



Automotive Safety Office  
Environmental and Safety Engineering

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September 18, 2009

Ms. Kathleen C. DeMeter, Director  
Office of Defects Investigation  
National Highway Traffic Safety Administration  
1200 New Jersey Avenue, S.E. W45-302  
Washington, D.C. 20590

Dear Ms. DeMeter:

Subject: PE09-031:NVS-213cnl

The Ford Motor Company (Ford) response to the agency's July 31, 2009, letter concerning reports of alleged separation of a front suspension lower ball joint assembly while driving in 2007 and 2008 model year Ford Edge and Lincoln MKX vehicles is attached.

Ford's review of the responsive reports and warranty claims found 16 that specifically allege a "separation of a front suspension lower ball joint assembly while driving," including one VOQ. Ford's review also identified 15 that allege front suspension lower ball joint assembly separation, though it is unclear whether the vehicle was being driven at the time. Ford has combined these 31 owner reports, field reports, and warranty claims together for its analyses. Overall, the owner and field report complaint rate of alleged front suspension lower ball joint assembly separation is very low, 0.02 R/1000. The warranty claim rate is also very low at 0.08 R/1000.

Twenty-three of thirty-one vehicles identified in the reports and claims had a prior repair that required disassembling and reassembling the passenger side lower ball joint assembly. These prior repairs were conducted to address either Power Transfer Unit (PTU) seal replacement (AWD only) as a result of minor leaks from the PTU link shaft seal, PTU replacement (AWD only), or transmission replacement. While a large number of these repairs have been successfully completed without a subsequent lower ball joint assembly concern, a small number of the repairs likely have led to subsequent joint separation. When reassembling this joint, the technician is specifically instructed to discard the old fasteners (lower ball joint bolt and nut) and install new fasteners. Nevertheless, there is the potential that the joint may not be properly reassembled during service, whether it results from reuse of the original fasteners, improper torque, or some other service issue. In an attempt to encourage proper repair, Ford is working to release a revised PTU seal kit that includes the required fasteners. In the interim, the online parts ordering system is being updated to add a reminder about ordering fasteners when ordering a PTU seal kit.

A review of the eight remaining reports and warranty claims that did not involve a prior disassembly of the lower ball joint finds that seven allege lower ball joint assembly separation before 5,000 miles in service. Of those seven vehicles, five are 2007 model year vehicles

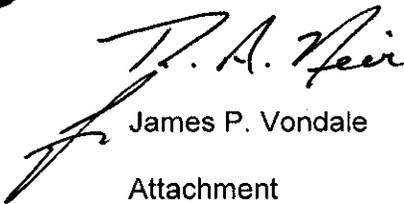


built in a relatively narrow time frame (late February 2007, to early April 2007), suggesting there may have been some limited anomaly with the assembly process during this particular time period. The exact nature of any assembly concerns is unknown; however, in 2008 the assembly plant requested a change to the lower control arm bolt to reduce the likelihood of cross-threading when the operator hand starts the nut on the assembly line to increase the probability that the joint achieves the proper clamp load. Given that the alleged incidents on these 2007 model year vehicles occurred at very low mileage and that there are only two similar reports for the entire 2008 model year, it appears that any assembly concerns were resolved and any additional incidents should have occurred by this point. Overall, the rate (complaint and warranty) for these eight reports, for which there is no known prior service of the joint is very low at 0.02 R/1000.

In summary, the owner and field report complaint rate of alleged lower ball joint assembly separations is very low at 0.02 R/1000, and the warranty claim rate is also very low at 0.08 R/1000. The majority of the reports relate to vehicles that experienced a prior repair, such as a PTU seal leak, requiring the disassembly of the lower ball joint assembly. Only eight reports concern vehicles that have not had a prior disassembly and reassembly of the subject joint; the rate (complaint and warranty) drops to a miniscule 0.02 R/1000. Further, there are no substantiated claims of accidents or injuries associated with the alleged defect. Based on all the facts, Ford believes that there is no defect trend related to the design or initial assembly of the front suspension lower ball joint and no unreasonable risk to motor vehicle safety associated with the lower ball joint in the subject vehicles.

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

Sincerely,



James P. Vondale

Attachment

FORD MOTOR COMPANY (FORD) RESPONSE TO PE09-031

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.

In an August 24, 2009, telephone conversation, Chris Lash of the agency informed Ford personnel that the scope of the investigation includes reports of alleged loose ball joints in addition to the described alleged defect, "separation of a front suspension lower ball joint assembly while driving."

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 31, 2009, the date of your inquiry. Ford has searched within the following offices for responsive documents: Sustainability, Environment and Safety Engineering, Global Core Engineering, Office of the General Counsel, Vehicle Operations, and North American Product Development.

Request 1

State, by model, model year and drivetrain (e.g., four-wheel drive, two-wheel drive), the number of subject 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. Model;
- c. Model Year;
- d. Date of manufacture;
- e. Date warranty coverage commenced; and
- f. 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 I, Data Collection Disc, for a pre-formatted table which 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) and its protectorates and territories (American Samoa, Guam, Northern Mariana Islands, Puerto Rico, and Virgin Islands) is 321,475.

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

Model	2007 MY FWD	2007 MY AWD	2008 MY FWD	2008 MY AWD
Ford Edge	70,612	51,034	78,190	50,145
Lincoln MKX	15,609	19,083	17,304	19,498

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 the subject vehicles:

- a. Consumer complaints, including those from fleet operators;
- b. Field reports, including dealer field reports;
- c. Reports involving a crash, injury, or fatality, based on claims against the manufacturer involving a death or injury, notices received by the manufacturer alleging or proving that a death or injury was caused by a possible defect in a subject vehicle, property damage claims, consumer complaints, or field reports;
- d. 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
A	Alleged Separation of Lower Ball Joint Assembly While Driving
B1	Alleged Separation of Lower Ball Joint Assembly Ambiguous if Driving
B2	Alleged Ambiguous Separation of Lower Ball Joint Assembly
L	Alleged Loose Lower Ball Joint or Lower Ball Joint Bolt/Nut

We are providing electronic copies of reports categorized as "B" as "non-specific allegations" for your review because of the narrow 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 categorized in accordance with the categories described above. The number and copies of relevant owner reports identified in this search that may relate to the agency's investigation 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.

Legal Contacts: Ford is providing, in Appendix B, a description of Legal Contacts and the activity that is responsible for this information. To the extent that responsive (i.e., not ambiguous) owner reports indicate that they are Legal Contacts, Ford has gathered the related files from the Office of General Counsel (OGC). Non-privileged documents for files that were located that are related to the responsive owner reports are provided in Appendix D.

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 categorized in accordance with the categories described above. The number and copies of relevant field reports identified in this search that may relate to the agency's investigation 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 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 three Vehicle Owner's Questionnaires (VOQs), two of which were duplicative. Ford made inquiries of its MORS database for customer contacts, and its CQIS database for field reports, and its AWS database for warranty reports regarding the vehicles identified on the VOQs. The reports located in these searches, are included in the MORS and AWS portions of the database provided in Appendix C and have been identified by a "Y" in the "VOQ Dup" field.

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, and lawsuits and claims. One allegation of injury and accident was identified and is duplicative of the VOQ report (10266230) provided by the agency. A copy of the report made to Ford corresponding to this alleged incident is provided in the MORS portion of the database provided in Appendix C.

Claims, Lawsuits, and Arbitrations: For purposes of identifying incidents that may relate to the alleged defect, 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 - none were found to relate to the agency's request.

### 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 a crash is alleged;
- j. Whether property damage is alleged;
- k. Number of alleged injuries, if any; and
- l. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2003, or a compatible format, entitled "REQUEST NUMBER TWO DATA." See Enclosure 1, Data Collection Disc, for a preformatted table which 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.

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.

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 the subject components including all claims for lower control arm replacement, in the subject vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign.

Separately, for each such claim, state the following information:

- a. Ford's claim number;
- b. Vehicle owner or fleet name (and fleet contact person) and telephone number;
- c. VIN;
- d. Model;
- e. Repair date;
- f. Vehicle mileage at time of repair;
- g. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
- h. Labor operation number;
- i. Problem code;
- j. Replacement part number(s) and description(s);
- k. Whether there was a claim for towing within 3-days of the subject component repair claim;
- l. Whether there was a claim for replacement of any of the following components at the same side as the subject component involved in the claim (i.e., right-front or left-front) within 3-days of the subject component repair claim:
  - i) Steering knuckle;
  - ii) Brake rotor; or
  - iii) Half-shaft.
- m. Concern stated by customer;
- n. Cause and correction of concern; and
- o. Additional comment, if any, by dealer/technician relating to claim and/or repair.

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 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 categorized in accordance with the categories described below.

Category	Allegation
A	Alleged Separation of Lower Ball Joint Assembly While Driving
B1	Alleged Separation of Lower Ball Joint Assembly Ambiguous if Driving
B2	Alleged Ambiguous Separation of Lower Ball Joint Assembly
L	Alleged Loose Lower Ball Joint or Lower Ball Joint Bolt/Nut
R	Replaced Lower Control Arm

The number and copies of relevant warranty claims identified in this search that may relate to the agency's investigation 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. 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 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. Ford provides roadside assistance as part of the New Vehicle Limited Warranty and certain optional Extended Service Plans (ESPs). 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 the type of assistance that was required, only that assistance was requested. The customer and technician comments provided with the warranty claim provide the best source of information regarding possible incident-related vehicle towing.

The agency also requested information related to additional claims made for the following components: steering knuckle, brake rotor, and half shaft. Specifically, the request is for claims made for these components within three days of a repair claim for the subject component. Ford's warranty system reports all replaced/repared parts related to a specific customer complaint on a single claim. There are certain cases that deviate from this process, for example, when parts are on order and the vehicle can be released to the customer while they wait for the part to arrive. The installation of the part will appear on a separate subsequent claim. It is highly unlikely that this situation would occur for repairs associated with the subject components. Therefore, if a steering knuckle, brake rotor, and/or half shaft were replaced as part of a repair associated with the subject component, the information is contained in the warranty claim text provided in the AWS portion of the database contained in Appendix C.

Ford's response to Request No. 13 includes an extensive discussion about the involvement of prior service repairs in relation to the occurrence of a repair performed for the subject components.

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.

For 2007 and 2008 model year Ford Edge 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. For 2007 and 2008 model year Lincoln MKX vehicles, the New Vehicle Limited Warranty, Bumper-to-Bumper Coverage begins at the warranty start date and lasts for four years or 50,000 miles, whichever occurs first. Optional ESPs are available to cover various vehicle systems, time in service, and mileage increments. The details of the various plans are provided in Appendix E. As of the date of the information request, 36,916 new and used vehicle ESP policies had been purchased on 2007 and 2008 model year Ford Edge vehicles and 2,709 new and used vehicle ESP policies had been purchased on 2007 and 2008 model year Lincoln MKX vehicles.

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 separation of a front suspension lower ball joint assembly while driving, 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 alleged defect in the subject vehicles.

Internal Service Messages: Ford has not identified any ISMs that may relate to the alleged defect in the subject vehicles.

Field Review Committee: Ford has not identified any field service action communications that may relate to the alleged defect in the subject vehicles.

Ford is not aware of any forthcoming communications related to the alleged defect in the subject vehicles.

### 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.

In the interest of ensuring a timely and meaningful submission, Ford is not producing non-responsive materials or items containing little 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. Should the agency request additional materials, Ford will cooperate with the request.

#### 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 component, from the start of production to date, which relate to, or may relate to, the alleged defect in the subject vehicles. For each such modification or change, provide the following information:

- a. The date or approximate date on which the modification or change was incorporated into vehicle production;
- b. A detailed description of the modification or change;
- c. The reason(s) for the modification or change;
- d. The part numbers (service and engineering) of the original component;
- e. The part number (service and engineering) of the modified component;
- f. Whether the original unmodified component was withdrawn from production and/or sale, and if so, when;
- g. When the modified component was made available as a service component; and
- h. Whether the modified component can be interchanged with earlier production components.

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

#### Answer

A table of the requested changes is provided in Appendix H.

#### Request 10

Produce two each of the following for the subject components:

- a. Properly assembled subject components (please send cut 4-inch sections of the steering knuckles and lower control arms and not complete assemblies);
- b. Disassembled lower ball joint assemblies, including lower ball joint, lower ball joint bolt, lower ball joint nut, and steering knuckle (please send cut 4-inch section of the portion of the steering knuckle to which the lower ball joint attaches).

#### Answer

The requested parts are being provided directly to Chris Lash of the agency.

#### Request 11

State the number of each of the following that Ford has sold that may be used in the subject and/or peer 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):

- a. Subject component (or lower control arm assembly if the subject components are not sold/serviced separately); and
- b. Any kits that have been released, or developed by Ford for use in service repairs to the subject component/assembly.

For each component part number, provide the supplier's name, address, and appropriate point of contact (name, title, and telephone number). Also, identify by make, model and model year, any other vehicles of which 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 by which 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 lower control arms including ball joint, steering knuckles, lower ball joint bolts, and nuts by part number (both service and engineering) and month/year of sale, where available, in Appendix I. Appendix I also contains information pertaining to production and service usage for each part number, and supplier point of contact information.

#### Request 12

Provide the following for the front- and all-wheel drive versions of the subject vehicles:

- a. A diagram of the front suspension at static curb weight with longitudinal, lateral and vertical loads of the lower ball joints;
- b. Provide a video or photographs showing the manufacturing process for connecting the lower control arm to the steering knuckle in the subject vehicles; and
- c. Describe in detail the process for verifying proper assembly of the stud and pinch bolt and all associated torque specifications.

#### Answer

A diagram of the front suspension loads at static curb weight is provided in Appendix J.

An assembly illustration with torque specifications is provided confidentially in Appendix G in the Engineering Drawings folder, page 0050.

The assembly process for the attachment of the knuckle to lower control arm requires two visual inspections of the joint and the use of a DC nut runner to apply torque to the lower control arm nut. The first visual inspection occurs immediately following the placement of the knuckle on the lower control arm ball stud to verify that the knuckle is fully seated on the lower control arm ball stud. Then the lower control arm nut is hand started and the required torque is applied by a DC nut runner. If the DC nut runner does not record the required torque, the

vehicle cannot move to the next station until the operator enters a "release with concern" notation in the electronic tracking system. The final visual inspection occurs after the lower control arm ball joint is completely assembled and the tie rod is attached to the lower control arm, this inspection again verifies that the knuckle is fully seated. Any open concerns such as the DC nut runner not recording the proper torque, are reviewed, resolved, and signed off at the end of the line repair area. A vehicle cannot be released from the assembly plant with any open concerns.

### Request 13

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

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

### Answer

Ford's review of the responsive reports and warranty claims found 16 that specifically allege a "separation of a front suspension lower ball joint assembly while driving," including one VOQ. Ford's review also identified 15 that allege front suspension lower ball joint assembly separation, though it is unclear whether the vehicle was being driven at the time. Unless specifically stated otherwise, Ford has combined these 31 owner reports, field reports, and warranty claims together for its analyses.

Overall, the owner and field report complaint rate of alleged front suspension lower ball joint assembly separation is very low, 0.02 R/1000. The warranty claim rate is also very low at 0.08 R/1000. Ford reviewed the detailed vehicle repair histories related to each of these 31 alleged incidents. Twenty-eight (28) of the thirty-one (31) pertain to the ball joint assembly on the passenger (right) side of the vehicle. Of these 28, 23 had a prior repair that required disassembling and reassembling the passenger side lower ball joint assembly. These prior repairs were conducted to address either Power Transfer Unit (PTU) seal leaks (AWD only), PTU replacement (AWD only), or transmission replacement. The procedure for replacing the PTU seals or the entire PTU requires disassembly and reassembly of only the passenger side joint. Transmission replacement requires disassembly and reassembly of both the driver and passenger side joint.

Ford has experienced ongoing quality concerns with minor leaks from the PTU link shaft seal. Several thousand repairs have been completed to address PTU seals leaking; the vast majority of these have been successfully completed without a subsequent lower ball joint assembly concern. When reassembling this joint, the technician is specifically instructed to discard the old fasteners (lower ball joint bolt and nut) and install new fasteners. Nevertheless, there is the potential that the joint may not be properly reassembled during service, whether it results from reuse of the original fasteners, improper torque, or some other service issue. In at least one report, the joint apparently separated while the technician was performing a post-PTU repair road test. Five vehicles returned for an alleged joint separation within a hundred miles of the prior PTU leak repair. More than half of the vehicles with a PTU

repair returned within a thousand miles. Fourteen of the technicians specifically mentioned that a missing or broken lower ball joint bolt and/or nut caused the post-repair separation of the lower ball joint assembly. Based on the available information, Ford cannot determine if the fasteners are improperly torqued in service or if the original fasteners are being reused. Regardless, the data strongly supports the conclusion that improper reassembly of the lower ball joint and knuckle contributed to these post-repair lower ball joint separation reports. The existing service kit for repairing PTU seal leaks does not include the lower ball joint bolt and nut; typically dealers are responsible for ordering standard items such as fasteners. In an attempt to encourage proper repair, Ford is working to release a revised PTU seal kit that includes the required fasteners. In the interim, the online parts ordering system is being updated to add a reminder about ordering fasteners when ordering a PTU seal kit.

A review of the eight remaining reports and warranty claims that did not involve a prior disassembly of the lower ball joint finds that seven allege lower ball joint assembly separation before 5,000 miles in service. Of those seven vehicles, five are 2007 model year vehicles built in a relatively narrow time frame (late February 2007, to early April 2007), suggesting there may have been some limited anomaly with the assembly process during this particular time period. Due to the age of the vehicles, additional data from the assembly plant regarding torque values and any possible in-plant rework is no longer available. The exact nature of any assembly concerns is unknown; however, in 2008 the assembly plant requested a change to the lower control arm bolt to reduce the likelihood of cross-threading when the operator hand starts the nut on the assembly line and increase the probability that the joint achieves the proper clamp load. The revision was incorporated by the start of 2009 model year production and specified that at least the first six threads are chased following plating. Given that the alleged incidents on these 2007 model year vehicles occurred at very low mileage and that there are only two similar reports for the entire 2008 model year, it appears that any assembly concerns were resolved and any additional incidents should have occurred by this point. Overall, the rate (complaint and warranty) for these eight reports, for which there is no known prior service of the joint is very low at 0.02 R/1000.

Ford has identified only one alleged accident - the same incident identified by the agency and contained in VOQ No. 10266230. Ford searched MORS, CQIS, AWS, and lawsuits and claims for any information related to this report. The only contact received by Ford is a MORS report (provided in the MORS section of the database in Appendix C). The MORS report indicates that a rocker arm broke causing a crash and injury, but there was no police report filed. A review of Ford's internal systems indicated that the vehicle title had been branded. A CARFAX® Vehicle History Report™ for this particular vehicle indicates that the vehicle was involved in an accident resulting in vehicle damage in June 2008, with a police report filed. There is no entry on the report for the alleged accident in March 2009, though the Oklahoma Motor Vehicle Department issued a "Total Loss Vehicle" title to an insurance company in May 2009. As of the date of this inquiry, Ford has not received an insurance subrogation claim related to this vehicle. Based on the available information, Ford cannot determine whether the alleged incident relates to the alleged defect, or whether the cause may relate to prior repair resulting from the accident reported a year earlier.

Though several reports provided in this response indicate that the wheel "separated" or "came off" the vehicle, Ford believes, in reality, there was no separation of the wheel. The front suspension for the Ford Edge and Lincoln MKX is a McPherson strut design that incorporates a strut assembly instead of an upper arm/ball joint setup. The strut assembly supports the weight of the vehicle and provides the pivot axis for the steering spindle. The main function of the lower control arm is to control lateral and longitudinal loads from the wheel and tire assembly. The ball joint transfers these loads from the knuckle through the lower control arm

to the subframe. If a vehicle experiences a separation of the lower ball joint from the knuckle, the vehicle weight remains supported and the wheel remains attached to the vehicle at the strut and steering arm. The wheel may "kick out" or "kick back" and the half shaft may pull out of the transaxle, but the wheel does not detach from the vehicle. A separation of the lower ball joint assembly does not result in a wheel separation from the vehicle.

In addition to reports related to the alleged defect, the agency also requested that Ford provide reports relating to loose ball joints as well as lower control arm replacements. Ford identified fewer than 200 reports relating to loose ball joints and/or loose lower control arm nuts and bolts. The customer most often describes the vehicle as making a snapping, popping, cracking, or clunking noise. These symptoms may be more noticeable on bumps or slow speed tight turns such as parking lot maneuvers. Premature tire wear is also a sign of a loose ball joint. Technicians characterize loose ball joints many different ways, such as binding, popping, twisting, worn, not secure, floating, and about to come out of the arm. The ball joint design for the Ford Edge and Lincoln MKX is a Mazda derived design that utilizes both an interference fit and a crimp feature. When the ball joint is pressed into the lower control arm a flange from the lower control arm is crimped into a 4 mm wide groove in the ball stud. This crimping operation reduces the net surface area of the interference fit but also provides a positive retention mechanism. If the crimp is compromised or poorly formed, the force required to loosen the ball joint in the lower control arm is reduced and, over time, the ball joint can loosen in the lower control arm. It is important to emphasize that even if a ball joint is loose, it cannot pull out of the lower control arm because it is captured on the top side by the knuckle and the bottom side by the flange on the ball joint housing.

Loose lower control arm nuts and bolts are also easily identified by the customer because they make noise, similar to loose ball joints. There are two design elements that work together to provide customer indication that service is needed. The lower ball joint nut is a torque prevailing nut. A torque prevailing nut can become loose and back off the bolt; however, it takes an extended period of time to completely back off the bolt. If the nut were to become loose, clamp load would be reduced and the bolt would rattle around making noise. The second element is the whistle notch that the bolt sits in on the ball stud. If the nut becomes loose, the bolt will start to move around in the whistle notch, creating more noise. As long as the nut is attached to the bolt, the joint cannot separate because the bolt sits in the whistle notch. These are readily identifiable indicators to the customer over an extended period of time that service is needed, well before there is an associated risk of ball joint separation.

Ford identified 37 reports that were ambiguous as to whether they pertain to a lower ball joint assembly separation. Though more than 90 percent of these ambiguous reports describe the ball joint as "separated from" or "came out" of the lower control arm, review of the customer comments strongly suggests that they actually relate to a loose ball joint and not a separation of the lower ball joint assembly. For example, comments clearly indicating that the vehicle was brought in for a noise issue, such as a clunk, would not be related to a "separation." Nevertheless, the reports are provided in an ambiguous category for the agency's review based solely on the original description or allegation.

The agency also requested claims relating to lower control arm replacement. The lower control arm replacement claims provided in this response include numerous claims related to a leaking hydrobushing at the rearward lower control arm to frame mounting point. A leaking hydrobushing is typically identified by the customer from a drip of oil on the ground or from noise. The bushing is not serviceable separately from the lower control arm. The change log provided in Appendix H provides the history of this bushing concern.

In summary, the owner and field report complaint rate of alleged lower ball joint assembly separations is very low at 0.02 R/1000, and the warranty claim rate is also very low at 0.08 R/1000. The majority of the reports relate to vehicles that experienced a prior repair, such as a PTU seal leak, requiring the disassembly of the lower ball joint assembly. While there have been thousands of repairs associated with the PTU seal leak, the vast majority without a subsequent ball joint assembly concern, actions have been taken to include the appropriate new fasteners in the repair kit to increase the probability that the PTU seal leak repair and ball joint reassembly process are performed correctly. Only eight reports concern vehicles that have not had a prior disassembly and reassembly of the subject joint; the rate (complaint and warranty) drops to a miniscule 0.02 R/1000. Of those, only one vehicle had more than 5,000 miles on it when it allegedly experienced a lower ball joint assembly separation. Further, there are no substantiated claims of accidents or injuries associated with the alleged defect. Based on all the facts, Ford believes that there is no defect trend related to the design or initial assembly of the front suspension lower ball joint and no unreasonable risk to motor vehicle safety associated with the lower ball joint in the subject vehicles.

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