TOYOTA

Toyota Motor North America

Vehicle Safety & Compliance
Liaison Office
Mail Stop: W4-2D
6565 Headquarters Drive
Plano, TX 75024

November 4, 2020

Mr. Joshua Neff
Chief, Recall Management Division (NEF-100)
National Highway Traffic Safety Administration
1200 New Jersey Ave, SE
Washington, D.C. 20590

Re: Amendment to Toyota and Lexus Safety Recall 20V-012

Dear Mr. Neff:

This confirms our recent conversation regarding a scope expansion of 20V-012 involving a potential fuel pump issue in certain Toyota and Lexus vehicles. As we discussed, and as documented in the attached October 28, 2020 amended Part 573 submission to 20V-012 in accordance with 49 CFR Part 573.6, continued investigation identified that an additional population of vehicles should be included with 20V-012.

We understand the Agency intends to assign a new recall identifier to facilitate tracking of quarterly remedy completions of the expanded population and to organize associated owner communications and dealer instructions. We have entered the information needed in the recall portal so that the Agency can establish the new identification number.

We discussed the potential for misunderstanding among owners and dealers by establishing a new recall number for the amended population. To help minimize potential confusion of vehicle owners and dealers that could affect completion rates, the Agency understands this new population is an expansion of the existing recall (20V-012) and intends to document the action as such in an acknowledgment of the new recall record.

Should you have any questions about this report, please contact me directly.

Sincerely,

Cory Hoffman
General Manager
Vehicle Safety & Compliance Liaison Office
Toyota Motor North America, Inc.

Enclosures:
[Amendment to Safety Recall 20V-012]

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October 28, 2020

RECALL 20V-012

AMENDED DEFECT INFORMATION REPORT

1. Vehicle Manufacturer Name:

Toyota Motor Corporation ["TMC"]
1, Toyota-cho, Toyota-city, Aichi-pref., 471-8571, Japan

Toyota Motor Manufacturing, Kentucky, Inc. ["TMMK"]
1001 Cherry Blossom Way, Georgetown, KY, 40324

Toyota Motor Manufacturing, Indiana, Inc. ["TMMI"]
4000 Tulip Tree Drive, Princeton, IN 47670-4000

Toyota Motor Manufacturing Canada Inc. ["TMMC"]
1055 Fountain Street North, Cambridge, Ontario, Canada N3H 5K2

Toyota Motor Manufacturing Mississippi, Inc. ["TMMMS"]
1200 Magnolia Way, Blue Springs, MS 38828

Toyota Motor Manufacturing, Texas, Inc. ["TMMTX"]
1 Lone Star Pass, San Antonio, Texas 78264

Toyota Motor Manufacturing de Baja California, S. de R. L. de C.V. ["TMMBC"]
Carretera Tijuana Tecate Kilometro 143 y 144
Tijuana, Baja California C. P. 22550

Affiliated U.S. Sales Company

Toyota Motor North America, Inc. ["TMNA"]
6565 Headquarters Drive, Plano, TX 75024

Manufacturer of Fuel Pump Assembly:

DENSO CORPORATION
1-1, Showa-cho, Kariya-city, Aichi-pref., 448-8661, Japan
Phone: +81-566-25-5511
DENSO International America, Inc.
24777 Denso Drive, Southfield, Michigan 48086 U.S.A.
Phone: +1-248-350-7500

Country of Origin: Japan and U.S.A.

2. Identification of Involved Vehicles:

Make/ Car Line	Model Year	Manufacturer	Production Period
Toyota/4Runner	2014-2015 2018-2019	TMC	September 2, 2013 through February 19, 2015 May 31, 2018 through April 4, 2019
Toyota/Avalon	2018-2020	TMMK	April 2, 2018 through October 9, 2019
Toyota/Camry	2018-2020	TMMK/TMC	August 31, 2017 through September 20, 2019
Toyota/Corolla	2018-2020	TMMC/TMMMS /TMC	October 19, 2017 through July 1, 2019
Toyota/Corolla Hatchback	2019	TMC	June 14, 2018 through November 9, 2018
Toyota/FJ Cruiser	2014	TMC	September 2, 2013 through August 7, 2014
Toyota/Highlander	2017-2019	TMMI	July 12, 2017 through December 9, 2019
Toyota/Land Cruiser	2014-2015 2018-2019	TMC	September 2, 2013 through March 11, 2015 July 20, 2018 through April 5, 2019
Toyota/RAV4	2019-2020	TMC/TMMC	October 5, 2018 through October 7, 2019
Toyota/Sequoia	2018-2020	TMMI	April 2, 2018 through July 29, 2019
Toyota/Sienna	2017-2020	TMMI	September 5, 2017 through September 6, 2019
Toyota/Tacoma	2017-2020	TMMBC/TMMTX	September 1, 2017 through September 19, 2019

Toyota/Tundra	2018-2020	TMMTX	April 2, 2018 through July 12, 2019
Lexus/ES350	2018-2020	TMC/TMMK	November 17, 2017 through September 6, 2019
Lexus/GS200t	2017	TMC	July 26, 2017 Through September 5, 2017
Lexus/GS300	2018-2019	TMC	October 13, 2017 through May 16, 2019
Lexus/GS350	2013-2015 2017-2019	TMC	September 2, 2013 through February 21, 2015 July 6, 2017 through May 29, 2019
Lexus/GX460	2014-2015 2018-2019	TMC	September 2, 2013 through February 19, 2015 May 31, 2018 through April 4, 2019
Lexus/IS-F	2014	TMC	September 10, 2013 through July 24, 2014
Lexus/IS200t	2017	TMC	July 5, 2017 through October 2, 2017
Lexus/IS300	2018-2019	TMC	October 2, 2017 through May 17, 2019
Lexus/IS350	2014-2015 2018-2019	TMC	September 2, 2013 through February 21, 2015 October 2, 2017 through May 17, 2019
Lexus/LC500	2018-2020	TMC	July 12, 2017 through June 21, 2019
Lexus/LC500h (Hybrid)	2018-2020	TMC	July 12, 2017 through June 7, 2019

Lexus/LS460	2013-2015	TMC	September 2, 2013 through February 23, 2015
Lexus/LS500	2018-2020	TMC	July 27, 2017 through May 27, 2019
Lexus/LS500h (Hybrid)	2018-2019	TMC	October 7, 2017 through May 27, 2019
Lexus/LX570	2014-2015 2018-2019	TMC	September 2, 2013 through March 11, 2015 July 20, 2018 through April 5, 2019
Lexus/NX200t	2015	TMC	October 20, 2014 through June 2, 2015
Lexus/NX300	2018-2019	TMC	May 11, 2018 through April 20, 2019
Lexus/RC200t	2017	TMC	July 5, 2017 through November 28, 2017
Lexus/RC300	2018-2019	TMC	November 27, 2017 through May 17, 2019
Lexus/RC350	2015 2018-2019	TMC	April 15, 2014 through February 23, 2015 November 27, 2017 through May 17, 2019
Lexus/RX350	2017-2020	TMC/TMMC	July 3, 2017 through December 6, 2019
Lexus/RX350L	2018-2020	TMC/TMMC	August 1, 2017 through September 9, 2019
Lexus/UX200	2019	TMC	June 25, 2018 through February 19, 2019

NOTE: (1) Although the involved vehicles are within the above production period, not all vehicles in this range were sold in the U.S.

(2) Based on Toyota's current understanding of the condition, this recall applies to certain vehicles with specific fuel pumps supplied by Denso, containing impellers produced during specific periods under specific circumstances. These vehicles contain fuel pumps that were produced with impellers of lower density and contain either (1) a pump impeller of a type with lower surface strength or (2) a pump impeller that was exposed to production solvent drying for longer periods of time. Vehicles with fuel pumps that were not produced under the aforementioned conditions are not included at this time.

(3) Some hybrid models are equipped with the aforementioned fuel pumps. However, with the exception of LS500h and LC500h, if the condition occurs, these vehicles will enter a fail-safe driving mode, resulting in illumination of warning lights and reduced motive power in which the vehicle can still be driven for certain distances. This does not present an unreasonable risk to safety. Toyota intends to conduct a customer satisfaction campaign for these vehicles in the future.

Applicability	Part Number	Part Name	Component Description
MY2014-2015 MY2018-2019 Toyota/4Runner	23220-31430	23220- : Pump Assy, Fuel w/Filter 23221- : Pump Assy, Fuel	Fuel Pump Assembly
MY2018-2020 Toyota/Avalon	23220-0P180 23221-31130		
MY2018-2020 Toyota/Camry	23221-31130 23220-25020 23220-F0020		
MY2018-2020 Toyota/Corolla	23220-0T201 23221-25030		
MY2019 Toyota/Corolla Hatchback	23221-25030		
MY2014 Toyota/FJ Cruiser	23220-31430		
MY2017-2019 Toyota/Highlander	23221-31130		
MY2014-2015 MY2018-2019 Toyota/Land Cruiser	23220-50271		
MY2019-2020 Toyota/RAV4	23221-25030		
MY2018-2020 Toyota/Sequoia	23220-0S011		
MY2017-2020 Toyota/Sienna	23221-31130		
MY2017-2020 Toyota/Tacoma	23220-0C301 23221-31130		

MY2018-2020 Toyota/Tundra	23220-0S011		
MY2018-2020 Lexus/ES	23220-0P180 23221-31130 23221-25030		
MY2013-2015 MY2017-2019 Lexus/GS	23220-38041 23221-31130		
MY2014-2015 MY2018-2019 Lexus/GX	23220-31430		
MY2014-2015 MY2017-2019 Lexus/IS	23220-38041 23221-31130		
MY2018-2020 Lexus/LC/LC Hybrid	23221-31130		
MY2013-2015 MY2018-2020 Lexus/LS/LS Hybrid	23220-38030 23220-38050 23221-31130		
MY2014-2015 MY2018-2019 Lexus/LX	23220-50271		
MY2015 MY2018-2019 Lexus/NX	23221-36030		
MY2015 MY2017-2019 Lexus/RC	23220-38041 23221-31130		
MY2017-2020 Lexus/RX	23221-31130		
MY2019 Lexus/UX	23221-25030		

3. Total Number of Vehicles Potentially Involved:

	After March 19, 2020 Amendment	Oct 28, 2020 Amendment	Total
Toyota 4Runner	112,524	121,409	233,933
Toyota Avalon	20,739	12,982	33,721
Toyota Camry	19,291	571,527	590,818
Toyota Corolla	364,656	6,629	371,285
Toyota Corolla Hatchback		10,348	10,348
Toyota FJ Cruiser	17,156		17,156
Toyota Highlander	375,851	143,762	519,613
Toyota Land Cruiser	4,519	2,849	7,368
Toyota RAV4		187,516	187,516
Toyota Sequoia	11,056	3,578	14,634
Toyota Sienna	111,515	54,761	166,276
Toyota Tacoma	323,917	178,265	502,182
Toyota Tundra	71,797	34,147	105,944
Lexus ES350	40,312	25,077	65,389
Lexus GS200t		5	5
Lexus GS300	31	1	32
Lexus GS350	42,270	1,957	44,227
Lexus GX460	34,417	23,035	57,452
Lexus IS200t	2	2,781	2,783
Lexus IS300	26,760	5,511	32,271
Lexus IS350	16,365	690	17,055
Lexus IS-F	87		87
Lexus LC500	1,820	1,126	2,946
Lexus LC500h Hybrid	45	70	115
Lexus LS460	13,582		13,582
Lexus LS500h Hybrid	498	45	543
Lexus LS500	11,786	1,430	13,216
Lexus LX570	6,852	4,022	10,874
Lexus NX200t	27,140		27,140
Lexus NX300		51,237	51,237
Lexus RC200t	157	426	583
Lexus RC300	1,999	508	2,507
Lexus RC350	9,201	619	9,820
Lexus RX350	135,304	62,550	197,854
Lexus RX350L	29,103	3,263	32,366
Lexus UX200		5,595	5,595
Total	1,830,752	1,517,721	3,348,473

4. Percentage of Vehicles Estimated to Actually Contain the Defect:

Unknown. Toyota is unable to provide an estimate of the percentage of vehicles to actually contain the defect. Whether the issue in each case will lead to a vehicle stall while driving at higher speeds depends on many variables, such as the specific production condition of fuel pump impeller and vehicle operating conditions.

5. Description of Problem:

The subject vehicles are equipped with a low-pressure fuel pump, located in the fuel tank, that supplies fuel pressure to the fuel injection system. These fuel pumps may include impellers which have been manufactured with lower density. If these impellers are also (1) of a type with lower surface strength or (2) of a different type but were exposed to production solvent drying for longer periods of time, higher levels of surface cracking may occur. In this condition, excessive fuel absorption may occur, resulting in increased impeller deformation. In some cases, the impeller may deform to a point that creates sufficient interference with the fuel pump body to cause the fuel pump to become inoperative. An inoperative fuel pump due to these conditions could result in illumination of check engine and master warning indicators, rough engine running, engine no start and/or vehicle stall while driving at low speed. However, in rare instances, vehicle stall could occur while driving at higher speeds, increasing the risk of a crash.

6. Chronology of Principal Events:

June 2019 – August 2019

In early June 2019, Toyota observed an increase in field reports related to the low pressure fuel pumps produced by the supplier. These reports indicated that customers alleged rough engine running, engine no start, and/or loss of motive power while driving at low speed (less than 20 mph) and occurred more commonly in areas of the southern U.S. with hotter climates.

In mid-June, Toyota began an investigation, including the recovery of failed parts from the field. The supplier began inspection and analysis of the recovered parts and identified impeller deformation inside the fuel pump assembly due to more fuel absorption into the impeller material, with signs of binding/interference between the pump impeller and the pump casing/cover. A further analysis of failed impellers was conducted, and it was confirmed that the failed impellers had a lower density. Generally, impellers with lower density are more susceptible to fuel absorption.

As part of ongoing parts analysis, an additional observation was made of cracking to the impeller surface. To understand the relationship between surface cracks and pump failure, Toyota began an investigation to identify factors potentially contributing to cracking.

September 2019 – December 2019

As part of the investigation, Toyota hypothesized that solvent used during the manufacturing process was a factor in fuel pump impeller cracking and began duplication testing. During the testing, cracks occurred on the surface of the impellers as the solvent dried over time. However, the duplication test could not match impeller crack that was observed in the parts

recovered from the field.

Toyota also conducted vehicle testing to understand potential failure modes of incidents identified in the field. Starting with a review of operation parameters to support duplication, recovered failed parts were installed in a Toyota fleet vehicle. After confirming that no DTC was initially present, the vehicle was parked for a period of time and then started; low fuel pressure was detected. Shortly thereafter, the check engine light and master warning were displayed. The vehicle was then driven until a rough running condition/loss of power became noticeable, and vehicle speed was gradually reduced until low speed engine stall occurred. The vehicle returned to normal operation immediately after restarting it.

This evaluation suggested that this issue occurs at lower speeds, but Toyota continued to investigate whether this condition could lead to a loss of motive power at higher speeds. As part of this investigation, a manual review of available freeze frame data from all field incidents was done. Based on a detailed analysis of these data, three alleged cases were identified where loss of motive power occurred at higher speed (>20mph).

January 9, 2020

While continuing its investigation into the cause of impeller swelling, Toyota could not rule out the possibility of loss of motive power at higher speeds in the subject vehicles. Therefore, the decision was made to conduct a voluntary safety recall campaign.

January 13, 2020

Toyota filed a Part 573 report.

January – mid February 2020

As observed in Toyota's earlier study of low density impellers combined with drying solvent, cracks could not be duplicated to a level observed in the recovered parts. Thus, it was concluded that these conditions alone could not create impeller swelling and deformation which could result in sufficient impeller interference with the fuel pump body, causing the pump to become inoperative.

Toyota continued investigating whether there were other factors that could create cracks similar to those in the field recovered parts. One factor considered was the potential for longer lead times and temperature variation during fuel pump transit to the vehicle assembly plant during which the fuel pump would be exposed to drying solvent. Replication testing was done again with low density impellers, but with longer duration of dry solvent exposure and also temperature cycling. As a result, cracking was observed and appeared similar to the level of cracking as the recovered parts from the field.

However, Toyota observed that some field cases involved impellers that had low density with similar cracks to other field cases, but experienced shorter lead times to the vehicle assembly plant (i.e., were not exposed to drying solvent for longer periods of time during production in the same manner as the pumps investigated above). Thus, Toyota investigated a second factor, which was the surface strength of different pump impeller types. Analyses were performed on impeller samples from the pump types that may have been produced with lower density material. These analyses identified that the surface strength was low on one particular type.

Impellers of this type, produced with the lower density material, can experience higher levels of surface cracking even when exposed to shorter durations of solvent drying.

Based on the above activities, Toyota concluded that pumps produced with impellers of lower density that also contain either (1) a pump impeller of a type with lower surface strength or (2) a pump impeller that was exposed to production solvent drying for longer periods of time could experience the impeller cracking at a level that could lead to excessive fuel absorption and increased impeller deformation. If impeller deformation results in sufficient interference with the fuel pump body, the fuel pump may become inoperative.

In parallel with the aforementioned investigation (beginning in mid-January), Toyota began an investigation to confirm that a fail-safe driving mode would occur in hybrid vehicles if this condition occurs. The testing involved inducing an inoperative fuel pump condition on test vehicles. During testing it was observed that the LS500h and LC500h could potentially experience a ready off condition instead of entering a fail-safe driving mode under specific testing circumstances.

Additional analysis was conducted on the hybrid system design. This analysis compared design differences between hybrid systems used in the models being tested above. Further refinements to the test methods were developed to understand if the initial testing reflected what could occur in the field if one of these hybrid models experienced this fuel pump condition. Using the refined test methods, additional testing was done to cover all the hybrid models that may be equipped with a subject fuel pump.

Based on these results, it was determined that all hybrid vehicles equipped with the subject fuel pump, except LS500h/LC500h, would enter a fail-safe driving mode if this fuel pump condition occurs. However, because the LS500h and LC500h vehicles use a hybrid system of a unique design that may use more electricity from the battery and use the engine less than earlier designs, there is a possibility that, under certain driving conditions, these vehicles may have a hybrid battery state of charge that would not allow the vehicle to enter a fail-safe driving mode if this fuel pump condition occurs. Thus, it was determined that these models should be included in the recall population.

February 27, 2020

Based on the new information explained above, Toyota decided to amend recall 20V-012 [and Toyota filed its amendment on March 4, 2020].

March 19, 2020

Toyota filed an additional amendment to its Part 573 Report for recall 20V-012 to add certain Lexus GS300 and GS350 vehicles, that are equipped with the aforementioned fuel pumps, to the affected population. Toyota had identified a clerical error that resulted in those vehicles not being included in the March 4, 2020 amendment.

April 9, 2020

Toyota had identified separate clerical errors that resulted in certain field reports from non-U.S. sources being included in the chronology in the March 4, 2020 amendment. Thus, Toyota revised the relevant portion of Section 6, Chronology of Principal Events, in that document with the following information about the vehicles covered by this recall at this point:

"As of March 4, 2020, based on a diligent review of records, Toyota's best engineering judgment is that there are 73 Toyota Field Technical Reports and 3,358 warranty claims that have been received from U.S. sources that relate or may relate to the fuel pump failure investigated in this chronology and which were considered in the decision to submit this report."

April 2020 – September 2020

Toyota continued to monitor the field data and investigate whether vehicles outside the scope of recall 20V-012, that potentially received impellers of lower density, could experience the condition identified in the recall. As a part of this effort, Toyota requested the supplier to continue examining the three factors (impeller density, impeller surface strength, and stress exposure through solvent drying) that can combine to create the condition in the recall.

The supplier first re-evaluated whether surface stress exposure could be affected by the variation in solvent amount applied on the impeller during the supplier's manufacturing process. As stress exposure in this case is affected by (1) the point in time the applied solvent has been absorbed by the impeller and begins drying, and (2) the rate at which the solvent dries, the supplier conducted a test where different levels of solvent were applied to the impeller and the impeller weight change was measured over time. Based on the observed weight change over time, the supplier determined that (1) the point at which solvent absorption ends and solvent drying begins is not earlier than previously estimated; and (2) the rate at which solvent dries is not higher than previously estimated. Thus, because the previously estimated drying time and drying rates were appropriate, the supplier determined that its previous estimates about the level of potential surface stress exposures were also appropriate and conveyed these results to Toyota.

In addition, the supplier re-evaluated its prior estimates about the potential levels of density in the affected impellers. Because the impeller material contains three elements (resin, glass fiber, and calcium carbonate), but only one element (the resin) is susceptible to swelling, the supplier examined whether considering only the density of the resin is more appropriate. Thus, the supplier developed a method to measure resin density by assessing the production variation of the amount of resin, glass fiber, and calcium carbonate between each impeller lot that could have used material of lower density. Then the supplier conducted testing to quantify the content of glass fiber and calcium carbonate in representative impellers from each lot, which was then used to calculate the resin density. Based on this methodology, it was determined that the resin density had a higher correlation to the occurrence of field cases confirmed through part recovery as compared to overall density.

The supplier also re-evaluated its prior measurements of the surface strength for the affected impeller types. From this activity, the supplier observed that some test pieces previously used to assess surface strength had rougher surfaces due to the process used to cut the samples for testing. Thus, the supplier evaluated whether the existence of a rough surface on the test pieces could affect the accuracy of the measurement. The supplier then collected available impellers to re-test and confirm the prior measurements of minimum surface strength. The results of these tests found that the potential range of surface strength measurements could be wider than previously measured and that a lower minimum surface strength than previously estimated could be possible.

September 2020 - October 2020

The supplier then conducted a simulation to estimate a minimum resin density threshold for each fuel pump type/lot, taking into account the existing information on solvent drying stress exposure and the latest information on each pump type's surface strength. This minimum resin density was then compared with resin density distribution of all affected impeller lots, and as a result, an additional pump type and additional suspect lots not included in the 20V-012 recall scope were identified.

October 22, 2020

Toyota decided to amend the vehicle population involved in recall 20V-012, as the previous method for evaluating the combination of factors leading to this condition resulted in the exclusion of vehicles from the recall that should have been included.

As of October 11, 2020, Toyota's best engineering judgment is that there are 103 Toyota Field Technical Reports and 3,522 warranty claims that have been received regarding the newly identified vehicles included in this amendment from U.S. sources that relate or may relate to the fuel pump failure investigated in this chronology and which were considered in the decision to amend this report.

7. Description of Corrective Repair Action:

For all involved vehicles, Toyota and Lexus dealers will replace the fuel pump assembly with an improved one.

Reimbursement Plan for pre-notification remedies

The owner letter will instruct vehicle owners who have paid to have this condition remedied prior to this campaign to seek reimbursement pursuant to Toyota's General Reimbursement Plan.

8. Recall Schedule:

Owners of vehicles currently included in the recall, that were not included in the recall population as of April 9, 2020, will be notified by December 23, 2020. Owners of the vehicles that were covered by this recall and are still covered by this recall were notified by May 18, 2020

9. Distributor/Dealer Notification Schedule:

Notifications to distributors/dealers were sent on October 28, 2020. Copies of dealer communications will be submitted as they are issued.

10. Manufacturer's Campaign Number:

	Interim	Final
Toyota:	20TB02	20TA02
Lexus:	20LB01	20LA01