



November 9, 2022

Mr. Josh Neff
Chief, Medium/Heavy Duty Vehicle Defect Division (NEF-106)
Office of Defects Investigation
National Highway Traffic Safety Administration
1200 New Jersey Ave SE
Washington, D.C. 20590

RE: **PE20-006**

Dear Mr. Neff,

On behalf of Volvo Group, and specifically Volvo Trucks North America, I am responding to your September 28, 2022, Information Request (IR) letter sent in connection with Preliminary Evaluation (PE) 20-006, an investigation into loss of power steering assist in certain power steering gear manufactured by ZF North America/TRW Automotive Inc. and supplied as equipment to VTNA. Please feel free to give me a call if you have any questions.

With Best Regards,



Emily Bishop

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Volvo Group



November 9, 2022 Response to NHTSA's September 28, 2022 Letter

This letter is in response to an Information Request (IR) letter sent to Volvo Trucks North America (VTNA) and dated September 28, 2022. The IR was issued in connection with Preliminary Evaluation (PE) 20-006, an investigation being conducted by the National Highway Traffic Safety Administration's (NHTSA's) Office of Defects Investigation (ODI), that was opened on May 1, 2020. According to the PE20-006 opening resume, the subject of the investigation is "Loss of Power Steering Assist" in trucks equipped with a subject steering gear (model THP60) manufactured by ZF North America, Inc/TRW Automotive Inc (ZF/TRW), a major tier-one manufacturer of automotive equipment who supplied the subject steering gear to VTNA. The resume cites 15 complaints reported in 3 Vehicle Owner Questionnaires (VOQs)¹ and other Technical Service Bulletins and Field Reports supplied by ZF/TRW. No crashes, fires, injuries or fatalities are cited. The investigation was opened to understand the failure mode, design, and longevity of the subject steering gear, particularly with respect to operation in high temperature environments, and its effect on the overall ability for the driver to control the vehicle when a loss of power assist occurs. VTNA is aware that an IR has been sent to ZF/TRW in connection with this investigation.²

The following terms were defined by NHTSA in its September 28, 2022, IR letter:

Subject Vehicles: all makes and models of final stage vehicles from MY 2010 – 2020 equipped with a new or re-manufactured TRW THP60 steering gear manufactured for sale or lease in the United States, including, but not limited to, the District of Columbia, and current U.S. territories and possessions.

Subject Component: all new and re-manufactured ZF Group/TRW steering gear THP60 identical or substantially similar to those installed on the subject vehicles.

Alleged Defect: Loss of power steering assist.

As requested in the IR letter, VTNA is repeating the applicable request verbatim before providing its response. When applicable, the source of the information is provided with each response; the last date the information was gathered through is that of NHTSA's IR letter, specifically September 28, 2022. VTNA is not claiming confidentiality for any portions of this submission. Where a readily editable document (e.g., an Excel spreadsheet, or a Word document) is provided in the response, VTNA is also submitting a duplicate copy in Adobe PDF format to document its state at the time of submission. VTNA's full and complete response consists of this letter and electronic (digitized) documents that are provided in a folder titled Attachments which contains a total of 24 subfolders with 54 files (36.9 MB). At this time, VTNA has not identified the presence of a safety-related defect involving the subject component's use in the subject vehicles, as discussed further below.

¹ Specifically, the reports were filed under ODI numbers 11195150, 11195335 and 11193866, filed in late 2018 and early 2019; none involved a VTNA product. One VOQ alleged knowledge of 13 subject steering gear failures and was counted multiple times.

² Accordingly, VTNA considers this request a "peer IR" similar to those sent to other OEMs who purchased the subject THP60 steering gear, and also because VTNA is not a named OEM in PE20-006.



VTNA's Responses to NHTSA's PE20-006 IR Letter Requests

Request 1:

State, by model and production year, the number of subject components VTNA has purchased for OEM, repair and replacement and aftermarket use in the United States.

Separately, for each subject component purchased to date by VTNA, state the following:

- a. Serial number;
- b. Make;
- c. Model;
- d. Facility where steering gear was manufactured or remanufactured;
- e. Subject component part number and design version;
- f. Date of subject component manufacture; and
- g. Date warranty coverage commenced;

Provide the table in Microsoft Access 2010, or a compatible format, entitled "PRODUCTION DATA." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

Response 1:

Within VTNA, the subject steering gear is known generically as the "THP60" model gear. Specific part numbers are assigned by both ZF/TRW and VTNA to further define the application and version (design) level of the subject component. VTNA's understanding is that all subject components, either new or remanufactured, are produced at ZF/TRW's Lebanon, TN production facility. The serial number for the subject steering gear is not supplied to VTNA by ZF/TRW, nor does VTNA trace or record it; similarly, VTNA does not receive or record the date of manufacture for each gear.³ Accordingly, VTNA cannot provide the information requested above at the "for each subject component purchased" level, nor can it provide the requested database.

However, VTNA was able to provide a spreadsheet that contains the number (volume) of steering gear supplied by ZF/TRW listed by both ZF/TRW and VTNA part number, and by the calendar year the units were supplied to VTNA beginning at CY 2010. The spreadsheet is titled Subject Component Volumes and is provided in the Response 1 folder. Version (design) level of the gear is indicated by the suffix (A, B, C, etc.) of the ZF/TRW part number, except for the 'R' suffix which indicates the gear was a remanufactured component. The volumes provided in the spreadsheet include all gear volumes (OEM, service parts, etc.). VTNA estimates that just under 80% of the gears supplied were used for OEM production, the remainder were likely used for service parts (there may be other internal and external uses also, e.g., engineering evaluation/testing, product development, training purposes, third party users, etc.). Warranty coverage for any specific subject gear would commence on

³ VTNA believes it would be reasonable to assume the gear was manufactured approximately in the year it was supplied.



the first date of sale to an original owner of the vehicle it was installed in; VTNA refers to this as the "in-service date."

VTNA is also providing a spreadsheet containing information about subject vehicles manufactured with the subject components. The spreadsheet, titled Subject Vehicle Details and provided in the Response 1 folder, contains three worksheets; the first tab contains VIN level details (VIN, make, model 1, model 2 (marketing type), model year, manufacture date, and in service date) on each of the 236,296 VTNA vehicles produced with the subject component, two other tabs shows production volumes (counts) aggregated by model names and model years.

Specific answers to the questions enumerated above follow:

- a. Serial Number: Not available, see above
- b. Make: ZF/TRW
- c. Model: THP60
- d. Facility where produced: Lebanon, TN
- e. Part Number, design level: See above and Response 1 folder
- f. Date of Manufacture: Unknown, see above
- g. Warranty Start Date: Original date of sale of vehicle

Source: The information provided in this response and the included spreadsheets were provided from, or with ZF/TRW's assistance, or from VTNA's E Purchasing System reporting for global purchasing.

Request 2:

State the number of each of the following, received by VTNA, or of which VTNA is otherwise aware, which relate to, or may relate to, the alleged defect in the subject component:

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

For subparts "a" through "g" 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 "g," provide a summary description of the alleged problem and causal and contributing factors and VTNA's assessment of the problem, with a summary of the significant underlying facts and evidence. For items "f" and "g," 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.



Response 2:

VTNA conducted a diligent search of records and data sources where reports of the alleged defect in the subject component would normally be stored and identified the following counts:⁴

- a. Consumer Complaints: **3**
- b. Field Reports: **19⁵**
- c. Reports involving a crash, injury or fatality: **0**
- d. Reports involving a fire: **0**
- e. Property damage claims: **0**
- f. Third party arbitrations: **0**
- g. Lawsuits: **0**

Source: VTNA internal records and data sources, such as the ASIST and ARGUS systems (consumer complaints, technical assistance requests, field reports) and the Legal Tracker database (lawsuits, property damage and third party arbitrations), where records of this type would normally be stored.

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. VTNA'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), street address, email address and telephone number;
- d. OEM or aftermarket sales location which initially received the steering gear from ZF Group/TRW;
- e. Subject component's serial number;
- f. Subject component's make, model and production date;
- g. Subject component's mileage at time of incident if known;
- h. Subject component's time in service at time of incident;
- i. Incident date;
- j. Report or claim date;
- k. Whether a crash is alleged;
- l. Whether a fire is alleged;
- m. Whether property damage is alleged;
- n. Number of alleged injuries, if any; and
- o. Number of alleged fatalities, if any.

Provide this information in Microsoft Access 2010, or a compatible format, entitled "REQUEST NUMBER TWO DATA." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

Response 3:

VTNA is submitting the spreadsheet titled REQUEST NUMBER TWO DATA.xlsx

⁴ VTNA also reviewed the 11 reports that were cited in the IR letter, as provided by NHTSA, and included in these counts any that were deemed responsive.

⁵ Two of these reports involve Canadian market vehicles, see discussion in Response 4.



located in the Response 3 folder. VTNA is unable to provide owner names and incident dates because this information is not captured by its data systems.⁶ The serial number of the subject gear is not known. Instead VTNA is providing the VIN (see column H, e1. VIN) and the make, model and model year of the vehicle involved (column J, f. make model MY (Vehicle)). VTNA is also providing the in-service date (see column I, e2. in-service date) for the subject vehicle. The time in service values shown in column L were calculated (in months) based on the in-service and report dates. For item 'd.' above, VTNA notes that all original equipment subject components would have been delivered by ZF/TRW to the Volvo plant in Dublin, VA where all subject VTNA products are manufactured. The mileage provided in Column K is that of the vehicle at the time of the report, it is unknown if the gear was original equipment or not. The "Field Report" category was segregated into two types as discussed further in Response 4 below.

Source: VTNA internal records and data sources, such as the ASIST and ARGUS systems (consumer complaints, technical assistance requests, field reports) and the Legal Tracker database (lawsuits, property damage and third party arbitrations), where records of this type would normally be stored.

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 VTNA used for organizing the documents. Describe in detail the search methods and search criteria used by VTNA to identify the items in response to Request No. 2.

Response 4:

Copies of the Request 2 related documents have been provided in the Response 4 folder which contains three subfolders, one titled Consumer Complaints, and one for each of the two types of field reports being submitted, Field Report Type 1 and Type 2. Both field report types involve requests for technical assistance from service providers however they come from two different VTNA systems containing different data elements, specifically the Service Request (SR) and ASIST systems. Each of the three folders contain a spreadsheet with the information (data) available in the pertinent VTNA system. Copies of SR detail reports and any available attachments are included in subfolders within the Field Reports Type 1 folder; the subfolders are titled by the SR number. Two of the 14 included Type 1 SR field reports (IDs 1-12056546631 and 1-2193242831) involved Canadian market vehicles however VTNA is including both so as to be fully comprehensive in its response.

The search method VTNA used to identify these reports involved identifying the VIN for each subject vehicle as defined by NHTSA and provide in Response 1. For any of the identified VINs, VTNA extracted all reports deemed a consumer complaint or field report from the source VTNA systems listed below. The resultant data set was then searched for reports containing defined keywords or phrases. The records containing the keyword or phrase were then manually reviewed (independently by two individuals) for relevance to the alleged defect in the subject component (i.e., an

⁶ VTNA notes the report date may represent a reasonable proxy for the incident date in some cases.



allegation of a loss of power steering indicative of a steering gear failure). A list of the keywords and phrases is also included in the Response 4 folder.

Source: VTNA internal records and data sources, such as the ASIST and ARGUS systems (consumer complaints, technical assistance requests, field reports) and the Legal Tracker database (lawsuits, property damage and third party arbitrations), where records of this type would normally be stored.

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 VTNA to date that relate to, or may relate to, the alleged defect in the subject components: 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. VTNA's claim number;
- b. Vehicle owner or fleet name (and fleet contact person), street address, email address and telephone number;
- c. Serial number;
- d. Repair date;
- e. Vehicle mileage at time of repair;
- f. Vehicle's Time in Service at time of repair;
- g. Repairing dealer's or facility's name, telephone number, city and state or ZIP code;
- h. Labor operation number(s);
- i. Problem code(s);
- j. Diagnostic Trouble Code (s);
- k. Replacement part number(s) and description(s);
- l. Concern stated by customer;
- m. Cause as stated on the repair order;
- n. Correction as stated on the repair order; and
- o. Additional comments, if any, by dealer/technician relating to claim and/or repair

Provide this information in Microsoft Access 2010, or a compatible format, entitled "WARRANTY DATA." A pre-formatted data collection file, which provides further details regarding this submission, will be provided to you.

Response 5:

VTNA is submitting the spreadsheet titled Warranty Claims located in the Response 5 folder. In total, 183 responsive warranty claims were identified (0.08% claim rate). VTNA's warranty system does not contain owner contact information, nor does it make use of labor operations or problem codes. Also, there are no applicable diagnostic trouble codes (DTCs) for the subject component's use in the subject vehicles. Accordingly, only the customer's name is provided for item b, and items h, i, and j are not available. As noted



previously, VTNA does not possess the serial number of the original or replacement steering gear as requested in item c. Instead VTNA is providing the VIN, make, model, model year, date of manufacture, and in-service date of the vehicle repaired. Time in service is calculated (in months) based on the in-service and repair dates. The repairing dealer's ID number and name is provided in columns N and O; contact information is not stored in VTNA's warranty systems however VTNA is providing a spreadsheet (titled Dealer Information and located in the Response 5 folder) containing dealer address information (by ID number). VTNA is providing the type of warranty coverage (standard, extended, etc.) utilized in column V.

Source: VTNA's prior and current warranty systems, specifically data from the E-Warranty (legacy) and Unified Claim Handling Process (current) warranty systems.

Request 6:

Describe in detail the search methods and search criteria used by VTNA to identify the claims in response to Request No. 5, including the labor operations, problem codes, diagnostic trouble 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, diagnostic trouble codes and diagnostic trouble code descriptions applicable to the alleged defect in the subject vehicles. State whether the diagnostic trouble codes are automatically reported to the warranty database electronically or manually entered into the warranty database by a claims administrator.

State, by make, model, and production year, the terms of the new vehicle warranty coverage offered by VTNA on the subject components (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 VTNA offered for the subject components and state by option, make, model, and production year, the number of subject components that are covered under each such extended warranty.

Response 6:

By normal business process, warranty claims must include all part numbers used in the repair of the vehicle and for which the service facility is requesting monetary reimbursement. The search method VTNA used to locate responsive claims involved identifying the VINs for each subject vehicle. For those VINs, all warranty claims where any of the claimed repair parts matched one of the part numbers listed for the subject components (see Response 1) were extracted. The resultant claims were then manually reviewed for pertinence to the alleged defect in the subject component (i.e., an allegation of a loss of power steering indicative of a steering gear failure) by utilizing the three fields containing information about the repair, specifically the complaint (concern), cause, and corrective action fields located in columns R, S and T of the submitted spreadsheet.



As noted in Response 5, labor ops and problem codes are not used in VTNA's warranty system, and there are no DTCs for steering gear operation.

VTNA products are sold with a standard chassis warranty that covers the subject component for a period of 12 months or 100,000 miles, whichever occurs first, starting from date of sale to the original owner. An extended warranty, available at additional cost, is offered and extends the coverage for 2 years and 200,000 miles, whichever occurs first. Historical records required to establish the number of vehicles covered by extended warranty dating back to the 2010 model year do not exist, however in the past 12 months just over 10% of new truck sales included the purchase of an extended warranty coverage.

Source: VTNA's warranty data systems, specifically historical data from E-Warranty and Unified Claim Handling Process (UCHP) systems.

Request 7:

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

Response 7:

VTNA has not identified any published documents meeting the criteria cited above, nor does it have any plans to publish any in the next 120 days.

Source: Review of records stored in the following system: Case Based Reasoning (CBR), Impact, E-Media, Field Service Bulletins (FSB).

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 component that have been conducted, are being conducted, are planned, or are being planned by, or for, VTNA. 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.



Response 8:

VTNA has not identified any documents or records indicating any of the “actions” cited above were conducted by or for VTNA, nor are any actions planned at this time.

Source: Review of records stored in the following system: Engineering Reports (ER) database, Phoenix document management system.

Request 9:

Describe all modifications or changes made by, or on behalf of, VTNA 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 the subject component production;
- b. A detailed description of the modification or change;
- c. The reason(s) for the modification or change;
- d. The part number(s) (service and engineering) of the original component;
- e. The part number(s) (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 VTNA is aware of which may be incorporated into subject component production within the next 120 days.

Response 9:

VTNA has not identified any documents or records indicating the modifications or changes cited above being made for, by, or at the request of VTNA.

Source: Review of records stored in the following system: KOLA (Swedish based) design data/product data management system, Design Change Notice (DCN) system.

Request 10:

Produce one/two of each of the following:

- a. Exemplar sample of each design version of the subject component;
- b. Field return sample of the subject component exhibiting the subject failure mode; and
- c. Any kits that have been released, or developed, by VTNA for use in service repairs to the subject component/assembly which relate, or may relate, to the alleged defect in the subject vehicles.

Response 10:



Per prior discussion with the agency, VTNA is unable to provide the components requested in subparts a and b above, see the email provided in the Response 10 folder for reference. Other than typical repair parts offered for the servicing of steering gear, VTNA has not developed or released any 'kits' for use in remedying the alleged defect in the subject components, as requested in subpart c (see Response 11 for further information).

Source: Discussion with NHTSA.

Request 11:

State the number of each of the following that VTNA has sold that may be used in the subject vehicles by component name, part number (both service and engineering/production), model and model year of the vehicle in which it is used and month/year of sale (*including the cut-off date for sales, if applicable*):

- a. Subject component; and
- b. Any kits that have been released, or developed, by VTNA for use in service repairs to the subject component/assembly.

Response 11:

Service replacement steering gears, whether new or remanufactured, are made available to serviced providers through ZF/TRW rather than being provided through VTNA. ZF/TRW also takes possession of warranty and service replacement steering gear when required. Both new and remanufactured components are produced from ZF/TRW's Lebanon, TN production facility.

Remanufactured gear, made available at lower cost than new gear, are for service repair only; they are not used in new vehicle production. In total, ZF/TRW reported supplying 3,246 remanufactured steering gear under 7 unique part numbers from calendar years 2010 to 2020. Remanufactured gear volumes are provided by calendar year of receipt and part number (ZF/TRW and VTNA) on the first tab of the spreadsheet titled Parts Sales located in the Response 11 folder.⁷

As noted previously, about 80% of new subject components were provided for OEM use in new vehicle production. The second tab of the above spreadsheet contains volumes for new gear, by year of receipt, some of which were likely used for service replacement. However, VTNA systems are not able to distinguish the volume that may have been sold for service replacement or other usage.

Replacement parts are applicable to all models and model years manufactured with the subject THP60 steering gear. See Response 1 above for a complete list of all subject vehicles manufactured.

Additionally, VTNA is providing sales volumes of repair parts for use in servicing the subject steering gear some of which are referred to as a 'kit' (e.g., seal kit, set screw kit). VTNA notes that the kits were not developed to address or remedy the alleged defect in the subject component, they are ordinary and typical service part kits

⁷ VTNA will provide this data at the month and year of receipt level if NHTSA requires.



applicable to steering gear. The third tab of the spreadsheet noted above contains service parts by calendar year of receipt.

Source: ZF/TRW provided data for remanufacturer (complete service part) subject component volumes; repair part volumes were sourced from VTNA's Purchasing System.

Request 12:

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 VTNA is aware that contain the identical component, whether installed in production or in service, and state the applicable dates of production or service usage. Furnish VTNA's assessment of the alleged defect in the subject component, 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; and
- 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;

Response 12:

All THP60 model steering gear are provided by ZF/TRW. VTNA's point of contact is:

Mr. Scott Paxton
Director, Regulatory Legal Counsel
ZF Group
12001 Tech Center Drive
Livonia, MI 48150
612 227-9864
Scott.paxton@zf.com

The make, model and model year of VTNA vehicles that contain the subject component, whether installed in production or in service, and the applicable dates of production or service usage is provided in VTNA's response to Request 1, see the spreadsheet titled Subject Vehicle Details in the Response 1 folder.

At this time, and after a thorough review of available data, VTNA has not identified the presence of a safety-related defect, within the meaning of the National Traffic and Motor Vehicle Safety Act, involving the subject component's use in VTNA vehicles. No crashes, fires, property damage claims, lawsuits, injuries, or fatalities have been identified that relate to, or are alleged to relate to, the alleged defect in the subject component. VTNA believes the frequency of alleged defect related failures is unremarkable for a population of nearly one quarter million vehicles with service times ranging, on average, from 3 to 13 years. The available failure data does not



provide a clear indication of either an increasing or decreasing failure trend, suggesting the failures are occurring on a random basis. A pattern of common failure modes or mechanisms has not been observed in the data either. VTNA is available to discuss this matter further should the Agency request.

Source: N/A