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**Steve M. Kenner, Global Director**  
Automotive Safety Office  
Sustainability, Environment & Safety Engineering

**Fairlane Plaza South, Suite 400**  
330 Town Center Drive  
Dearborn, MI 48126-2738 USA

August 29, 2012

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



Dear Mr. Borris:

Subject: PE12-017:NVS-213cni

The Ford Motor Company (Ford) response to the agency's July 12, 2012 letter concerning reports of alleged loss of power steering assist in 2011 model year Ford Explorer vehicles is attached.

Ford has conducted extensive analysis on this subject resulting in the identification of quality issues for which corrective actions have been implemented. Ford has also taken actions to improve dealership diagnosis and repair capability for subject vehicles that may experience the loss of power steering assist.

Ford believes that loss of power steering assist in the subject vehicles does not present an unreasonable safety risk in these vehicles based on the following reasons: 1) low customer complaint rate of 2.5 complaints per 1,000 vehicles; 2) in the unlikely event of loss of power steering assist, the steering system will default to manual steering mode allowing the vehicle to be steered in a safe and controlled manner; 3) the mechanical linkage between the steering wheel and the road surface is maintained at all times, similar to other steering systems, both hydraulic and electric, used by Ford and other manufacturers for many years; 4) drivers are clearly informed of a change in the status of the steering system via both an audible chime and the display of a power steering assist fault message in the instrument cluster; and, 5) the loss of power steering assist is unlikely to be associated with accidents at higher speeds because the amount of assist supplied is greatest at low speeds, such as during parking lot maneuvers, and reduced as vehicle speed increases.

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

Sincerely,

Steven M. Kenner

Attachment



FORD MOTOR COMPANY (FORD) RESPONSE TO PE12-017

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.

The agency defined the "subject system" as "the EPAS system and all associated subsystems and components." Ford has construed this to mean the EPAS gear assembly which, on the subject vehicles, includes the torque sensor, power steering control module, position sensor, and motor.

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 July 12, 2012, the date of your inquiry. Ford has searched within the following offices for responsive documents: Sustainability, Environment and Safety Engineering, Ford Customer Service Division, Marketing and Sales Operations, Purchasing, Global Core Engineering, Office of the General Counsel, and North American Product Development.

Request 1

State, by model and model year, the number of MY 2011 through 2012 Ford Explorer vehicles Ford has manufactured for sale or lease in the United States. Separately, for each vehicle manufactured to date by Ford, state the following:

- a. Vehicle identification number (VIN);
- b. Make;
- c. Model;
- d. Model Year;
- e. Plant of manufacture;
- f. Date of manufacture;
- g. Date warranty coverage commenced; and
- h. 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 2003, or a compatible format, entitled "PRODUCTION DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

### Answer

Ford records indicate that the approximate total number of 2011 and 2012 model year Ford Explorer 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 166,940.

All of the subject vehicles were built at the Ford Chicago Assembly Plant, located in Chicago, Illinois.

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

Model	2011 Model Year	2012 Model Year
Ford Explorer	82,328	84,612

The requested data for each subject vehicle 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 MY 2011 through 2012 Ford Explorer vehicles:

- a. Consumer complaints, including those from fleet operators;
- b. Consumer complaints, including those from operators, where a failure or malfunction of the EPAS system was reported;
- c. Field reports, including dealer field reports;
- d. Field reports, including dealer field reports where EPAS failure was claimed;
- e. 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;
- f. Property damage claims;
- g. Third-party arbitration proceedings where Ford is or was a party to the arbitration; and

- h. Lawsuits, both pending and closed, in which Ford 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 "e" through "h," 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 g and h, 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
A	Lack or loss of power steering assist or steering efforts too high
B	Ambiguous steering issue

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 Master Owner Relations Systems (MORS) 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 a loss of power steering assist or increased steering efforts in a 2011 or 2012 model year Ford Explorer are provided in the MORS III 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 identified no responsive owner reports that indicate that they are Legal Contacts.

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 a loss of power steering assist or increased steering efforts in a 2011 or 2012 model year Ford Explorer 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 included an attachment with 45 Vehicle Owner Questionnaires (VOQs). Ford made inquiries of its MORS database for customer contacts, and its CQIS database for field reports concerning the vehicles identified on the VOQs, and identified 15 Owner Reports and five field reports that are duplicative of VOQs. Ford notes that in some instances where the VOQ does not contain the VIN or the owner's last name and zip code, it is not possible to query the databases for owner and field reports specifically corresponding to the VOQs.

Crash/Injury Incident Claims: For purposes of identifying allegations of accidents or injuries that may have resulted from the alleged defect, Ford has reviewed responsive owner and field reports, lawsuits and claims, and warranty claims. Ford identified nine accident allegations that meet the agency's request. Copies of reports corresponding to these alleged incidents are provided in the MORS, CQIS, Legal Claims/Lawsuits, and Analytical Warranty System (AWS) portions of the database provided in Appendix C.

Ford notes that most of the alleged accidents that may relate to the alleged defect are low speed (e.g., parking lots) incidents that are minor in nature.

- One customer (VIN: 1FMHK7F81BG [REDACTED]) alleged their passenger side door was scraped while driving in a parking lot with no power steering. It is not clear from the available information whether loss of power steering assist occurred on this vehicle at vehicle start up, at some time earlier in that particular drive cycle, at the time immediately preceding the incident, or if lack of power steering assist was an existing condition from a previous drive cycle.
- In another report (VIN: 1FMHK7F85BG [REDACTED]), the customer alleged that a failure of the steering rack caused mirror and fender damage at a car wash. Although Ford was unable to locate a warranty claim associated with this incident, Ford did confirm that this vehicle had a lack of power steering assist when it was subsequently inspected at the dealership.

Allegations of loss of assist at higher speeds would not be expected to result in loss of vehicle control, as the amount of assist provided by the system at higher speeds is less than that

provided at lower speeds, and a fault warning chime and message in the instrument cluster would adequately alert the driver that heightened concentration is appropriate. Ford located one accident allegation (VIN: 1FMHK7D88BG [REDACTED]) involving loss of power steering assist at higher speeds; however, it is unclear at what speed the alleged accident actually occurred. More specifically, it is alleged that the power steering assist was lost while driving 50 mph, and that the vehicle subsequently went over a curb. However, it is not clear at what speed the vehicle was travelling when it allegedly went over the curb. Furthermore, although there is an allegation that the vehicle "may" have suffered tire damage, the warranty claim associated with this incident does not indicate any repairs other than replacement of the power steering gear assembly.

Other reports provide no indication of the conditions under which the alleged incident occurred.

- One report (VIN: 1FMHK8D85BG [REDACTED]) simply alleged loss of steering and contact with a curb. Vehicle damage was reportedly limited to the wheel, inner fender, lower control arm and constant velocity joint. No body damage was reported. Ford believes it is reasonable to conclude that this incident likely occurred at a relatively low speed.
- One warranty claim (VIN: 1FMHK8F82BG [REDACTED]) provided no indication of the conditions under which the alleged incident occurred, only a comment stating that the customer had recently brought the vehicle in for some curb damage, and that the power steering had failed and been repaired. A review of the warranty history on this vehicle indicates that repairs were limited to front end realignment and adjustment of the subframe. Again, based on available information regarding vehicle repairs, Ford believes it is reasonable to conclude that this incident occurred at low speed.
- In another incident (VIN: 1FMHK7D86BG [REDACTED]) the customer alleged that they lost power steering while driving, hit a wall, and scratched the right rear of the vehicle.

Other allegations are not consistent with EPAS related loss of power steering assist.

- In one report (VIN: 1FMHK8D84CG [REDACTED]) that is duplicative of VOQ #10442868, it is alleged that while making a left hand turn, the steering wheel would not turn back to the right and that brakes were applied but that the vehicle would not stop. Loss of brake function is not consistent with EPAS related loss of power steering assist because the foundation brakes remain fully functional under these circumstances. In addition, in the VOQ the customer alleges the entire right front end of the vehicle was destroyed as well as the concrete pole the customer allegedly hit. This amount of vehicle and property damage is not consistent with the stated vehicle speed of 15 mph. In the customer complaint that Ford received related to this incident, the customer acknowledged that they did not know what happened, but that the vehicle "seemed to have died." Ford was unable to locate any warranty claims associated with this incident.
- Similarly, in another report (VIN: 1FMHK8B81BG [REDACTED]) that is duplicative of VOQ #10462707, the customer alleged that they experienced a "sudden, instantaneous, loss of response" to both the steering and braking of the vehicle resulting in a collision with a wooden utility pole. Again, loss of vehicle braking function is not consistent with EPAS related loss of power steering assist. While the customer indicates one injury related to this incident in their VOQ to the agency, there was no mention of any injury in the customer's contact with Ford - only a request for repair or replacement of the vehicle, and a request for alternate transportation.

- In another report (VIN: 1FMHK7D86BG [REDACTED]) the customer alleged loss of power steering assist and that the brake pedal got very hard. Once again, EPAS related loss of power steering assist does not affect brake pedal efforts. Approximately two months later, the customer alleged that loss of power steering assist was the cause of a "fender bender" in a parking lot, but there was no braking related allegation at this time.

We are also including two accident allegations as ambiguous reports categorized as "B" as "non-specific allegations" for your review because of the broad scope of this request where available information indicates that the loss of power steering was a post-accident symptom. Based on our engineering judgment, the information in these reports is insufficient to support a determination that they may pertain to the alleged defect. In one of these reports (VIN: 1FMHK8F80BG [REDACTED]) a technician, after having replaced an inner tie rod end because of damage allegedly resulting from an incident where the right front of the vehicle slid into a curb, requested diagnostic assistance because of no power steering assist during the vehicle repair. Similarly, in the other report (VIN: 1FMHK7D86BG [REDACTED]) a technician was again requesting diagnostic assistance because of lack of power steering assistance after an accident. Both of these cases involve technicians requesting diagnostic assistance and Ford is not aware of any information to suggest or imply that loss of power steering assist was alleged to have occurred prior to, or was the cause of, either of these incidents.

Only two injuries were alleged in any of the reports. As previously stated, one of the customers that alleged an injury in their VOQ (#10462707) to the agency made no mention of an injury in their report to Ford. The customer associated with VOQ #10462897 alleged that he hurt his shoulder (he has a total shoulder implant) while "muscling" the steering wheel after power steering was lost at approximately 10-15 mph. However, according to available information, the driver elected to drive the vehicle in this condition to the dealership approximately two to three miles away without incident. There is no crash alleged to have occurred in this incident.

For purposes of providing a thorough response to the agency's information request, Ford has construed the meaning of "accident or injury that may have resulted from the alleged defect" very broadly, including the examples previously mentioned. However, Ford notes that, in the closing resume for PE10-005 concerning electric power steering failures on certain General Motors vehicles, the agency's criteria for a "crash claim" was based on verifiable factors such as "whether a loss of EPS was indicated at the time of the crash by a chime or malfunction indicator lamp or if an EPS related component malfunction was identified after the crash occurred." Although General Motors submitted 81 complaints to the agency where a crash was claimed to have been related to loss of power steering assist, the agency determined that there were a total of only 36 possible crashes related to EPS failure, taking into account duplicate reports received by both the agency and General Motors. By applying this same criteria to the accident allegations included with this response, only a portion would be included in the count of possible accidents related to loss of power steering assist.

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.

We are providing the requested detailed information, where available, on the responsive 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 MORS 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. 2, 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. Incident date;
- h. Report or claim date;
- i. Whether any warning lights or sounds were illuminated or heard at the time the alleged defect occurred;
- j. Whether the vehicle was towed into the dealership;
- k. Whether the driver was able to restart the vehicle, and reset the EPAS system;
- l. If the EPAS was reset, did the failure occur more than once;
- m. Diagnostic Trouble Code(s) (DTCs) indicated at the time of repair;
- n. Repair(s) dealer made to the vehicle;
- o. Whether a crash is alleged;
- p. Whether property damage is alleged;
- q. Number of alleged injuries;
- r. Number of alleged fatalities; and
- s. A summary of the incident.

Provide this information in Microsoft Access 2003, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

### 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 contained in either the Legal Claim/Lawsuits tab provided in Appendix C or in the documents relating to matters shown on the Log of Lawsuits and Claims provided in Appendix D.

Request 4

Produce copies of all documents related to each item within the scope of Request No. 2. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method 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 MORS 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, total counts for all of the following categories of claims, collectively, that have been paid by Ford to date that relate to repair or replacement of the subject system in MY 2011 through 2012 Ford Explorer vehicles: warranty claims; extended warranty claims; claims for good will services; and field, zone, or similar adjustments and reimbursements. This should include all claims made in accordance with procedures specified in any service bulletins issued by Ford related to the subject components.

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. Whether there was a claim for towing within three days before or after the subject claim (yes/no);
- h. Whether there is any other reference to towing in the claim (yes/no);
- i. Labor operation number;
- j. Problem code;
- k. Diagnostic Trouble Code(s) (DTCs) indicated at the time of repair;
- l. Replacement part number(s) and description(s);
- m. Concern stated by customer;
- n. Comment, if any, by dealer/technician relating to claim and/or repair; and
- o. Ford's assessment of whether the claim was associated with an EPAS failure while driving.

Provide this information in Microsoft Access 2003, or a compatible format, entitled "WARRANTY DATA." See Enclosure 1, Data Collection Disc, for a pre-formatted table that provides further details regarding this submission.

Answer

As previously stated, Ford has construed the subject system as the EPAS gear assembly.

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 below:

Category	Allegation
A	Lack of power steering assist or steering efforts too high
B	Ambiguous steering issue
C	Instrument cluster warning only
D	Other allegations unrelated to steering efforts

The number and copies of relevant warranty claims identified in this search that relate to repair or replacement of the EPAS gear assembly for any cause in a 2011 or 2012 model year Ford Explorer 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 repair or replacement of the subject system (EPAS gear assembly) that were not honored, if any, would be included in the MORS reports identified above in response to Request 2. Such claims that were honored are included in the warranty data provided.

Additionally, the agency has requested information related to claims for vehicle towing within three days of the subject component repair claim and whether there is any reference to towing in the claim. 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 MORS 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.

Request 6

Describe in detail the search criteria used by Ford to identify the claims identified in response to Request No. 5, including the labor operations, problem codes, part numbers and any other pertinent parameters used. Provide a list of all labor operations, labor operation descriptions, problem codes, and problem code descriptions applicable to the alleged defect in the subject vehicles. State, by make and model year, the terms of the new vehicle warranty coverage offered by 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. Lists of customer concern codes, customer concern code descriptions, condition codes, and condition code descriptions are also provided in Appendix B.

For 2011 and 2012 model year Ford Explorer 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. Powertrain coverage begins at the warranty start date and lasts for five years or 60,000 miles, whichever occurs first. Safety Restraint System coverage begins at the warranty start date and lasts for five years or 60,000 miles, whichever occurs first. Finally, Corrosion Perforation coverage begins at the warranty start date and lasts for five years regardless of miles driven.

Optional Extended Service Plans (ESPs) are available to cover various vehicle systems, time in service and mileage increments. The details of the various plans that include coverage for the EPAS gear assembly, and the number of contracts purchased for 2011 and 2012 model year Ford Explorer vehicles for each plan, are provided in Appendix E. As of the date of the agency's information request, 29,624 new vehicle ESP policies had been purchased on 2011 and 2012 model year Ford Explorer vehicles that include coverage for the EPAS gear assembly.

#### 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 loss of power steering assist or increased steering efforts, 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 identified one SSM and no TSBs that may relate to the agency's request and is providing a copy of it in Appendix F1.

Internal Service Messages: Ford has identified one ISM that may relate to the agency's request and is providing a copy of it in Appendix F2.

Field Review Committee: Ford has identified no field service action communications that may relate to the agency's request.

Ford currently has no plans to issue communications related to the subject of the agency's information request.

#### Request 8

Provide a detailed description EPAS system operation in the subject vehicles, including the following information:

- a. Provide a block diagram of the system components and communication busses;
- b. Provide a table listing all diagnostic trouble codes (DTCs) with the following information: (1) code; (2) description; (3) conditions for setting the code; (4) system response; (5) all visual and audible warnings or other information provided to the driver; and (6) conditions for clearing the code;
- c. Describe whether and how the system detects a failure within the EPAS that may result in abnormal (too high or too low) steering assist;
- d. Describe the "Normal" process the diagnostic logic should use to limit or ramp down steering assist;
- e. In the event of an EPAS shutdown resulting from a fault detection, describe the conditions necessary for power steering assistance to be restored;
- f. Copies of all Failure Mode and Effects Analysis documents; and
- g. Describe Under any normal circumstance would the EPAS fault detection logic turn OFF steering assist without notifying the driver with a malfunction indicator lamp illumination, chime or other warning indicator.

#### Answer

Ford is providing the requested information pertaining to EPAS system operation and system components in Appendix G1, and the requested information pertaining to diagnostic trouble codes, descriptions and operational information in Appendix G2. Ford is providing available failure mode and effects analysis documents in Appendix J - DFMEA with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512.

The power steering control module (PSCM) is the electronic control unit for the EPAS system. The PSCM monitors all sensor inputs and High Speed CAN messages that relate to the EPAS system and directly controls the output of the EPAS motor. The PSCM is self-monitoring and is capable of setting and storing DTCs. Depending on the fault detected, the PSCM responds by either reducing or removing assist, and the PSCM may also send a request to the instrument panel cluster over the High Speed CAN displaying a message and alerting the driver of a potential EPAS concern. The action taken by the PSCM for each DTC is provided in Appendix G2.

The system will go into Reduced Steering Assist Mode if any of the following conditions are detected:

- 1) Vehicle Speed signal lost over CAN,
- 2) Voltage to the EPAS module below 10.8 volts or above 17 volts,
- 3) Environmental temperatures above 105 degrees Celsius at the EPAS module,
- 4) High friction detected in gear.

A further description of the Reduced Steering Assist Mode is provided in portions of the workshop manual provided in Appendix G1.

As mentioned, some DTCs may cause the system to go into Manual Steering Mode. If this occurs, the following actions will take place:

- 1) A warning chime will sound,
- 2) The message "POWER STEERING ASSIST FAULT" will be displayed in the message center, and
- 3) Steering assist will be removed.

If this occurs, the driver is instructed in the Owner's Manual to: "...stop the vehicle in a safe place, and turn off the engine. After at least 10 seconds, reset the system by restarting the engine, and watch the message center for POWER STEERING ASSIST FAULT. If the message returns, or returns while driving, take the vehicle to your dealer to have it checked. With the message displayed, the steering assist is turned off, making the vehicle harder to steer." A further description of the Manual Steering Mode is provided in portions of the workshop manual provided in Appendix G1.

The conditions necessary for power steering assist to be restored after a fault is detected by the PSCM will vary depending on the message displayed in the instrument cluster. If a particular fault causes a "POWER STEERING ASSIST FAULT" to be displayed, the driver is instructed in the Owner's Manual to stop the vehicle in a safe place, turn off the engine, wait at least 10 seconds, and reset the system by restarting the engine. If power steering assist is not restored, "POWER STEERING ASSIST FAULT" will continue to be displayed, and the vehicle will require dealership service to have power steering assist restored. Under other conditions "SERVICE POWER STEERING NOW" may be displayed, also requiring dealership service to have power steering assist restored. Regardless, there is no normal circumstance under which power steering assist would be turned off because of fault detection by the PSCM without driver notification via an audible chime and/or message displayed in the instrument cluster that there is a power steering assist fault.

#### Request 9

If any of the subject vehicles comes equipped with an Terrain Management System (TMS) or other electronic stability control (ESC) system, if not previously answered in Question 8, please describe:

- a. The function of the TMS/ESC;
- b. Specifically how that system interacts with the EPAS; and
- c. Explain how the TMS/ESC system responds when an EPAS fault is detected.

Answer

The subject vehicles are equipped with both a TMS (AWD only) and an ESC system. A description of the function and operation of both the TMS and the ESC system is included in the Owner's Manual for the 2011 model year Ford Explorer that Ford is providing in Appendix H. The function and operation of the ESC system is described on pages 267 and 277 of the provided Owner's Manual, and the function and operation of the TMS is described on pages 318 and 319 of the provided Owner's Manual. Ford notes that the ESC system is just one feature of the ADVANCETRAC® WITH ROLL STABILITY CONTROL™ (RSC®) stability enhancement system on the subject vehicles that also includes traction control, roll stability control™, and curve control in addition to electronic stability control. Details of all features of the ADVANCETRAC® WITH ROLL STABILITY CONTROL™ (RSC®) stability enhancement system are available in the provided Owner's Manual.

Electronic stability control interaction with EPAS differs on vehicles with or without the optional Active Park Assist feature. For vehicles without the optional Active Park Assist feature, the ESC system is dependent upon EPAS for relative steering position which is transmitted via the High Speed CAN Bus. Although there is no direct interaction between TMS and EPAS systems on these vehicles, the TMS is dependent, at least in part, on proper function of the ESC system which, as previously mentioned, is dependent on EPAS for relative steering position. Vehicles with the optional Active Park Assist feature are equipped with a separate steering column sensor module that provides the relative steering position to the ESC system, so there is no interaction between the ESC system and EPAS on these vehicles.

When an EPAS fault is detected that results in the loss of power steering assist, the relative steering position will no longer be transmitted via the High Speed CAN Bus. When this happens, the ABS module raises a DTC against EPAS, and the driver will receive the following warnings:

- 1) Skidding car symbol telltale will be illuminated,
- 2) Skidding car "OFF" telltale will be illuminated,
- 3) A warning chime will sound,
- 4) "SERVICE ADVANCE TRAC" appears in the message center,
- 5) TMS selector switch illumination extinguishes (AWD only),
- 6) "TERRAIN MANAGEMENT SYSTEM FAULT" appears in the message center (AWD only).

At the same time, ESC functionality, including support of TMS, is disabled.

On vehicles equipped with the optional Active Park Assist feature, TMS and ESC functionality are not affected when an EPAS fault is detected because these vehicles are equipped with a separate steering column sensor module that provides relative steering position to the ABS module.

Request 10

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 I. 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 J 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 in Appendix J – 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 11

State the number of EPAS system components; including motors, control modules, sensors, and steering column assemblies; that Ford has sold that may be used in the subject vehicles by part number (both service and engineering/production) and month/year of 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, all vehicle applications that use the 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 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 EPAS gear assemblies (which, on the subject vehicles, includes the torque sensor, power steering control module, position sensor, and motor) by part number (both service and engineering) and month and year of sale, where available, in Appendix K1. Information pertaining to supplier point of contact and vehicle usage for each part number is included in Appendix K2. Ford notes that the agency also requested service part sales for steering column assemblies on these vehicles. The steering column assembly on these vehicles does not contain componentry that is part of the EPAS system function. Accordingly, Ford is not providing service part sales for the steering column assembly. If the agency still desires this information, please advise.

Request 12

Provide a table with the following information regarding actual and statistically estimated failure frequencies for each EPAS design level of the subject vehicles:

- a. Identify the predominant EPAS failure cause in the subject vehicles;
- b. Identify all design and manufacturing process changes that relate to the failure cause identified in 12.a;
- c. Identify the scope of vehicles affected by the failure cause identified in 12.a (i.e., model, model year, production range);
- d. State, by model and model year, Ford's assessment of the total number of failures that have occurred to date that may be associated with the cause identified in 12.a;
- e. Ford's estimate of the failure rates associated with the failure cause identified in 12.a that would occur at 12, 24, 36 and 48 months-in-service;
- f. A short description of the method/model used for the statistical analysis, including the bases for selecting each method, explanations for any differences in modeling methods for different populations; and
- g. Charts showing the model results for each population and model parametric values.

Answer

Following is a detailed description of the three predominant quality issues and associated corrective actions that have been found in Ford's analyses and, in some cases, may result in loss of power steering assist in the subject vehicles:

- 1) Ribbon Cable Conformal Coating
- 2) Ribbon Cable Pin Misalignment
- 3) Relay Contacts

Ribbon Cable Description

The ribbon cable assembly is built at a Tier 4 supplier (TE Connectivity) in Speyer, Germany. It is then shipped to a Tier 3 supplier (Nidec) in Zhejiang, China, where it is assembled into the

motor assembly. The motor assembly is then shipped to a Tier 2 supplier (TRW Automotive Components) in Shanghai, China, where it is assembled onto the Electrical Power Pack (EPP). The EPP is then shipped to TRW in Marion, Virginia, where it is assembled onto the gear assembly before being shipped to Chicago Assembly Plant for installation in the subject vehicle.

Ribbon Cable Conformal Coat (Ford Diagnostic Trouble Code (DTC): C200D-49; TRW Fault Code: B9A):

When the motor printed circuit board (PCB) is assembled at Nidec, the ribbon cable and motor relay are soldered to the board. The board is then flipped over and a conformal coat is applied through an automatic process on specific locations of the board, one of which is the relay solder joints. The board is then placed in a fixture to dry for one minute, and then moves along a conveyor for four minutes to cure. This conveyor was originally tilted at three degrees which allowed the conformal coat to run away from the relay, prior to curing, and pool around the ribbon cable connector. If the conformal coating seeped into the insulation of the ribbon cable it could subsequently cause intermittent connections.

Interim Containment Action: Beginning on November 11, 2011, all existing stock was inspected at Nidec and TRW Automotive Components with an ultraviolet (UV) light prior to assembly of the motor PCB into the EPP to verify that the conformal coat has cured in the proper locations of the board and had not contaminated any other components or connections. Suspect parts were quarantined and scrapped.

Permanent Corrective Action: On November 11, 2011, the conveyor was revised to be tilted three degrees in the opposite direction so that the conformal coat could not run into any other components while curing. Additionally, 100% visual inspections were added to the process to confirm proper conformal coating. The operator inspects the surface with a UV light to verify that the conformal coat has remained in the appropriate area of the board and has not contaminated any other components or connections.

Ribbon Cable Misalignment (Ford DTC: C200D-49; TRW Fault Code: B9A):

The ribbon cable assembly is comprised of a 12 wire insulated ribbon cable with a cover and connector base on each end. Each of the 12 wires consists of seven strands. The ribbon cable is fed vertically through an automatic assembly machine. A cover and connector base is automatically fed into the fixture located on the horizontal surface of the machine. Slides push the cover and connector base into the ribbon cable, sandwiching the wires so that a connection is made. If the ribbon cable and connector base are allowed to move out of design position because of tolerances in the moving equipment, any of the seven strands can miss the "slot" and break. If there are fewer than seven strands inside the connector slot, the connection may be loose and may result in an intermittent connection. After the assembly is complete on each end of the ribbon cable, the cable is cut from the reel.

Interim Containment Action: The broken end of the cable may get pushed out of the end of the ribbon cable assembly and may protrude out of the insulation potentially leading to an intermittent connection. Beginning on November 16, 2011, a 100% visual inspection was done at Nidec and TRW Automotive Components on all existing motors. Suspect parts with visible protrusions were quarantined and scrapped. Beginning on November 17, 2011, 100% visual inspection was added at end of line at TE, as well as 100% visual inspection at Nidec prior to assembly into the motor.

Permanent Corrective Action: The following tooling improvements were made to the ribbon cable assembly equipment:

- 1) The wedge height was increased to reduce clearances around the connector base in the fixture for more precise placement (September 2, 2011),
- 2) Cross-sectioning of the first and last part of each batch and the first part of each day (November 17, 2011),
- 3) Gauges built and calibrated to be used for fixture set-up of the connector base and cover (November 25, 2011),
- 4) Increase frequency of the blade change to every 50,000 cycles (December 2, 2011).

Relay Contacts: Link Relay (Ford DTC: U3000-49; TRW Fault Code: B43) and Motor Relay (Ford DTC: U2011-49; TRW Fault Code: B3A):

The relay contacts (rivets) are built by a Tier 5 supplier (Doduco) in Spain. They are shipped in large batches (120,000 pieces per batch) to a Tier 4 supplier (TE Connectivity) in Portugal where they are assembled into the relays. Two relays, a motor relay and a link relay, are used in the subject component. The motor relay is shipped to a Tier 3 supplier (Nidec) in Zhejiang, China, where it is assembled into the motor assembly. The motor assembly is then shipped to a Tier 2 supplier (TRW Automotive Components) in Shanghai, China, where it is assembled onto the EPP. The link relay is shipped directly to the Tier 2 supplier (TRW Automotive Components) where it is assembled into the Power Filter Stage of the EPP. The EPP is then shipped to TRW Automotive in Marion, Virginia, where it is assembled onto the gear before being shipped to Chicago Assembly Plant for installation in the subject vehicle.

When the relay contacts were originally manufactured at the Tier 5 supplier, voids could exist between the copper and silver layers on the bi-metal contacts. Sulfur used in the cleaning process at the Tier 5 supplier could then get into the voids causing copper sulfate corrosion on the contact surface, potentially resulting in a loss of connection. Loss of power steering assist resulting from relay contact corrosion would typically be expected to occur at vehicle start up.

Interim Containment Action: The following actions were implemented on August 5, 2011:

- 1) Inspect ten rivets per 10,000 piece bag under a microscope for evidence of voids between the copper and silver at TE,
- 2) Scrap the first 1,000 parts every time the cold weld press starts up at Doduco because voids may occur when the press first starts up,
- 3) Clean the feeder tube of any rivets after every set-up/tool change after the 1,000 rivet scrap procedure at Doduco to prevent set-up parts from getting into production.

Permanent Corrective Action: Implement solid silver contact at TE in place of bimetal copper/silver contact (May 20, 2012).

Ford notes that these containment action dates correspond to actions at the respective component suppliers. EPAS steering gear assemblies that incorporated interim corrective actions for each of these quality issues were installed in vehicles produced no later than February 10, 2012, and additional permanent corrective actions and robustness actions as noted above were implemented in Ford Explorer vehicles produced after February 10, 2012 (which were 2013 model year vehicles, which began production on February 6, 2012). Ford is not aware of any EPAS gear assemblies built after corrective actions were implemented that required replacement due to any of these three supplier quality issues.

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

### Request 13

Describe and provide copies of all documents relating to all general research, testing, and other studies or analyses related to unassisted steering effort, including human factors considerations that have been conducted by, or for, Ford, or of which Ford is otherwise aware from 1970 to date. Include the following information in response to this request:

- a. A chronological summary of all such work, including the dates of all relevant design/engineering requirement changes;
- b. Copies of all documents related to engineering standards, specifications, guidelines or other requirements related to steering efforts with and without power steering assist;
- c. Ford's assessment of the driving maneuvers that would be expected to require the highest unassisted steering efforts at low (10 mph or less), moderate (10 to 30 mph) and higher (greater than 30 mph) driving speeds. Include discussion of the following maneuvers in your response: (1) emergency maneuvers, such as double-lane change avoidance maneuver; (2) highway exit and entrance ramps; (3) secondary road curves; (5) city driving, including intersection turns (right and left turns); (6) roundabouts; (7) parking maneuvers requiring large steering inputs/angles at low speeds (less than 5 mph); and (8) static lock-to-lock steering;
- d. Ford's assessment of the primary factors affecting unassisted steering effort in each of the speed ranges identified in 13.c (e.g., lateral acceleration, speed, steering angle, steering rate);
- e. Ford's assessment of the ranges of steering efforts that would be required for the driving maneuvers identified in 13.c. for different sizes and classes of light-duty vehicles (e.g., small passenger cars and various sizes of sport utility vehicles); and
- f. Copies of all studies, reports or related material associated with each of the following for the subject vehicles or any other vehicles: (1) driving steering force capability (for the full range from 5th to 95th percentile male and female drivers); and (2) human factors testing/analyses of driver performance in various turning maneuvers when confronted with an unexpected loss of power steering assistance.

### Answer

Ford is providing the requested documents, where available, in Appendix J – Test Results and Appendix J – Engineering Design Specifications with a request for confidentiality under separate cover to the agency's Office of the Chief Counsel pursuant to 49 CFR Part 512.

Ford notes that TRW conducted vehicle evaluations under a variety of conditions, including sudden loss of power steering assist, in August 2010 on the subject vehicle as part of the normal vehicle development process. A copy of this report, dated December 10, 2010, is provided in Confidential Appendix J – Supplier Documents/TRW. The purpose of the vehicle testing was to evaluate controllability under a variety of maneuvers and speeds that are detailed in the referenced test report. Subjective ratings were given for vehicle handling and

controllability performance under each of these conditions. A description of the rating scale is provided in Appendix F of that TRW report.

With respect to sudden loss of assist, the subjective ratings ranged from "no effect" for straight ahead driving to no worse than "distracting" for circular and s-curve maneuvers at a variety of speeds, and low speed parking maneuvers, with "distracting" defined as "erroneous steering interventions which require .... a marked compensatory effort from the driver .... still judged by the driver as tolerable." Ratings for all tests conducted are available in the referenced report.

#### Request 14

Provide the following information regarding the effect of the alleged defect on steering effort and vehicle control in the subject vehicles:

- a. A description of all testing conducted by, or for, Ford to measure steering efforts in the subject vehicles with and without power steering assistance, with detailed descriptions of the test procedures, the purpose of the testing, and a summary of the results;
- b. Ford's assessment of the maximum steering efforts that may occur in the subject vehicles with a loss of power steering assistance in the following speed ranges: below 10 mph, between 10 and 30 mph, and above 30 mph
- c. Provide brief descriptions of the driving maneuvers, speeds, steering inputs/angles and lateral accelerations associated with the maximum efforts for each of speed range give in 14.b;
- d. Steering efforts with and without power assist at 0, 0.1, 0.25 and 0.4 g's of lateral acceleration for each of the following speeds: 15, 30 and 60 mph;
- e. The front axle and vehicle curb and gross vehicle weight ratings;
- f. The steering ratio; and
- g. Ford's assessment of each of the crash incidents provided in Ford's response to this letter, including incident speed, driving maneuver (e.g., refer to maneuvers identified in 13.c and 13.d), Ford's assessment of the state of the EPAS system immediately before and after the crash, the driver's description of the effect on steering performance/effort, and Ford's assessment of the crash severity and all causal factors.

#### Answer

To the extent that the requested information for subparts a) through d) is available, Ford is providing the requested documents and information pertaining to steering efforts in Appendix J – Test Results and Appendix J – Supplier Documents/TRW 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 information pertaining to front axle, vehicle curb and gross vehicle weight ratings in Appendix M.

The steering wheel to road wheel steering ratio for the subject vehicles is 15.9 to 1.

Ford's assessment of the alleged accidents and injuries that may be related to the alleged defect is provided in our response to Request 2.

Request 15

Provide Fords assessment of the alleged defect in the subject vehicles, including:

- a. Causal or contributory factor(s);
- b. The failure mechanism(s);
- c. The failure mode(s);
- d. The risk to motor vehicle safety;
- e. What warnings, if any, the operator of the vehicle would have that the alleged defect was occurring or subject system was malfunctioning, and
- f. The reports included with this inquiry.

Answer

Ford's analysis of the information provided with this response indicates that the customer complaint rate for allegations of loss of power steering assist on the subject vehicles is low at 2.5 complaints per 1,000 vehicles. Even in the unlikely event of loss of power steering assist, base steering functionality is maintained, including the mechanical linkage between the steering wheel and the road surface, with steering efforts being greater at lower speeds and tighter turning radiuses as compared to higher speeds and/or larger turning radiuses. As described in the Owner's Manual, drivers are informed of a change in the status of the EPAS system via both an audible chime and the display of a power steering assist fault message in the instrument cluster. Additionally, braking functionality is maintained, affording the driver adequate opportunity to slow or stop the vehicle in a safe manner. This is particularly pertinent at lower speeds where the highest amount of steering assist is provided and where stopping distances are relatively short. Ford also notes that there is no risk of fire as may be the case on a vehicle with a hydraulic power steering system that experiences loss of power steering assist because of a power steering fluid leak.

Furthermore, considering that: 1) loss of power steering assist, accompanied by visual and audible driver warnings, isn't expected to be more likely to occur during any particular driving maneuver, and 2) during a typical drive cycle, it seems likely that more vehicle operation time is spent on activities that require lower steering efforts or smaller steering inputs, or steady-state highway driving, than on operations that require higher steering efforts and inputs, such as low speed parking lot maneuvers, it is reasonable to conclude that loss of assist is more likely to occur at a time when lower steering efforts are required. It is also reasonable to conclude that if a driver becomes aware of a lack of assist condition at a time when lower steering efforts are required, it is likely that the driver will be better able to compensate for this lack of assist when conditions requiring higher steering efforts are encountered, thus increasing the ability to safely control the vehicle at lower speeds. Additionally, the very low probability of actually losing power steering assist, based on the reports included in this response, combined with the low probability that loss of assist would actually occur while driving at a time when the highest steering efforts are required, supports a conclusion that the real world likelihood of a driver experiencing loss of assist at a time when the highest efforts are being provided, although possible, is uncommon. Furthermore, because system faults can occur that require the removal of steering assist, due care and testing was performed to ensure compliance with ECE 79 and vehicle controllability. As indicated previously in this response, vehicle evaluations were conducted to rate the effects that sudden loss of power steering assist had on vehicle controllability of the subject vehicles at various speeds and driving maneuvers, and in all cases it was found that steering, after loss of assist, under multiple conditions was still possible with increased concentration (a natural expectation given

the concurrent warning chime and message in the instrument cluster), while still being tolerable to drivers.

As previously described, Ford conducted extensive analysis associated with this subject in these vehicles, and found three predominant supplier quality issues accounting for the majority of warranty repairs related to loss of power steering assist. Corrective actions have been implemented for these three quality issues, and, as previously stated, Ford is not aware of related reports on EPAS gear assemblies built after the implementation of corrective actions. Ford notes that most of the field reports included with this response are related to technician requests for assistance with vehicle diagnosis and repair, and do not pertain to driver's ability to control their vehicles when loss of power steering assist occurs. To address technician diagnosis questions, Ford issued Special Service Message #22383 on May 31, 2012, informing dealers that selected diagnostic procedures in the shop manual related to loss of power steering assist had been revised, improving the technician's capability of vehicle diagnosis and repair without the need for diagnostic assistance.

Ford's analysis of the information provided with this response indicates that the customer complaint rate for allegations of loss of power steering assist on the subject vehicles is low at 2.5 complaints per 1,000 vehicles. This rate is substantially lower than the complaint rate of 12.6 complaints per 1,000 vehicles associated with investigation EA04-018 which the agency closed without action. More recently, the agency closed PE07-023 without action on vehicles with a complaint rate of 8.9 complaints per 1,000 vehicles and similar time in service relative to the vehicles that are the subject of this information request.

In summary, Ford believes that loss of power steering assist in the subject vehicles does not present an unreasonable safety risk in these vehicles based on the following reasons:

- 1) Low rate of reports,
- 2) In the event of loss of power steering assist, the steering system will default to manual steering mode allowing the vehicle to be steered in a safe and controlled manner,
- 3) The mechanical linkage between the steering wheel and the road surface is maintained at all times, similar to other steering systems, both hydraulic and electric, used by Ford and other manufacturers for many years,
- 4) Drivers are clearly informed of a change in the status of the steering system via both an audible chime and the display of a power steering assist fault message in the instrument cluster, and
- 5) The loss of power steering assist is unlikely to be associated with accidents at higher speeds because the amount of assist supplied is greatest at low speeds, such as during parking lot maneuvers, and reduced as vehicle speed increases, and the reports included with this response support this conclusion.

###