Ford Motor Company

James P. Vondale, Director
Automotive Safety Office
Environmental & Safety Engineering

October 22, 2003

Ms. Kathleen C. DeMeter, Director
Office of Defects Investigation Safety Assurance
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Dear Ms. DeMeter:

Subject: EA03-010:NVS-212mjl

Attached is the Ford Motor Company (Ford) response to the agency's September 2, 2003 letter requesting certain information regarding air bag assemblies in 2000 and 2001 model year Ford Taurus and Mercury Sable vehicles. The complete answers to your requests are found in the attachment.

In its letter, the agency defines the "alleged defect" as "any failure of a frontal air bag to deploy in frontal or near-frontal crash; or any allegation of non-deployment of a frontal air bag." As the agency is aware, supplemental air bag systems, including the subject air bag system, are not designed or intended to deploy in all frontal collisions. It is, therefore, inappropriate to consider any "failure" to deploy or any allegation of a non-deployment as a potential "defect."

Ford uncovered no evidence to indicate that there is a pattern of a defect related to non-deployments of the frontal air bags in the subject vehicles in collisions warranting such deployments. There is no evidence demonstrating that air bags are not deploying in the subject vehicles when involved in collisions of sufficient longitudinal deceleration to require supplemental restraint from the driver and/or front passenger frontal air bags.

The air bag system in 2000 model year Taurus and Sable vehicles represented a significant advancement in technology. These vehicles were the first vehicles to be equipped with Ford's advanced Personal Safety System (System). This System built upon the many years of Ford air bag design experience that began with a small fleet of vehicles equipped with supplemental air bags in 1971 by including a number of new and unique features to further enhance the already high level of occupant protection for the driver and front seat passenger in moderate to severe frontal collisions. Most notable was Ford's first use of dual threshold supplemental driver and passenger air bags. Inputs to the System include the severity of the collision as well as safety belt use and driver seat position. This design had the intended

effect of increasing the threshold required to deploy frontal air bags in certain crashes to enhance the effectiveness of the system and the safety of occupants.

Modern supplemental air bag systems are extremely complex. Sensor systems that are designed to determine whether an air bag will deploy in a given accident rely upon complicated algorithms. Even with state-of-the-art technologies available today, all airbag systems of all vehicle manufacturers include deployment threshold gray zones where an air bag may or may not deploy in a collision consistent with the design intent of the vehicle. In addition, Ford is not aware of any air bag system technology capable of ensuring that an air bag will always deploy as designed in each and every accident regardless of severity or uniqueness of the crash circumstances.

The complexity of modern supplemental air bag systems and the uniqueness of each individual collision make it extremely difficult to evaluate system performance in real world accidents. It is well understood that vehicle speed or readily observable collision damage are poor predictors of system performance. Experience also has shown that customers do not have a good understanding of air bag system performance, and systems with features like safety belt use sensors that can substantially raise the deployment threshold, make this determination even more difficult. Experience also shows that customers may receive injuries in accidents where an air bag properly has not deployed according to the design intent of the vehicle manufacturer; however, the overwhelming majority of these injuries are minor because the velocity change is low. Accordingly, customer complaints for a given vehicle are an inherently unreliable indicator of proper system performance, and a thorough evaluation of each collision generally is necessary to determine if the system functioned as designed.

In the case of the 2000 model year Taurus that prompted this investigation, a thorough review of the accident, the vehicle, and its restraints control module by Ford and the agency's Special Crash Investigation unit did not establish why the air bag did not deploy in this unique accident. During the course of this inquiry, one additional event involving a 2001 Mercury Sable was identified. The circumstances of that accident are unusual and significantly different from the Taurus accident giving rise to this investigation. The unusual and significantly different circumstances of the Mercury accident do not give rise to a defect in the subject supplemental air bag system or provide evidence of a defect trend. Further details of the incident surrounding the 2001 Mercury Sable are included in the attachment.

The very favorable real world data for the large population of 2000 and 2001 model year Taurus and Sable vehicles, and the extensive work of the Special Crash Investigation unit clearly demonstrate that these vehicles are reliably providing a high level of occupant protection for our customers and that these vehicles do not contain a defect in the supplemental air bag system nor do they present an unreasonable risk to motor vehicle safety.

If you have any questions, please call my office.

Sincerely,

James P. Vondale

Attachment

ATTACHMENT
October 22, 2003

FORD MOTOR COMPANY (FORD) RESPONSE TO EA03-010

Ford's response to this Engineering Analysis 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 every effort to provide thorough and accurate information, and we would be pleased to meet with agency personnel to discuss any aspect of this Engineering Analysis.

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, as more fully described in this response. 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.

During Preliminary Evaluation PE03-002, Mr. Michael Lee of the agency informed Ford personnel that the investigation pertained to frontal or near-frontal impacts only and did not include impacts which can be determined to be strictly to the side or rear of the vehicle under which circumstances a deployment of the frontal air bags would not be expected. Ford has applied the same criteria to this information request.

Answers to your specific questions are set forth below. As requested, after each numeric designation, we have set forth verbatim the request for information, followed by our response. Unless otherwise stated, Ford has undertaken to provide responsive documents dated up to and including September 2, 2003, the date of your inquiry. Ford has searched business units and/or affiliates within the following offices for responsive documents: Environmental and Safety Engineering, Ford Customer Service Division (FCSD), Quality, Research, Global Core Engineering, Office of the General Counsel, Vehicle Operations, and Ford Car Product Development.

Request 1

State, by model and model year, 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. Make;
c. Model;
d. Model Year;
e. Date of manufacture;
f. Date warranty coverage commenced; and
g. The State in the United States where the vehicle was originally sold or leased (or delivered for sale or lease).

Provide the table in Microsoft Access 2000, or a compatible format, entitled "PRODUCTION DATA."

Answer

The requested information was previously provided in Appendix A of Ford's March 24, 2003 response to Request 1 of PE03-002.

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;
d. Property damage or personal injury 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 the purpose of identifying reports of incidents potentially involving the alleged defect and any related documents, Ford has gathered "owner reports" and "field reports" maintained by FCSD, Intensified Customer Concern Definition (ICCD) data maintained by Ford's Quality Office, fleet reports maintained in a Fleet Test Database, and claim and lawsuit information maintained by Ford's Office of the General Counsel (OGC).

Ford has not attempted to gather information from the Unified Database (UDB) due to the nature of the information contained within it. UDB tracks certain service part sales information from volunteering dealers in an effort to improve customer service and provide service parts in a timely fashion. We believe that because incidents potentially related to the alleged defect are

the result of an accident and not related to normal service repairs, any such information that may be contained in UDB would likely be duplicative of corresponding owner complaints, field reports, lawsuits or claims. Further, UDB is typically searched by part number. Because the alleged defect is non-deployment of an air bag, and therefore, the air bags would not require replacement, a search by air bag part number would yield no relevant results.

Descriptions of the FCSD owner and field report systems, the ICCD and the Fleet Test Database systems, and the criteria used to search each of these are provided electronically in Appendix A (filename: 2003-10-22 Appendix A - Searches) on the enclosed CD.

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

Category	Allegation
A1	Alleged Non-deployment – No mention of injuries
A2	Alleged Non-deployment – Alleged Injuries

Owner Reports: The search and review of the Ford Master Owner Relations Systems (MORS) database records, as described in Appendix A, identified the following number of owner reports, in addition to those provided in our March 24, 2003 response to PE03-002, in accordance with the categories described above:

Category	A1	A2
Reports	37	57

Copies of these owner reports are provided in the MORS III portion of the electronic database contained in Appendix B (filename: 2003-10-22 Appendix B – EDDS) on the enclosed CD. Additionally, two hardcopy reports also are being provided in Appendix B. The categorization of each report is identified in the "Category" field. Where 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.

Ford has also included owner reports that are ambiguous as to whether they meet the alleged defect criteria. We are providing electronic copies of these reports in Appendix 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. For example, the report for VIN 1FAFP53UYA116046 indicates the vehicle was purchased from a leasing company. After purchasing the vehicle the owner drove the vehicle to a Ford dealer with a complaint that the air bag light was illuminated. Although there was no allegation of an air bag non-deployment during an accident, the dealership noted apparently minor damage to the front bumper and grill indicating that the vehicle had been in an accident. The dealership noted that the air bag had been tampered with, and the pretensioners had been "disconnected." From the details contained within the report Ford is unable to discern any of the details prior to the vehicle being presented at the dealership for repair. In an abundance of caution Ford is providing such reports as part of the response. These reports are identified by a B in the Category field.

Legal Contacts: Ford is providing, in Appendix A, a description of Legal Contacts and the activity that is responsible for this information, Litigation Prevention. To the extent that responsive (i.e., not ambiguous) owner reports reflect that they are Legal Contacts, Ford has gathered the related files from the Litigation Prevention section. Based on this search, 31 files corresponding to responsive owner reports were located; the associated documents are provided in Appendix C. We note that we were unable to locate one Litigation Prevention file corresponding to an apparently responsive owner report.

ICCD Information: A search of the ICCD database, as described in Appendix A, located no reports that relate to the alleged defect in the subject vehicles and no reports that are ambiguous as to whether they relate to the alleged defect.

Fleet Reports: In addition to fleet reports that may be contained in the owner reports or field reports identified in this response, Ford conducted a search of its Fleet Test Database, as described in Appendix A, for reports that may relate to the alleged defect in the subject vehicles. This search did not identify any such fleet reports.

Field Reports: A search and review of the Ford Common Quality Indicator System (CQIS) database records, as described in Appendix A, identified the following number of field reports, in addition to our March 24, 2003 response to PE03-002, in accordance with the categories described above:

Category	A1	A2
Reports	1	0

A copy of the single identified field report is provided in the CQIS portion of the electronic database contained in Appendix B on the enclosed CD. The categorization of the report is identified in the "Category" field.

Ford has also included field reports that are ambiguous as to whether they meet the alleged defect criteria. We are providing electronic copies of these reports in Appendix 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. These reports are identified by a B in the Category field.

Reports of Crash/Injury/Fatality: Because each of the reports provided in response to this information request relates to an alleged non-deployment of a frontal air bag during a collision, Ford has not separately categorized claims of vehicle crash.

Ford has construed this request to include reports of all alleged injuries, even those that are minor in nature, because it is not always possible based upon available information to reliably classify those reports that are AIS 2 or greater. For purposes of identifying alleged injuries potentially related to the alleged defect, Ford has reviewed responsive (i.e., not ambiguous) owner and field reports, lawsuits and claims, and warranty claims. Based on a reasonable and diligent search, Ford located 68 reports that allege injury.

Ford has identified one report alleging a fatality related to a non-deployment in this response. The alleged event involved a 2001 Mercury Sable (VIN 1MEFM50U41G623711). Ford believes the Sable impacted a flat bed truck that was in the process of placing construction (barricade) barrels in a construction zone. The police report states that witnesses observed the Sable being operated erratically prior to the accident. The police report also states that a witness was

in contact with 911 emergency personnel prior to the alleged collision in an effort to report the driver's erratic operation of the Sable. Witnesses also stated that the Sable swerved to avoid the rear of the truck just prior to the alleged impact and impacted the right rear portion of the truck bed. A review of the subject vehicle by Ford suggests that the height difference between the truck bed and the Sable resulted in an initial impact along the hood line, windshield and A-pillar partially collapsing the passenger compartment. Impact to the lower front structure of the Sable was secondary as the vehicle continued to travel under the rear of the truck. According to the police report the operator was belted. Inspection of the vehicle found that the belt pretensioners did deploy. While Ford's investigation into this matter is incomplete, Ford believes the accident sequence played a role in the sensor's decision to not deploy the air bag. Further, Ford's investigation noted significant electrical system damage from the unique underride of the crash that also may have affected the performance of the System.

Claims, Lawsuits, Arbitrations, Early Notices, Miscellaneous Matters: For purposes of identifying incidents potentially related to the alleged defect, Ford has gathered lawsuits, claims, arbitrations, early notices, and miscellaneous matters 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.

Based on a reasonable and diligent search, Ford located five lawsuits, 16 claims, one early notice, no consumer breach of warranty lawsuits, and no arbitrations that appear to relate to the alleged defect in the subject vehicles. Of these, 11 suits and claims appear to be duplicative of MORS reports and are included along with the others in Appendix C.

A log of lawsuits and claims with alleged injuries is provided in Appendix D. With respect to the lawsuit and claims, Ford has not undertaken to contact outside law firms to obtain additional documentation.

Request 3

Separately, for each item or report (consumer complaint, field 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;
l. and Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "REQUEST NUMBER THREE DATA."

Answer

The requested information, to the extent it is available, is provided in Appendices B, C, and D, as discussed in response to Request 2.

Request 4

Produce copies of all documents related to each item that involves a serious injury or fatality (i.e., an injury of Abbreviated Injury Scale greater than or equal to 2) to a front seat occupant, within the scope of Request No. 2. The term "all documents" includes, but is not limited to, vehicle photographs and RCM data. Organize the documents separately by category (i.e., consumer complaints, field reports, etc.) and describe the method Ford used for organizing the documents. Also, clearly identify Ford's file number, vehicle owner or fleet name, and VIN for each item responsive to this request.

Answer

Ford seldom has available to it reports containing medically assigned AIS numbers. Accordingly, we are producing copies of documents related to alleged injuries identified in the reports related to allegations of injury greater than general bruising or soreness.

Request 5

State, by model and model year, a total count for all of the following categories of claims, collectively, that have been paid by Ford to date that relate to, or may relate to, the alleged defect in the subject vehicles: warranty claims; extended warranty claims; claims for good will services that were provided; field, zone, or similar adjustments and reimbursements; and warranty claims or repairs made in accordance with a procedure specified in a technical service bulletin or customer satisfaction campaign. Separately, for each such claim, state the following information:

a. Ford's claim number;
b. Vehicle owner or fleet name (and fleet contact person) and telephone number;
c. VIN;
d. Repair date;
e. Vehicle mileage at time of repair;
f. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
g. Labor operation number;
h. Problem code;
i. Replacement part number(s) and description(s);
j. Concern stated by customer; and
k. Comment, if any, by dealer/technician relating to claim and/or repair.

Provide this information in Microsoft Access 2000, or a compatible format, entitled "WARRANTY DATA."

Answer

In responding to this information request, Ford electronically searched its Analytical Warranty System (AWS) for all claims meeting the criteria described in Appendix A. The resulting claims

were then reviewed individually for allegations that may relate to the alleged defect. This search and review of the Ford AWS database records identified a single warranty claim for the subject vehicles, which is duplicative of the single CQIS report identified previously. An electronic copy of this claim is provided in the AWS portion of the electronic database contained in Appendix B.

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

The search criteria used by Ford to identify responsive claims is described in the AWS section of Appendix A.

The warranty coverage information was previously provided in Ford's March 24, 2003 response to Request 6 of PE03-002.

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

The requested information was previously provided in Ford's March 24, 2003 response to Request 7 of PE03-002. There is no new information to report since the time that response was provided.

Request 8

Furnish copies of all communications between Ford and each supplier of the subject components for subject vehicles pertaining to the design, manufacture, performance, durability, quality, testing, or modification of the subject components that relate to, or may relate to, the alleged defect. If any communications on this subject were oral, provide a written transcript or summary of each such communication, and include a statement that identifies all participants and the date of the communication.

Answer

After a reasonably diligent search and inquiry, Ford states that it has not been able to locate documents responsive to this request.

Request 9

> Produce copies of all documents related to all frontal or near-frontal pole or pole-like (e.g., impact into concrete bridge rail in SCI case no. CAOO-020) crash tests of the subject vehicles (including pre-production vehicles) conducted by Ford, or on behalf of Ford, from the start of vehicle development to date.

Answer

The requested information is provided in Appendix F. Ford understands this request to mean "vehicle development" related to the D186 platform that the subject vehicles are based upon. Development of that platform began in support of the 1996 model year. Accordingly, in response to this request, Ford is providing information related to development of the D186 platform, but did not endeavor to include information on the prior platform due to the extensive differences between the platforms and restraint systems.

Request 10

> Furnish the deceleration vs. time and velocity vs. time requirements (e.g., threshold profiles) of all "must fire" deployment thresholds for the frontal air bags and pretensioners in the subject vehicles.

Answer

Ford understands this request to mean that the agency is seeking data collected during Ford crash testing of the subject vehicles. Deceleration vs. time data is contained in graphical form in the crash test reports provided in response to Request 9. Velocity vs. time data (the mathematical integral of the deceleration data) is used on a very limited basis and typically only on a specific data channel when an engineer desires to gain a better understanding of the event. Within Ford, velocity vs. time data is typically transient data and is not stored as part of the permanent event record. To the extent that such data exists, it would be included in the crash test reports provided in response to Request 9.

It should be noted that Ford sets "must deploy" targets based upon occupant protection objectives that are similar throughout the industry. A speed is determined to meet the objective, and this target-related speed is used in crash testing to capture acceleration signals that are used in sensor modeling and system calibration development. The acceleration/deceleration data from the crash test is used to develop sensor and system strategy to meet an occupant protection objective. The deceleration vs. time data provided in response to this question is not considered by Ford to be "threshold profiles," but rather the vehicular/sensor system responses to crash events.

Request 11

> Provide Ford's time-to-fire requirements for the Insurance Institute for Highway Safety's (IIHS) 40-mph frontal offset deformable barrier crash test.

Answer

Ford conducted two separate tests related to the Insurance Institute for Highway Safety's (IIHS) 40-mph frontal offset deformable barrier crash test. The time-to-fire requirements for the two tests are:

Test ID 10921

Unbelted stage one target deployment time was 31 msec.
Belted stage one target deployment time was 36 msec.
Stage two belted and unbelted deployment target was "non-deployment."

Test ID 11398

Unbelted stage one target deployment target time was 30 msec.
Belted stage one target deployment time was 36 msec.
Stage 2 belted and unbelted deployment target was "non-deployment."

Complete copies of the results from both of these tests are included in response to Request 9.

Request 12

Describe all assessments, analyses, tests, 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

The requested information was previously provided in Appendix O of Ford's response to Request 10 of PE03-002. Additional information is provided in Appendix E.

Request 13

Describe all modifications or changes made by, or on behalf of, Ford in the design, material composition, manufacture, quality control, supply, or installation of the subject components, from the start of production to date, which relate to, or may relate to, the alleged defect 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.

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

The requested information was previously provided in Appendix L of Ford's March 24, 2003 response to Request 13 of PE03-002.

Request 14

State whether Ford ever considered substituting an alternative design(s) or component(s) for the subject components in the subject vehicles that relate, or may relate, in any way to this investigation. If so, identify and describe each such alternative design or component, and state:

a. The date it was first proposed;
b. The disposition of that proposal (i.e., approved, disapproved, or still being evaluated); and
c. The reasons for that action.

Answer

Ford did not consider any alternative designs or components as a result of any conditions related to the alleged defect. Documents responsive to this request are being submitted with a request for confidentiality under separate cover as Appendix G to the agency's Office of the Chief Counsel pursuant to 49 CFR, Part 512.

Request 15

Describe the differences in the subject components and vehicle structure between the subject vehicles and model year 2002 Taurus/Sable vehicles.

Answer

There are no structural differences between the subject vehicles and 2002 model year Taurus/Sable vehicles that affected the crash sensing or restraint system.

Differences between the air bag systems in the subject vehicles and those in 2002 model year Taurus and Sable vehicles were made as a part of routine technological enhancements across several different platforms within Ford. None of these changes were in response to any specific conditions or events. It should be noted that the system introduced into the 2002 model year Taurus/Sable was under development and under-going validation testing for Ford Motor Company prior to the incident noted by the agency.

A new restraint control module (RCM)/system, identified as ARM 300/400, was introduced in the 2002 model year Taurus/Sable. The system/component supplier to Ford remained the same. The system contained in the subject vehicles utilized an ARM100 RCM/system. The ARM100 system was designed specifically for the Taurus/Sable platform and did not contain the flexibility to incorporate future technology or to be integrated across several vehicle platforms (i.e., small sedans, large pickup trucks, SUV's and vans). The new ARM300/400 series system and the former ARM100 series share few components other than housings, fasteners, and basic electronic components. Among the additional features and capabilities of the ARM300/400 system in the 2002 model year Taurus/Sable include, are:

- Increased number of side satellite sensor channels (from 2 to 4 maximum)
- Programmable logic for deployment control (formerly fixed logic)
- Interface for Passenger Air Bag Deactivation (formerly not provided)
- Integrated rollover sensing and actuation control (formerly no rollover sensing or control)
- 58-pin connector from 37-pin connector
- 32 bit/32 MHz microcontroller (formerly 16 bit/10 MHz microcontroller)
- ASIC-based, continuous data-streaming satellites (formerly microcontroller-based, decision-making)
- Addition of high speed CAN data link

Request 16

Produce copies of all affidavits, depositions, or other statements of support related to the alleged defect in Schaeffer v. Ford Motor Co. that were provided by expert witnesses on behalf of Ford or the supplier(s) of the subject components.

Answer

Documents responsive to this Request are provided in Appendix H.

Request 17

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); and
d. The risk to motor vehicle safety that it poses.

Answer

The agency's letter defines the "alleged defect" as "any failure of a frontal air bag to deploy in frontal or near-frontal crash; or any allegation of non-deployment of a frontal air bag." As the agency is aware, supplemental air bag systems, including the subject air bag system, are not designed or intended to deploy in all frontal collisions. It is, therefore, inappropriate to consider any "failure of a frontal air bag to deploy" as a "defect." As will be described below, the air bag system is very complex. Vehicle operators cannot reasonably be expected to know or to understand circumstances under which an air bag should deploy and those under which it should not.

Ford has found no evidence of a defect pattern related to non-deployments of the frontal air bags in the subject vehicles when involved in collisions of sufficient longitudinal deceleration to require supplemental restraint for the driver and/or front passenger frontal air bags. Further, Ford is not aware of any technology capable of ensuring that an air bag will deploy, as designed, in every frontal impact regardless of the nature of the impact.

Brief Overview of the Personal Safety System

The 2000 model year Ford Taurus and Mercury Sable were the first vehicles produced by Ford to be equipped with Ford's Personal Safety System.

The Personal Safety System consists of:

- Safety belt pretensioners
- Dual-stage driver and front passenger air bag modules, the deployment of which depends on the severity of the crash, the fore/aft position of the driver's seat, and whether safety belts are buckled or unbuckled. (Fore/aft position of the driver seat and buckled/unbuckled status of the driver and front passenger safety belts will be referred to throughout simply as "occupant status.")
- A restraints control module (RCM), located in the center tunnel beneath the instrument panel, which provides information regarding the severity of the crash and predicts the level of appropriate supplemental restraint according to inputs received from the various sensors.
- A front crash sensor (FCS), located in front of the radiator, which provides additional information regarding the severity of the crash.

In the event of a frontal or near-frontal collision, the RCM predicts the longitudinal deceleration of the vehicle based on the input received from the FCS and its own crash severity sensing. If the predicted change in longitudinal velocity is great enough, the RCM will make a decision that some form of supplemental restraint is appropriate to reduce the potential for severe injury to a front seat occupant. Depending on a combination of the predicted severity of the crash and the occupant status, the level of supplemental restraint will vary. In some cases, deploying only safety belt pretensioners will be appropriate, while in others, frontal air bags may be deployed to provide additional supplemental restraint.

The system is also able to shift the threshold at which the air bags are deployed and the initiation timing of the two stages of the dual-stage inflator according to occupant status. Generally, the "must deploy" threshold for belted occupants is higher than those for unbelted

occupants allowing the safety belts to provide the appropriate level of occupant protection without unnecessarily deploying the air bags.

The fact that air bags do not deploy during a collision is not an indication of a defect in the Personal Safety System. Further, the amount of damage sustained by a vehicle is an unreliable indicator as to whether or not the air bags should have deployed. Longitudinal deceleration of the vehicle and occupant status are the determining factors. Longitudinal deceleration is affected by what a vehicle impacts (e.g., an animal, another vehicle, a guard rail, etc.) and the angle of that impact. Under-ride collisions, which generally result in the appearance of a severe impact, typically reduce deceleration loads transferred through the vehicle chassis to the RCM and often may result in a lower longitudinal deceleration than that required for air bag deployment. Additionally, frontal air bags are not designed to deploy in side, rear, rollover, or minor front impacts, where longitudinal decelerations are likely to be insufficient to warrant frontal air bag deployment. Therefore, despite what may appear to be relatively significant visible damage to a vehicle, the Personal Safety System may predict that the longitudinal deceleration is not sufficient to warrant the deployment of a frontal air bag.

Just as non-deployment of frontal air bags during an impact is not an indication of a defect in the Personal Safety System, neither is the deployment of a single frontal air bag. In certain situations, the Personal Safety System is capable of deploying one frontal air bag but not the other depending on the occupant status. For example, this situation may arise if the driver is unbelted and the passenger is belted. Depending on the longitudinal deceleration, the Personal Safety System may determine that the unbelted driver would benefit from the incremental protection afforded by an air bag, while the safety belt of the belted passenger would provide all of the necessary protection. Thus, in this particular example, the driver frontal air bag would deploy and the passenger frontal air bag would not. This performance is not a defect in the system but rather is proper function based upon the occupant status and conditions of the accident. A number of reports provided in this response relate to incidents like this example.

Further detail regarding the operation of the Personal Safety System can be found in Appendix I and Appendix J in response to Request 8 of PE03-002. Further, as a courtesy, Ford is providing a copy of the presentation made by the system supplier to ODI on June 12, 2003 to aid in understanding the complexity of this system. This information is being submitted with a request for confidentiality under separate cover as Appendix I to the agency's Office of the Chief Counsel pursuant to 49 CFR, Part 512.

Determining That The Personal Safety System Functioned as Designed

In order to make a determination that the Personal Safety System functioned as designed in frontal or near-frontal impacts and that air bag non-deployment was appropriate, we first reviewed owner and field reports for evidence that a deployment or non-deployment decision had been made. Such evidence includes the deployment of a supplemental restraint (e.g., a safety belt pretensioner or a single air bag) or reports of the presence of appropriate diagnostic codes.

If no such evidence was found, the reports were then reviewed to determine if the information regarding the circumstances of the incident were sufficient to make a determination that the non-deployment decision was appropriate. Such information would include where the vehicle was struck and some basis by which to judge the longitudinal deceleration. In collisions where the impact was not in the front or near-front of the vehicle, or the longitudinal deceleration was

below the deployment thresholds appropriate for the occupant status, the deployment of an air bag would not be expected, indicating the system functioned as designed.

Based on this review, we determined that the reports fall into three broad categories: 1) reports where the technical evidence supports a non-deployment decision, 2) reports where the conditions of the accident support a non-deployment decision, and 3) reports which do not have sufficient information by which to judge the appropriateness of the non-deployment decision. Each of these categories is discussed in greater detail below.

Analysis of Reports with Evidence that Supports a Non-Deployment Decision

Approximately 4% of all owner and field reports include diagnostic evidence submitted by dealer technicians or Ford representatives indicating that the system did function as designed. Such evidence includes air bag diagnostic trouble codes indicating that an accident had been detected upon which a non-deployment decision was based, and inspections and opinions rendered by outside agencies that the system functioned as designed. A review of the alleged injuries associated with these incidents provides support that the decision was appropriate. In two of the three reports containing diagnostic evidence, no injuries are alleged. The event that alleges an injury describes the injury as a "cardiac contusion" suffered during a "severe front impact." This type of injury is ordinarily associated with a seat belt restraint and results from loading of the seat belt. This type of injury can occur even with an air bag deployment.

In a small percentage of these reports, the diagnostic evidence of a non-deployment decision included the deployment of some portion of the supplemental restraint system, such as a pretensioner, or a single air bag. A single front air bag deployment is appropriate under conditions related to safety belt usage and occupant seat position. In these instances, no serious injuries were reported. Ford believes it is fair to conclude from these reports that, in these cases, the decision by the RCM not to deploy one or both of the air bags was appropriate.

Ford's ability to categorize the reports is generally inhibited by lack of information contained within the reports themselves. Ford believes that the number of reports containing evidence of a correct non-deployment decision could be much higher. However, the reports do not contain sufficient detail to allow Ford to draw reasonable conclusions about the appropriateness of the deployment decision. Details that are missing include information about pretensioner deployment and whether the report of a non-deployment refers to both air bags or a single air bag. Because most customers do not possess sufficient technical expertise to determine whether pretensioners deployed during an incident, for instance, this information is unavailable to Ford.

As discussed above in the brief overview of the system, air bag non-deployment by itself is not an indication of a defect in the Personal Safety System if, as in the example noted above, non-deployment is appropriate. Rather, such non-deployments are merely an indication that the longitudinal deceleration and the occupant status were such that the system predicted that supplemental restraint was not necessary for the circumstances. We believe that in each of the above incidents, the Personal Safety System functioned as designed.

Analysis of Reports Where the Conditions of the Accident Support a Non-Deployment

Approximately 36% of all owner reports provide some limited event details. The limited information provided in these reports suggests that the alleged event either was not a severe frontal or near-frontal impact, or may not have been a frontal or near-frontal impact at all. These

alleged incidents involve a myriad of conditions including crossing type impacts in "failure to yield" situations, parking lot impacts, driveway impacts, animal impacts, vehicles "bumping" or "tapping" the vehicle in front of them, vehicles being rear-ended and pushed into the vehicle in front of them, vehicles running down embankments or off into the median, or damage described as being to the side of the vehicle. As an example, one owner (VIN 1FAFP55U51A166725) impacted a cement pole in a parking lot, and then continued to his destination, attended an appointment, and drove 400 miles to his home prior to seeking repairs or medical attention while he alleges a broken sternum. This set of circumstances seems unlikely at best and not evidence of a defect related to non-deployment of an air bag. While the lack of definitive detail precludes fully analyzing these incidents, the information supports a conclusion that the System's non-deployment decision was appropriate.

In addition to the limited alleged accident details available, the alleged injuries associated with these specific incidents provide further evidence that the decision not to deploy air bags was appropriate. In approximately 41% of these reports, no injuries are alleged. In approximately 52% of the reports, only minor injuries typical of post-collision complaints arising from the nature of these events are alleged, or the alleged injuries are described such that we are unable to broadly classify the injuries. Only 7% allege more severe injuries which still can occur with lower speed crashes where an air bag non-deployment is consistent with the design of the system. Therefore, due to the low number and minor nature of the vast majority of these injuries, we conclude that deployment of the air bags in these particular incidents would have been unlikely to provide additional benefit to the occupants and that the non-deployment decision by the Personal Safety System was appropriate.

Reports with Insufficient Evidence to Make a Determination

Approximately 96% of the reports fall into this category; neither the owners nor the insurance companies followed Ford's suggestion to have the Ford/Lincoln/Mercury dealership of their choice perform diagnostics on the restraint system. In many cases, Ford was contacted only after the vehicle either was repaired or otherwise disposed. In these instances the owners were usually seeking financial assistance due to settlement short falls or "third party" suggestions that the restraint system did not function properly. Some owners commented that they contacted Ford (after repairs or disposition of the damaged vehicle) as a result of publicity related to the agency's investigation of the subject vehicles.

Apart from those reports discussed above, the majority of owner and field reports do not contain enough information regarding the nature of the impact or occupant status to reasonably determine whether or not deployment of air bags was appropriate.

Of the reports alleging some type of damage to the front of the vehicle, the vast majority do not indicate what the vehicle collided with or provide any estimation of vehicle speed at the time of the collision. Such information is necessary to make a judgment of the longitudinal deceleration. Nor is speed an accurate indicator of deceleration in a crash.
Even in those reports where a vehicle speed was indicated, we know that drivers often perceive vehicle speed at the moment of collision to be much higher than other evidence suggests. Estimates of vehicle speed by customers are likely based on the last known speed and likely do not account for slowing as a result of braking or other evasive maneuvers immediately preceding the impact.

The amount of frontal damage sustained by the vehicle may also lead customers to report that they were traveling faster than what they actually were. Vehicle front ends are designed to

dissipate the energy of the impact by crumpling in specific crush zones reducing the amount of impact energy transferred to the occupant compartment. The amount of damage to sheet metal body components resulting from an impact may cause customers to assume their speed immediately prior to the impact was greater than it actually was. In reality, substantial sheet metal deformation may reduce longitudinal deceleration below that required for air bag deployment. Sheet metal damage is not a reliable indicator of whether an air bag deployment is warranted.

Although a majority of the owner and field reports do not contain enough information by which to judge the appropriateness of the non-deployment, there is no evidence to suggest that the Personal Safety System did not function as designed. Apart from the single isolated case of the 2000 Taurus crash which prompted this investigation, Ford is not aware of any other incidents in which the air bags did not deploy in circumstances in which they would likely have been warranted. Based on the extensive and thorough testing conducted by Ford in the development of this system, and the lack of evidence to the contrary, we conclude that the system operated as designed and intended in the reports of non-deployment received by Ford.

A likely explanation for reports of non-deployment is that customers do not understand the complexity of the decision by the Personal Safety System to deploy or not deploy the air bags. Based on the amount of visible damage to their vehicles, customers may incorrectly believe that the air bags should have deployed, when in fact the Personal Safety System correctly predicted that no additional supplemental restraint was required. As an example, we cite the reports involving collisions with animals or pedestrians. Although such impacts are sometimes capable of causing significant damage to the front of a vehicle, the longitudinal deceleration typically is not sufficient to warrant deployment of an air bag. It is of interest that many owners who contact Ford make mention that they are making the contact because the "insurance adjuster," "independent mechanic," "police officer," "family member" or other individuals who may not have an understanding of the air bag system complexity told them the "air bag should have deployed." As noted previously, some contacts have been made solely due to publicity surrounding agency announcements.

In instances where the collision involvee another vehicle, customers may not fully comprehend the speed at which another vehicle can be struck without the need for a supplemental air bag restraint. This is particularly true when the deployment threshold is shifted upwards for a belted driver. (Appendix J, provided in response to Request 8 of PE03-002 regarding the description of the system, provides details of these thresholds.) Because the bodies of both vehicles crumple in such an accident, impact energy is dissipated, and the RCM may correctly predict that incremental protection from an air bag is not warranted.

In order to limit the potential for such misunderstandings, a general explanation as to the operation of the Personal Safety System is included in the Owner Guide of the subject vehicles (see Appendix M of the response to PE03-002).

Injuries

A review of the reports alleging injuries reveals that, when considered in a light most favorable to the complainant, approximately 7% of the alleged injuries are of the nature of bruised or broken ribs, soreness, and, in two cases, broken sternums. One report alleges a fractured knee, and several others allege only bruises. Approximately 36% of the incidents describe minor injuries, and another 17% cannot be classified from the descriptions provided. This data

further supports that the air bag deployment decisions made by the restraint system were appropriate.

Proper use of safety belts is the single most effective occupant protection device available for reducing the risk of injury or death. A supplemental frontal air bag is designed to work with the safety belt to help protect front seat occupants from certain upper body injuries in moderate to severe frontal collisions. For impacts with sufficient longitudinal deceleration to deploy the frontal air bags, safety belts and pretensioners help to restrain the occupants in a position to maximize the effectiveness of the air bags.

With respect to allegations of injury, Ford cannot determine whether each occupant was properly belted prior to the accident. Nevertheless, a properly belted occupant in a collision will not be isolated from post-collision complaints such as bruising, whiplash or other pains that may be a direct result of the collision forces during impact regardless of whether or not an air bag has deployed.

Complaints of injuries also may include those that frontal air bags are not designed to help protect against, such as injuries to the upper and lower extremities, contact injuries that result directly from a deploying air bag, or those that may result from lateral movement of the vehicle such as those likely to be experienced in accidents involving side, angled, near-frontal, or rollover impacts.

Summary

The Personal Safety System was designed to provide a high level of occupant protection to front seat occupants during higher severity impacts. The system is designed to predict the severity of the impact and appropriately deploys supplemental restraints according to occupant status. Non-deployment of an air bag is not an indication of a defect in the system; it simply indicates that the Personal Safety System determined that additional supplemental restraint was not required to provide an adequate level of occupant protection.

The complexity of modern supplemental air bag systems and the uniqueness of every crash make it extremely difficult to evaluate system performance in real world crashes. It is well understood that vehicle speed or readily observable crash damage frequently are not good predictors of system performance. Experience has shown that customers do not have a good understanding of air bag system performance, and systems with features like safety belt use sensors that can substantially raise the deployment threshold, make this determination even more difficult. Experience also has shown that customers can receive injuries in crashes where an air bag properly has not deployed according to the design intent of the vehicle manufacturer. However, the overwhelming majority of these injuries are minor because the velocity change is low. Thus, customer complaints for a given vehicle are an inherently unreliable indicator of proper system performance, and a thorough evaluation of each crash generally is necessary to determine if the system functioned as designed.

In the case of the 2000 model year Taurus that is the subject of this investigation, a thorough review of the crash, the vehicle and its crash data recorder by Ford and the agency's Special Crash Investigation unit did not establish why the air bag did not deploy in this unique crash. We believe that this is an isolated and unique incident and we are unaware of similar cases. The available real world data for the entire population of 2000 and 2001 Taurus and Sable vehicles, and the work of the Special Crash Investigation unit, clearly demonstrate that these vehicles are reliably providing a high level of occupant protection for our customers and that

these vehicles do not contain a defect in the supplemental air bag system, nor do they represent an unreasonable risk to motor vehicle safety.

Ford believes that the Personal Safety System is functioning as designed and provides appropriate levels of occupant protection. We do not believe that reports of air bag non-deployments in the subject vehicles represent a defect of the Personal Safety System nor an unreasonable risk to motor vehicle safety.

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