



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

400 Seventh Street, S.W.
Washington, D.C. 20590

JUL 16 2004

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Don Bearden, Director
Government Affairs
Subaru of America, Inc.
Subaru Plaza
P.O. Box 6000
Cherry Hill, NJ 08034-6000

NVS-214SS
EA03-024

Dear Mr. Bearden:

As you are aware, the Office of Defects Investigation (ODI) of the National Highway Traffic Safety Administration (NHTSA) has an ongoing Engineering Analysis (EA03-024) with Subaru concerning allegations of ABS performance problems on 2002-2003 WRX models

After reviewing Subaru's April 7, 2004 response to ODI's Information Request dated February 11, 2004 (EA-IR), ODI is requesting additional information from Subaru. Unless otherwise stated in the text, the following definitions apply to these information requests:

- **Subject vehicles:** all MY 2002-2003 Subaru Impreza WRX vehicles manufactured for sale or lease in the United States.
- **Subaru:** Subaru Corporation, all of its past and present officers and employees, whether assigned to its principal offices or any of its field or other locations, including all of its divisions, subsidiaries (whether or not incorporated) and affiliated enterprises and all of their headquarters, regional, zone and other offices and their employees, and all agents, contractors, consultants, attorneys and law firms and other persons engaged directly or indirectly (e.g., employee of a consultant) by or under the control of SUBARU (including all business units and persons previously referred to), who are or, in or after January 1, 1998, were involved in any way with any of the following related to the alleged defect in the subject vehicles:
 - Design, engineering, analysis, modification or production (e.g. quality control);
 - Testing, assessment or evaluation;



DOT AUTO SAFETY HOTLINE
888-DASH-2-DOT
888-327-4236

- Consideration, or recognition of potential or actual defects, reporting, record-keeping and information management, (e.g., complaints, field reports, warranty information, part sales), analysis, claims, or lawsuits; or
 - Communication to, from or intended for zone representatives, fleets, dealers, or other field locations, including but not limited to people who have the capacity to obtain information from dealers.
- **Alleged defect:** for the purpose of this information request, the term alleged defect includes any or all of the following issues as they relate to the subject vehicles:
 - braking performance characterized by vehicle operators' perception of a loss or degradation of braking ability, including, but not limited to, situations in which vehicle owners or operators describe themselves as having experienced any of the following: extended/prolonged stopping distance, reduced braking ability/effectiveness, loss/lack of braking ability/force, no/little braking ability, no brakes, brakes release, loss of brakes, brakes disengage, brakes fail, brake failure, or brake pedal goes to the floor;
 - antilock braking system (ABS) performance characterized by vehicle operators' perception of a loss or degradation of braking ability, including, but not limited to, situations in which vehicle owners or operators describe themselves as having experienced any of the following: overactive ABS, inappropriate ABS activation/intervention, ABS engages for no reason, premature ABS operation/activation; and
 - any concern expressed by vehicle owners or operators about braking performance when driving over roadway/pavement irregularities or contamination, including, but not limited to, any of the following: bump or bumps, rough/uneven road surface, pothole or potholes, washboard, ripples, manhole covers, pavement drop-offs, pavement seam, expansion joints, railroad tracks/crossings, or gravel/sand on the roadway.
- **Document:** "Document(s)" is used in the broadest sense of the word and shall mean all original written, printed, typed, recorded, or graphic matter whatsoever, however produced or reproduced, of every kind, nature, and description, and all non-identical copies of both sides thereof, including, but not limited to, papers, letters, memoranda, correspondence, communications, electronic mail (e-mail) messages (existing in hard copy and/or in electronic storage), faxes, mailgrams, telegrams, cables, telex messages, notes, annotations, working papers, drafts, minutes, records, audio and video recordings, data, databases, other information bases, summaries, charts, tables, graphics, other visual displays, photographs, statements, interviews, opinions, reports, newspaper articles, studies, analyses, evaluations, interpretations, contracts, agreements, jottings, agendas, bulletins, notices, announcements, instructions, blueprints, drawings, as-builts, changes, manuals, publications, work schedules, journals, statistical data, desk, portable and computer calendars, appointment books, diaries, travel reports, lists, tabulations, computer printouts, data processing program libraries, data processing inputs and outputs, microfilms, microfiches, statements for services,

resolutions, financial statements, governmental records, business records, personnel records, work orders, pleadings, discovery in any form, affidavits, motions, responses to discovery, all transcripts, administrative filings and all mechanical, magnetic, photographic and electronic records or recordings of any kind, including any storage media associated with computers, including, but not limited to, information on hard drives, floppy disks, backup tapes, and zip drives, electronic communications, including but not limited to, the Internet and shall include any drafts or revisions pertaining to any of the foregoing, all other things similar to any of the foregoing, however denominated by Subaru, any other data compilations from which information can be obtained, translated if necessary, into a usable form and any other documents. For purposes of this request, any document which contains any note, comment, addition, deletion, insertion, annotation, or otherwise comprises a non-identical copy of another document shall be treated as a separate document subject to production. In all cases where original and any non-identical copies are not available, "document(s)" also means any identical copies of the original and all non-identical copies thereof. Any document, record, graph, chart, film or photograph originally produced in color must be provided in color. Furnish all documents whether verified by the manufacturer or not. If a document is not in the English language, provide both the original document and an English translation of the document.

- **Other Terms:** To the extent that they are used in these information requests, the terms "claim," "consumer complaint," "dealer field report," "field report," "fire," "fleet," "good will," "make," "model," "model year," "notice," "property damage," "property damage claim," "rollover," "type," "warranty," "warranty adjustment," and "warranty claim," whether used in singular or in plural form, have the same meaning as found in 49 CFR 579.4.

In order for my staff to evaluate the alleged defect, certain information is required. Pursuant to 49 U.S.C. § 30166, please provide numbered responses to the following information requests. Insofar as Subaru has previously provided a document to ODI, Subaru may produce it again or identify the document, the document submission to ODI in which it was included and the precise location in that submission where the document is located. When documents are produced, the documents shall be produced in an identified, organized manner that corresponds with the organization of this information request letter (including all individual requests and subparts). When documents are produced and the documents would not, standing alone, be self-explanatory, the production of documents shall be supplemented and accompanied by explanation.

Please repeat the applicable request verbatim above each response. After Subaru's response to each request, identify the source of the information and indicate the last date the information was gathered.

1. Subaru's response to Request No. 9d of the EA-IR references the variables K1, K2, K3, K4, and K5.

- a. State the values for K1, K2, K3, K4, and K5 at the end of each of the following events (if these values are different for any or each of the vehicle's wheels, state the values for each wheel):
- a vehicle at a "vehicle traveling (cruising) status" of initial speed 40 mph on a smooth dry asphalt surface;
 - immediately subsequent to i) above, the driver initiates braking at a deceleration of 0.1 g's and decelerates to 35 mph; and
 - immediately subsequent to ii) above, the left front wheel hit a single bump of minimally sufficient severity to result in the activation of the ABS.

State the values for K1, K2, K3, K4, and K5 for seven additional sets of similar sequences of events as that described by i) through iii) above, with the deceleration indicated in b) incremented by 0.1 g's for each subsequent sequence of events up to a maximum of 0.8 g's;

- b. State the values of for K1, K2, K3, K4, and K5 at the end of each of the following events (if these values are different for any or each of the vehicle's wheels, state the values for each wheel):
- a vehicle at a "vehicle traveling (cruising) status" of initial speed 40 mph on a smooth dry asphalt surface;
 - immediately subsequent to i) above, the driver initiates braking at a deceleration of 0.1 g's and decelerates to 35 mph; and
 - immediately subsequent to ii) above, the left front wheel crosses an abrupt drop-off of minimally sufficient severity to result in the activation of the ABS.

State the values for K1, K2, K3, K4, and K5 for seven additional sets of similar sequences of events as that described by i) through iii) above, with the deceleration indicated in b) incremented by 0.1 g's for each subsequent sequence of events up to a maximum of 0.8 g's;

- c. Would any of the values of K1, K2, K3, K4, or K5 at the end of events a-iii or b-iii above change if both front wheels had encountered the bump or drop-off? If so, please describe how they would differ.

2. For the purposes of this Request, ABS sensitivity refers to the level of percent wheel slip, the level of wheel acceleration/deceleration, or the time interval over which a certain level of percent wheel slip or a certain level of wheel acceleration/deceleration occurs at one or more wheels at which the ABS will activate and begin to control the percent wheel slip at one or more of the wheels. Does ABS sensitivity vary with vehicle speed? If so, describe how such speed sensitivity is implemented in the control logic of the ABS.
3. Subaru's response to Request No. 9d of the EA-IR includes a discussion on the ABS learning function. In response to Request No. 9d, Subaru states: "The system monitors acceleration and deceleration in each of four (4) wheels while ABS is not controlled, and in the case a condition of acceleration and declaration over designated values were detected over designated times, wheel slip ratio that

triggers ABS control would be changed to higher values." With respect to that response, we have the following questions:

- a. Are there any cautions on testing an ABS unit with a learning function? Do we need to cycle the ignition key between every ABS test run to clear the learned changes?
 - b. If non-ABS stops are monitored and the slip ratios are raised, how long are they raised (e.g., for the rest of the ignition key cycle, for more than one brake application invoking ABS, for more than one "build to depart, dump to recover" cycle during an ABS stop?)
 - c. Are all four wheels' slip ratios that "trigger ABS control" changed equally? If not, are the wheel slip ratios that "trigger ABS control" of the wheels of either of the front or rear axles changed equally as a pair?
 - d. State the conditions (i.e., vehicle speed, coefficient of friction, and time between cycles) that would set the lowest wheel slip ratios possible for testing.
 - e. State whether 20 ABS stops on wetted Jennite (full low-co) change the ABS performance for the next stop over a vertical perturbation.
 - f. Specify the values of wheel acceleration and deceleration that cause changes in slip ratio triggers.
 - g. How does a very-low-co flag get set? Is there a critical time period between brake light switch "On" and a front wheel slip that sets a very low-co flag?
 - h. The last sentence of this paragraph is confusing as it states, "The start timing of pressure increase will be delayed most when the wheel speed becomes consistent with the reference speed. (See the circles portion in the attached Appendix 9d, part 2.)" Based upon the previous sentence, it appears that brake pressure would rebuild at the time that the wheel speed matches vehicle reference speed. Explain in detail.
4. After our review of Subaru's response to Request No. 9g of the EA-IR, the diagram attached to Subaru's response as Appendix 9G and titled "ECU Internal Circuit diagram" (diagram), we have the following questions:
- a. The diagram shows an input for "AT only" [near "C208" on drawing], what is the reason/function for this item?
 - b. The diagram shows an output for "AT only" [near "C501" on drawing], what is the reason/function for this item?
 - c. The diagram shows an input for a single G sensor with the note "4WD only" [near "C308" on drawing]. Is it not true that all Subaru's are AWD all the time?
 - d. The diagram shows only one G sensor, while response 9a says, "compensated according to the value of front/rear G sensor." Explain in detail.

5. Are there any cautions on ABS testing of Subaru's that may not be obvious? For example, one manufacturer has told us that the ABS self-test conditions could interfere with ABS testing since the vehicle needed to exceed 15 mph for more than 10 sec, without a 0.9 g wheel acceleration or deceleration (note the exact numbers have been changed). Specifically, the manufacturer warned us that if a vehicle were started, raced to 40 mph, and brake tested, the ABS might not have been fully operational. What are the Subaru ABS self test initiation speed, duration, limitations, etc?
6. Concerning Subaru Technical Services Case Report with Journals, Case No. 554565, state the final status of this case report, including ROs, photographs, etc. The apparent address along the bottom of the page was:
file://C:\WINDOWS\TEMP\~002.htm.
7. Subaru Service Quality Monitoring Reports, Record ID 9979 refers to "separate emails." Those e-mails are missing. Please discuss what changes in engine vacuum affect the power brake booster. Include ROs, photographs, etc. The apparent address along the bottom of the page was:
file://C:\WINDOWS\TEMP\~002.htm.
8. Subaru Technical Services Case Report with Journals, Case No. 567822: Please explain what "F/Frame data showed 158 MPH" refers to? What is "F/Frame?" How is this information accessed with the Select Monitor?
9. Very few of the Subaru Service Quality Monitoring Reports, Subaru Technical to each Services Case Reports, or Complete SAMI Case Reports discuss the conclusions made about the owner complaint. Please discuss each report and the information gathered, reported, the final disposition of the vehicle, the financial compensation made to the owner, etc.
10. In SAMI Case Report, Case No. 531966, the seven pages of text describe the setup for the test/inspection, but do not address the results, please complete the information.
11. In SAMI Case Report, Case No. 532724, the expected 25 pages of text are terminated after 21 pages. Please submit the rest of the pages and discuss the final conclusions, supply the final report, and the disposition of the buyback vehicle.
12. The following "Tech Notes" descriptions are truncated in mid-sentence. Provide the complete text.

Incomplete Tech Notes from WARRANTY_DATA.mdb	
Claim ID	Tech Notes
8631037	ONE DAY RENTAL,CUST REPORTS LOSS OF PEDAL WHEN DEPRESSING BRAKE PEDAL GOES TO FLOORBOARD,INSPECT AND ADVISE.EXTRA DIAG TIME TO DUPLICATE CONCERN DID NOT HAPPEN TILL VEHICLE WARMED UP. THEN EXTENDED STOP LIGHT,PEDAL FADE TO FLOOR.REPLACEDTHE BR
8648996	CUST. STATES WHEN IT SNOWS THE BRAKE PEDAL GOES TO THE FLOOR AND THERE IS NO BRAKES OR THE PEDAL WILL BRAB AND MAKE A HORRIBLE NOISE AND THE CAR WILL NOT STOP. ROAD TESTED VERIFIED NORMAL ABS OPERTION. CHECKED BRAKE SYS ON HOIST AND FLUID ALL
8781267	8 DAYS RENTAL VEHICLE ARRIVED UNSAFE BEFORE WEEKEND. 1.0 OLH NEC. INITIAL DIAGNOSIS WHICH INCLUDED MUCH ROAD TESTING TO DUPLICATE CONCERN INDICATED THAT RT FRT WHEEL SPEED SENSOR WAS DROPPING OUT ON SCANNER READING AS COMPARED TO OTHER 3. N
8793071	CUSTOMER STATES BRAKES FELL SOFTER THAN BEFORE CHECKED FLUID IN MASTER CYL- OK TEST DROVE PERFORMED PANIC STOP AT 65MPH COULD GET ABS TO COME ON AND CAR STOPPED VERY FAST SHUT CAR OFF PERFORMED BRAKE PEDAL TEST 3 PUMPS AT THE THIRD PUMP PEDAL
8925080	AT TIMES YOU CAN PUSH ON THE BRAKE PEDAL AND EXPERIENCE PEDAL FADE. ROAD TESTED WITH DSOM TANZER & CONFIRMED.REPLACED BOOSTER AS ADVISED- NO CHANGE.REPLACED MASTER CYLINDER-NO CHANGE.SUBARU ENGINEER CAME & HAD THE ELECTRONICS ON ABS MODULE REPL
8967111	CUSTOMER REQUEST TO CHECK BRAKES FEELS LIKE DRIVER NEEDS TO PRESS HARDER THAN SUPPOSE TO INABLE STOPPING TECH TEST DROVE CAR AND FOUND BRAKE PEDAL SOFT TECH INSPECTED ,ASTER CYLINDER AND FOUND BRAKE FLUID LOW TOPPED FLUID OFF AND DETERMINED IT

This letter is being sent to Subaru pursuant to 49 U.S.C. § 30166, which authorizes NHTSA to conduct any investigation that may be necessary to enforce Chapter 301 of Title 49 and to request reports and the production of things. It constitutes a new request for information. Subaru's failure to respond promptly and fully to this letter could subject Subaru to civil penalties pursuant to 49 U.S.C. § 30165 or lead to an action for injunctive relief pursuant to 49 U.S.C. § 30163. (Other remedies and sanctions are available as well.) Please note that maximum civil penalties under 49 U.S.C. § 30165 have increased as a result of the recent enactment of the Transportation Recall Enhancement, Accountability, and Documentation (TREAD) Act, Public Law No. 106-414 (signed November 1, 2000). Section 5(a) of the TREAD Act, codified at 49 U.S.C. § 30165(b), provides for civil penalties of up to \$5,000 per day, with a maximum of \$15 million for a related series of violations, for failing or refusing to perform an act required under 49 U.S.C. § 30166. This includes failing to respond to ODI information requests.

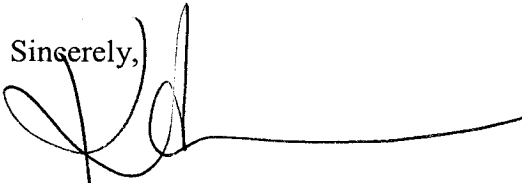
If Subaru cannot respond to any specific request or subpart(s) thereof, please state the reason why it is unable to do so. If on the basis of attorney-client, attorney work product, or other privilege, Subaru does not submit one or more requested documents or items of information in response to this information request, Subaru must provide a privilege log identifying each document or item withheld, and stating the date, subject or title, the name and position of the person(s) from, and the person(s) to whom it was sent, and the name and position of any other recipient (to include all carbon copies or blind carbon copies), the nature of that information or material, and the basis for the claim of privilege and why that privilege applies.

Subaru's response to this letter, in duplicate, together with a copy of any confidentiality request, must be submitted to this office by **August 13, 2004**. Please refer to **EA03-024** in Subaru's response to this letter. If Subaru finds that it is unable to provide all of the information requested within the time allotted, Subaru must request an extension from me at (202) 366-4933 no later than five business days before the response due date. If Subaru is unable to provide all of the information requested by the original deadline, it must submit a partial response by the original deadline with whatever information Subaru then has available, even if an extension has been granted.

If Subaru claims that any of the information or documents provided in response to this information request constitute confidential commercial material within the meaning of 5 U.S.C. § 552(b)(4), or are protected from disclosure pursuant to 18 U.S.C. § 1905, Subaru must submit supporting information together with the materials that are the subject of the confidentiality request, in accordance with 49 CFR Part 512, to the Office of Chief Counsel (NCC-113), National Highway Traffic Safety Administration, Room 5219, 400 Seventh Street, S.W., Washington, D.C. 20590. Subaru is required to submit two copies of the documents containing allegedly confidential information (except only one copy of blueprints) and one copy of the documents from which information claimed to be confidential has been deleted.

If you have any technical questions concerning this matter, please call Nate Seymour of my staff at (202) 366-6965.

Sincerely,

A handwritten signature in black ink, appearing to read 'Kd', followed by a long horizontal line extending to the right.

Kathleen C. DeMeter, Director
Office of Defects Investigation