lawsuits and claims in our Log of Lawsuits and Claims, provided in Appendix C in the Legal Claim/Lawsuits tab. The number of relevant lawsuits and claims identified is also provided in this log. To the extent available, copies of complaints, first notices, or FMC360 reports relating to matters shown on the log are provided in Appendix D. With regard to these lawsuits and claims, Ford has not undertaken to contact outside law firms to obtain additional documentation.

### Request 3

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

- a. Ford'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. Vehicle's speed at time of incident;
- h. Incident date;
- i. Report or claim date;
- 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 2007, or a compatible format, entitled "PE14-027 REQUEST NUMBER THREE DATA" See Enclosure, a Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

### Answer

Ford is providing owner and field reports in the database contained in Appendix C in response to Request 2. To the extent information sought in Request 3 is available for owner and field reports, it is provided in the database. To the extent information sought in Request 3 is available for lawsuits and claims, it is provided in the Log of Lawsuits and Claims provided in Appendix C in the Legal Claim/Lawsuits tab.

Request 4

Produce copies of all documents related to each item within the scope of Request No.3. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method Ford used for organizing the documents.

Answer

Ford is providing owner and field reports in the database contained in Appendix C in response to Request 2. Copies of complaints, first notices, or FMC360 reports relating to matters shown on the Log of Lawsuits and Claims provided in Appendix C in the Legal Claim/Lawsuits tab are provided in Appendix D. To the extent information sought in Request 4 is available, it is provided in the referenced appendices.

Request 5

State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by Ford to date that relate to, or may relate to, the alleged defect in the subject and peer 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. Ford'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;
- k. Was vehicle towed in; and
- l. Comment, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2007, or a compatible format, entitled "PE14-027 WARRANTY DATA." See Enclosure, Data Collection Disc, for a pre-formatted table which provides further details regarding this submission.

Answer

Records identified in a search of the AWS database, as described in Appendix B, were reviewed for relevance and sorted in accordance with the categories described in the response to Request 2. The number and copies of relevant warranty claims identified in this

search that allege failure of the front jounce brake hose resulting in brake fluid leakage, extended brake pedal travel, and/or extended stopping distance in a subject or peer vehicle are provided in the AWS portion of the database contained in Appendix C. The categorization of each report is identified in the "Category" field.

When we were able to identify that duplicate claims for an alleged incident were received, each of these duplicate claims was marked accordingly and the group counted as one report. In other cases, certain vehicles may have experienced more than one incident and have more than one claim associated with their VINs. These claims have been counted separately. Warranty claims that are duplicative of owner and field reports are provided in Appendix C but are not included in the report count above.

Requests for "goodwill, field, or zone adjustments" received by Ford to date that relate to the alleged defect that were not honored, if any, would be included in the FMC360 reports identified above in response to Request 2. Such claims that were honored are included in the warranty data provided. Ford assumes that providing the warranty claims in the electronic database format meets the requirements of this request because the agency can review or order the claims as desired.

Additionally, the agency has requested information related to claims for vehicle towing as a result of an issue with the subject component. Ford provides roadside assistance as part of the new vehicle limited warranty and certain optional extended service plans. The roadside assistance program is administered by an outside supplier and Ford does not have access to claims made for vehicle towing through this service. Recently, Ford has begun importing roadside assistance claims into its FMC360 database. However, the claims do not indicate what type of assistance was required, only that assistance was requested. The customer and technician comments provided with warranty claims provide the best source of information regarding possible incident-related vehicle towing. Ford has reviewed subject and peer vehicle reports for information where a vehicle has been towed and is providing a list in Appendix E.

#### Request 6

Describe in detail the search criteria used by Ford to identify the claims identified in response to Request 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 Ford 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 Ford 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.



Answer

Detailed descriptions of the search criteria, including all pertinent parameters, used to identify the claims provided in response to Request 5 are described in Appendix B. Ford is providing labor operation codes and descriptions and diagnostic trouble codes and descriptions in Appendix C.

For the 2013 model year Ford Explorer Police Interceptor vehicles, the New Vehicle Limited Warranty, Bumper-to-Bumper Coverage begins at the warranty start date and lasts for three years or 36,000 miles, whichever occurs first. No Optional Extended Service Plans that include coverage for the front brake jounce hose are available on the Ford Explorer Police Interceptor.

Request 7

Produce copies of all service, warranty, and other documents that relate to, or may relate to, the alleged defect in the subject vehicles, that Ford 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 Ford is planning to issue within the next 120 days.

Answer

For purposes of identifying communications to dealers, zone offices, or field offices pertaining, at least in part, to failure of the front jounce brake hose resulting in brake fluid leakage, extended brake pedal travel, and/or extended stopping distance, Ford has reviewed the following FCSD databases and files: The On-Line Automotive Service Information System (OASIS) containing Technical Service Bulletins (TSBs) and Special Service Messages (SSMs); Internal Service Messages (ISMs) contained in CQIS; and Field Review Committee (FRC) files. We assume this request does not seek information related to electronic communications between Ford and its dealers regarding the order, delivery, or payment for replacement parts, so we have not included these kinds of information in our answer.

A description of Ford's OASIS messages, ISMs, and the Field Review Committee files and the search criteria used are provided in Appendix B.

OASIS Messages: Ford has not identified any SSMs or TSBs that may relate to the agency's request.

Internal Service Messages: Ford has not identified any ISMs that may relate to the agency's request.

Field Review Committee: Ford has not identified any field service action communications that may relate to the agency's request.

Ford currently has no plans to issue communications related to the alleged defect that is the subject of NHTSA's investigation.

Request 8

Describe all assessments, analyses, tests, test results, studies, surveys, simulations, investigations, inquiries and/or evaluations (collectively, "actions") that relate to, or may relate to, the alleged defect in the subject vehicles that have been conducted, are being conducted, are planned, or are being planned by, or for, Ford. 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.

Answer

Ford is construing this request broadly and is providing not only studies, surveys, and investigations related to the alleged defect, but also notes, correspondence, and other communications that were located pursuant to a diligent search for the requested information. Ford is providing the responsive non-confidential Ford documentation in Appendix F.

To the extent that the information requested is available, it is included in the documents provided. If the agency should have questions concerning any of the documents, please advise.

Ford is submitting additional responsive documentation in Appendix G with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512. Redacted copies of the confidential documents will be provided under separate cover, on separate media, to the agency's Office of Chief Counsel as Appendix G – Redacted.

In the interest of ensuring a timely and meaningful submission, Ford is not producing materials or items containing little or no substantive information. Examples of the types of materials not being produced are meeting notices, raw data lists (such as part numbers or VINs) without any analytical content, duplicate copies, non-responsive elements of responsive materials, and draft electronic files for which later versions of the materials are being submitted. Through this method, Ford is seeking to provide the agency with substantive responsive materials in our possession in the timing set forth for our response. We believe our response meets this goal. If the agency would like additional materials, please advise.

Request 9

Describe all modifications or changes made by, or on behalf of, Ford in the design, material composition, manufacture, quality control, supply, or installation of the subject

components, from the start of production to date, which relate to, or may relate to, the alleged defect or subject condition 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. The applicable models;
- c. A detailed description of the modification or change;
- d. The reason(s) for the modification or change;
- e. The part number(s) and a description (service and engineering) of the original components;
- f. The part number(s) and a description (service and engineering) of the modified components;
- g. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
- h. When the modified component was made available as a service component;
- i. A photograph or graphic showing each component, highlighting the design features that may relate to the alleged defect or subject condition; and
- j. Whether the modified component can be interchanged with earlier production components.

Also, provide the above information for any modification or change that Ford is aware of which may be incorporated into vehicle production within the next 120 days.

#### Answer

Ford is providing a table summarizing the requested changes is provided in Appendix H and engineering drawings for the original front brake jounce hose assembly and updated part are provided in Appendix G with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512.

After its original release, Hitachi Automotive Systems (Hitachi) submitted a Supplier Request for Engineering Approval for authorization to move the source for the friction material from a Japanese plant that was located in the tsunami affected zone to another plant in February 2012. The part number was not changed, because the original friction tube material specification and dimensional requirements were the same. June 2012, Ford introduced a new front brake jounce hose assembly that eliminated the banjo fitting tube, which required a corresponding lengthening of the hose; this part is denoted as the DB53 level. In April 2013, the position of the crimp washer on the banjo fitting was revised to improve hose installation during vehicle assembly.

Ford currently has no plans for modifications related to the subject components in the subject vehicles.

#### Request 10

State the number of subject components that Ford 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 the sale (including the cut-off date for sales, if applicable).

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 Ford is aware that contain the identical component, whether installed in production or in service, and state the applicable dates of production or service usage.

Answer

As the agency is aware, Ford service parts are sold in the U.S. to authorized Ford and Lincoln-Mercury dealers. Ford has no means to determine how many of the parts were actually installed on vehicles, the vehicle model or model year on which a particular part was installed, the reason for any given installation, or the purchaser's intended use of the components sold.

Ford is providing the total number of Ford service replacement front brake jounce hose assembly by part number (both service and engineering) and year of sale, where available, and supplier point of contact information in Appendix I. The front brake jounce hose assembly usage is exclusively for the 2011 through 2013 model year Ford Explorer.

Request 11

Provide the following design and component information related to the alleged defect:

- a. Provide copies of all Ford specifications and design requirements for the subject components;
- b. Describe the construction and material composition of the subject components;
- c. Describe all quality control requirements and procedures for the subject components and provide copies of all related documents from the production period associated with the incident vehicles identified in the attachment to this letter;
- d. Provide a graph showing brake fluid pressure at the subject component as a function of the vehicle deceleration;
- e. Provide Ford's assessment of all design, manufacturing, environmental, and duty cycle factors that contribute to the alleged defect in the subject vehicles;
- f. Provide a table comparing the factors identified in 11.e between subject and peer vehicles; and
- g. Provide graphs showing vehicle deceleration as a function of brake pedal force for both normal/full system configurations with a failed subject component.

Answer

Ford is providing specifications and design requirements for the subject components in Appendix G with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512.

For the 2011 through 2013 model years, Hitachi manufactured the front brake jounce hose. The same part is used on both the standard duty and heavy duty brake system applications. The front brake jounce hose assembly consists of several components. A banjo block fitting and flow bolt, located on the caliper end of the assembly, provides a means of attachment between the hose and the brake caliper and allows for the transfer of fluid pressure from the master cylinder to the brake caliper. The brake hose is attached to a tube coming off the

banjo block by means of a crimped ferrule. The brake hose is constructed of five layers: the Inner Tube carries the brake fluid, an Inner Braid provide the structure to hold internal pressure, a Friction Layer prevents the two braid layers from rubbing together, an Outer Braid provides additional structure to hold internal pressure, and an Outer Cover which protects the Outer Braid from the elements. A routing sleeve, located on the body end of the hose assembly, provides additional stiffness to hose to maintain proper positioning of the hose during suspension travel. The brake hose must comply with the requirements of FMVSS 106 for hose expansion, burst strength, tensile strength, and whip resistance. A routing sleeve, located on the body end of the hose assembly, provides additional stiffness to the hose in order to properly route the hose during suspension travel. The body end of the front brake jounce hose is attached to an end fitting by means of a crimped ferrule. The end fitting is affixed to a stamped steel bracket that mounts to the vehicle body.

Ford is providing quality control requirements and procedures for the subject components and related documents from the production period associated with the D.C. Metro Police fleet in Appendix G with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512.

Ford is providing the requested test results in Appendix G with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512.

#### Request 12

Furnish Ford's assessment of the alleged defect in the subject and peer vehicles, including:

- a. The causal or contributory factor(s);
- b. The failure mechanism(s);
- c. The failure mode(s);
- d. The risk to motor vehicle safety that it poses;
- e. What warnings, if any, the operator and the other persons both inside and outside the vehicle would have that the alleged defect was occurring or subject component was malfunctioning; and
- f. The reports included with this inquiry.

#### Answer

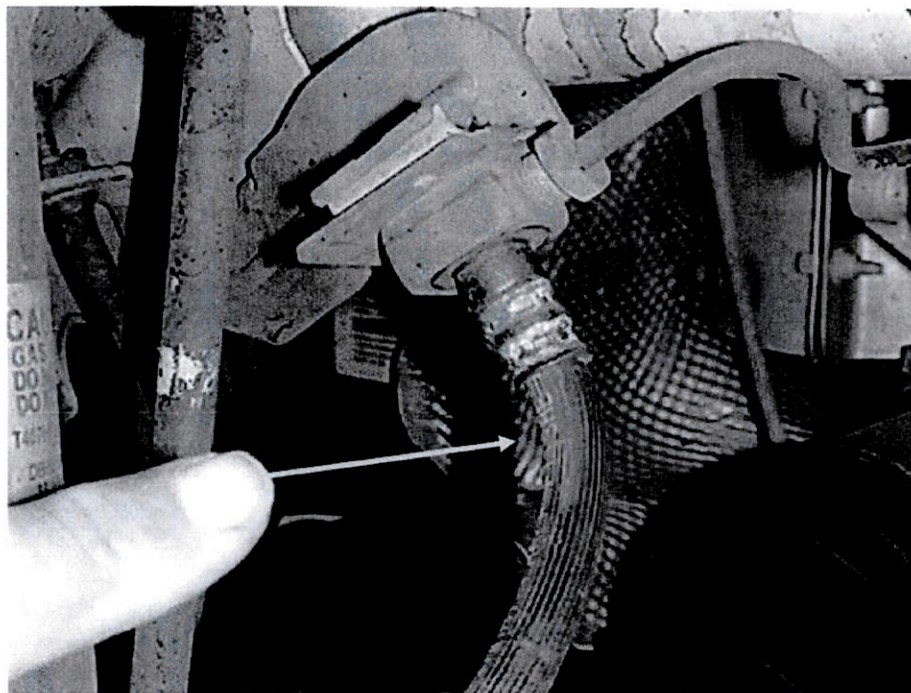
##### Background

The current version of the Ford Explorer (U502) was originally equipped with a 4-wheel standard duty brake system starting in the 2011 model year and continued through the 2012 model year. Beginning with the 2013 model year, Ford offered an Explorer Police Interceptor version. All Explorer Police Interceptors were equipped with a 4-wheel heavy duty brake system that included larger mass rotors, larger brake calipers, and heavier duty pads for high performance applications. For the 2013 model year, Ford expanded the application of the 4-wheel heavy duty brake system as standard equipment on Explorer XLT, Explorer Limited, and Explorer Sport versions beginning in September 2012. The 4-wheel standard duty brake system remained as standard equipment on base trim level Explorer vehicles. The same brake jounce hose is utilized on both systems.

### Investigation

In April 2014, the Washington D.C. Metropolitan Police Department contacted Ford's fleet representative at the Chicago Assembly Plant regarding 13 reports of leaking front jounce hoses on 11 vehicles (two of the 11 vehicles had both front jounce hoses replaced at separate times). The D.C. Metro Police reported these repairs to the Agency in a single Vehicle Owner Questionnaire (VOQ #1061634). Three vehicle repairs reported a low or fading brake pedal, six vehicle repairs reported a lack of braking performance, and two vehicle repairs reported a brake fluid leak during inspection. One vehicle was repaired due to an issue with the front brake jounce hose being twisted and one vehicle repair did not identify a cause.

On July 29, 2014, members of Ford's Brake Engineering team met with representatives from a D.C. Metro Police Department service garage to inspect the subject vehicles, review repair procedures, and to acquire parts for analysis. A representative from the Agency was also present for the vehicle inspection. The D.C. Metro Police service personnel provided Ford with four front brake jounce hose assemblies that had been serviced. Other leaking brake hoses had been previously discarded. Service personnel had observed leaks approximately 5 mm from the end of the crimp on the body side portion of the hose, shown in Photograph #1.



Photograph #1 – Front Brake Jounce Hose Leak Location  
(Routing Sleeve Moved for Access)

The D.C. Metro Police Department fleet operates Explorer Police Interceptor vehicles batch built in two production periods: the first batch of 46 vehicles was produced in March 2012 and the second batch of 45 vehicles was produced in August 2012. All 13 front brake jounce hose repairs were performed on vehicles produced during March 2012. No front jounce hose leaks were observed on vehicles produced during August 2012. Additionally, front brake jounce hoses from the remaining 34 vehicles built in March 2012, that had not experienced a leak, were acquired for further analysis.

### Analysis and Testing

The four front brake jounce hoses returned to Ford were from the BB53 part level. Review of the crimp tool marks on the ferrule show all dimensions to be within production tolerances. An examination of all four front brake jounce hose assemblies confirmed a small tear in the outer cover at the body end of the hoses on the outboard side. Further analysis identified that strands of the outer braid layer appeared to be frayed just beyond the edge of the crimped ferrule. When brake fluid was added to the hose, brake fluid leakage was observed where the outer braid was frayed. The hoses were then sectioned and each layer was inspected. All four parts exhibited a split on the inner liner approximately 1.5 – 2.0 mm after the end of the nipple (outside of the crimped ferrule joint). The brake hoses used on these parts were produced from two different production lots based on the date codes imprinted on the hose.

As described previously, the D.C. Metro Police Department also provided Ford with 67 front brake jounce hoses that had not experienced leaks from vehicles produced in March 2012 for analysis. A random sample of ten parts (five left hand and five right hand) were selected to evaluate their ability to hold pressure. Nine of the ten parts leaked at 6,000 psi. The parts were examined to determine the cause of the leak: four hoses failed on the outboard side of the hose – similar to the four field parts, five hoses leaked on the body end of the hose on the inboard side, one hose did not leak.

Ford sent four additional non-leaking parts to Hitachi's headquarters in Japan for analysis. A scanning electron microscope examination was performed on the braided layers and Hitachi engineers observed broken yarn on all four samples at the body side fitting and banjo fitting crimp locations. No manufacturing or material defects were identified. They also concluded that severe bending causes yarn stress. Yarn abrasion occurs and advances until the hose fails. Yarn abrasion was observed at both the body and banjo side fittings of the analyzed parts.

Hitachi supplied a set of non-leaking parts from the D.C. Metro Police Department fleet and a brand new set of parts to Element Materials Technology for an independent analysis. After examination, Element concluded that no manufacturing or material deficiencies were identified, and that the hose ruptures appear to be linked to bending stresses placed on the hose.

In an effort to gain further insight to the front brake jounce hose failure mechanism, Ford subjected new service parts to fatigue testing on a Suspension Motion Simulator. In order to determine the suspension travel which would maximize the distance from the fixed body end of the jounce hose to the moveable end on the brake caliper, suspension engineers statically evaluated a 2013 Ford Explorer Police Interceptor. These measurements, which would be used as a guide for simulator displacement, were conducted assuming worst case conditions: jounce bumpers were removed, internal rebound stops were fully compressed, and the shock absorbers were attached. With the front brake jounce hose installed, engineers translated the suspension from full jounce to full rebound, while at the same time, the steering was rotated through its full travel. This evaluation determined that maximum length condition occurs when the suspension is in full jounce and the steering is at its maximum position for an outside turn. With the suspension in this position, the brake hose is pulled in a direction that is approximately 90° perpendicular to the axis of the fixed portion of the brake line. With the brake hose in this position, engineers measured the minimum radius of the brake hose and obtained a minimum radius of 40 mm. The test parameters for the Suspension Motion Simulator were established to obtain this minimum hose radius. Ford would like to emphasize the severity of the test used to evaluate these parts – the suspension travel parameters used

for this study are beyond the physical limits obtained by any customer and also exceed those parameters used for Ford's component durability testing.

During the course of normal vehicle development, front brake jounce hoses are evaluated on the Suspension Motion Simulator as part of the component validation process. Ford's performance specification for suspension components evaluated on the simulator is to achieve a B10 life of 250,000 cycles when subjected to 88% of maximum suspension travel. Using the same level parts as installed on the D.C. Metro Police fleet vehicles produced in March 2012, Ford evaluated new front brake jounce hoses on the simulator using a more severe 100% maximum suspension travel and obtained a B10 life of 990,000 cycles, which exceeds Ford's component requirements. Ford also evaluated the latest level front brake jounce hose assemblies (DB53) on the simulator using the same 100% maximum suspension travel and achieved a B10 life of 1,325,000 cycles. One of the warranty claim repairs, as reported in the VOQ, was denied because the technician had improperly twisted the hose during reassembly. Ford conducted four additional Suspension Motion Simulator tests on the BB53 part using brake hoses that were twisted 180° and 360°. Three of the tests with twisted hoses completed between 6,900 to 13,000 cycles before failing. These are the only simulator tests that did not meet Ford's component durability test requirements, .

#### Field Data Analysis

Ford conducted an extensive search of consumer complaints, field reports, lawsuits and claims, and warranty claims for reports alleging leakage, extended brake pedal travel or extended stopping distance related to the front brake jounce hose and has identified a total of 24 reports, 20 of which were on Explorer Police Interceptor units. Of the 20 Ford Explorer Police Interceptor reports, 13 reports originated from a D.C. Metro Police department, three reports originate from the Minneapolis Police Department, and four other reports were from individual departments. Ford contacted the service technician who performed the repairs on the Minneapolis Police Department and was informed the leaks were on the banjo block end of the hose. Unfortunately these parts were discarded and were not available for analysis.

A review of the 20 Ford Explorer Police Interceptor reports indicates that six reports allege reduced brake performance characterized by mention of "no brakes." The Ford Explorer is equipped with a diagonally split brake system, where the left front brake and right rear brake are coupled on one hydraulic circuit and the right front brake and left rear brake are coupled on the other hydraulic circuit. In the event a front brake jounce hose ruptures causing a leak of brake fluid, some braking function would remain on that half of the hydraulic circuit until all the brake fluid was drained and the other half of the hydraulic circuit would remain fully functional. In this instance, drivers would notice the brake pedal would displace toward the floor during pedal application. If the fluid level becomes low in either circuit, a brake fluid level switch monitors the fluid level and will illuminate a red Service Brake Light in the instrument cluster and that half of the system will continue to provide braking function until the fluid is depleted. Four reports of 20 indicate that a low brake pedal or the brake pedal drop was observed, which may have indicated a front brake jounce hose leak. Six reports identified a vehicle repair due to an observation of a front brake jounce hose leak, and one report mentioned a bulging hose. Two vehicles were repaired without a symptom description.

Ford reviewed the vehicle production dates for Explorer Police Interceptor vehicles to determine the number of reports on vehicles produced with the original front brake jounce hose compared to the updated hose, which was introduced in production in June 2012. Fifteen reports are related to vehicles produced with the original part, 13 of which are from the



D.C. Metro Police fleet vehicles which were produced in March 2012. The remaining five reports are related to vehicles that were produced after June 2012 with the updated front brake jounce hose assembly. Ford has not identified any allegations of accidents, injuries, or fatalities on any Ford Explorer Police Interceptor vehicle related to this issue.

Ford also conducted a similar search for reports alleging leakage, extended brake pedal travel or extended stopping distance related to the front brake jounce hose and identified four reports on civilian vehicles. Three repairs did not mention any degradation in brake performance; rather, the owners brought their vehicles in for service for an illuminated Service Brake Light. The last repair mentioned a low brake pedal issue caused them to have their vehicle serviced. Ford reviewed the production dates for the four vehicles and identified that three vehicles were produced in the 2013 model year with the original front jounce brake hose assembly and the last vehicle also produced in 2013 model year, but was equipped with the DB53 level part. Ford has not identified any allegations of accidents, injuries, or fatalities on any civilian Ford Explorer vehicles related to this issue.

#### Field Data Summary

A thorough search of lawsuits and claims, customer complaints, field reports, and warranty claims, Ford has identified only 24 reports of front brake jounce hose leaks on 2011 through 2013 model year Ford Explorer vehicles. Further analysis yields that 20 of these reports pertain to Ford Explorer Police Interceptor units, where the vast majority of reports (16) of leaking front brake jounce hoses originated from two police department fleets. The other four Explorer Police Interceptor reports involve other unrelated fleets.

Ford also identified only four reports of front brake jounce hose leaks on Ford Explorer civilian units on a fleet of approximately 390,000 units. These vehicles are equipped with the exact same front brake jounce hose as used on the police units, but have up to four years of vehicle service, with similar or greater accumulated mileage. Due to the less severe brake actuation cycle for civilian units, the brakes are serviced on a less frequent basis. Considering that 80% of all reports originate from two police fleets and the low time in service for these units, the data suggest either a duty cycle that is particular to these two fleets or a unique brake service procedure may contribute to the location and failure mode observed on the front brake jounce hose.

#### Conclusions

Compared to civilian units, Police Interceptor Vehicles have a unique duty cycle. For example, police units accumulate mileage faster than civilian units because they could be driven by officers across multiple shifts. Vehicles that accumulate mileage faster require maintenance on a more frequent basis, particularly with respect to wear items, such as brake pads and tires. It is not uncommon for brake pads to be replaced after 15,000 miles of service for units operated in an urban environment.

One possible contributor of higher than expected rate of front brake jounce hose leaks could be improper service repair procedures. For example, frequent brake pad replacement requires the removal of the brake caliper from the steering knuckle in order to access the pads. In its Workshop Manual, Ford instructs service technicians, "Do not allow the brake caliper to hang from the brake hose or damage to the hose may occur" and to support the caliper using mechanic's wire.

Although a root cause has not been identified, based on Ford's engineering analysis, investigation, and testing, Ford believes either a highly unique duty cycle or service procedures may have contributed to the performance primarily observed by two police departments. As provided in its response to Request 11, Ford conducted vehicle brake tests on an Explorer Police Interceptor with one half of the brake's hydraulic system disabled in accordance with FMVSS 105 and was able to attain a vehicle deceleration value of 0.5 Gs at brake pedal force of approximately 100 lbf. This braking performance is well within the regulatory requirements. Additionally, Ford's Suspension Motion Simulator tests demonstrate the Ford Explorer Police Interceptor's front brake jounce hose not only exceeds Ford's durability requirements, but the only condition where premature failures were observed were on miss-installed parts.

As part of this investigation, Ford performed a comprehensive search of its database to identify allegations that may relate to front brake jounce hose leak. Based on the analysis and testing conducted by Ford, the low number of front brake jounce hose leak reports (24) on a population of approximately 390,000 vehicles, and overt indication of a low brake fluid condition, Ford does not believe that this condition presents an unreasonable risk to motor vehicle safety. This is further supported by no reports of accidents or injuries alleged to be attributed to this issue.

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