Reference report

Kenneth John Williams v Toyota Motor Corporation Australia Limited
(Federal Court proceedings no NSD1210/2019)

David P. Garrett
GARRETT & ASSOCIATES, INC.

Federal Court of Australia
No: NSD1210/2019

KENNETH JOHN WILLIAMS, Applicant

TOYOTA MOTOR CORPORATION AUSTRALIA LIMITED (ACN 009 686 097), Respondent

Reference Report of David P. Garrett

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A. INTRODUCTION

1. On 13 July 2020, I received notification that I was to be appointed as a referee, pursuant to the Court's orders dated 26 June 2020, to answer the following Relevant Questions:

    1. *Does the applicant's Affected Vehicle suffer, and did it during the Relevant Period suffer, from the Vehicle Defects and Vehicle Defect Consequences?*
    2. *Do the Affected Vehicles suffer, and have they suffered during the Relevant Period, from the Vehicle Defects and Vehicle Defect Consequences?*
    3. *During the Relevant Period, did the Affected Vehicles:*
        a. *require unusual or abnormal maintenance; and/or*
        b. *have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials relevant to the Affected Vehicle and any fuel consumption label applied to the windscreen of the Affected Vehicle?*
    4. *During the Relevant Period, did the Affected Vehicles have a DPF System that, in its design and manufacturing:*
        a. *completed an automatic regeneration every 250 to 300 kilometers of driving, depending on driving conditions and driving style;*
        b. *completed a regeneration cycle with sufficient regularity to prevent the DPF from becoming partially or completely blocked;*
        c. *prevented the DPF from becoming partially or completely blocked; and/or*
        d. *was effective at removing sufficient particulate matter from the DPF to prevent the DPF from becoming or remaining partially or completely blocked.*

2. This report sets out my findings in relation to each question.

3. In accordance with FCR 28.66, I attach the following documents which I have had regard to in preparing this report:

    (a) Applicant's Statement of Proposed Findings of Fact (**Applicant's Contentions**) (**Annexure A**);

    (b) Respondent's Statement of Contended Findings (**Respondent's Contentions**) (**Annexure B**);

    (c) Applicant's Response the Respondent's Statement of Contended Findings (with references) (**Annexure C**); and

(d) Respondent's Response to the Applicant's Statement of Proposed Findings of Fact (**Annexure D**).

4. I also attach for the Court's reference:

(a) the Statement of Agreed Facts (**SOAF**) and Dictionary (**Annexure E**) ; and

(b) a summary of my findings in relation to each of the alleged Vehicle Defects and Vehicle Defect Consequences alleged (respectively) in paragraphs 39 and 41 of the Further Amended Statement of Claim (**ASOC**) (**Annexure F**).

5. This report references concepts and terminology set out in those documents and in the SOAF and Dictionary at Annexure E.

6. Unless otherwise indicated, defined terms in this document are drawn from the Dictionary.

7. All of the findings referred to in this report are based on my formal education, specialist training, professional experience, and knowledge of the subject matter as set out in Part C below.

B. EXECUTIVE SUMMARY

B.1. Questions 1 and 2 (Vehicle Defects and Vehicle Defect Consequences)

B.1.1. Alleged Vehicle Defects (all Relevant Vehicles)

8. The DPF System was defective for the whole of the Relevant Period. The **core defect** was that the DPF System was not designed to function effectively during all reasonably expected conditions of normal operation and use in the Australian market. In particular, under certain conditions the DPF System was ineffective in preventing the formation of deposits on the DOC surface or coking within the DOC. The deposits and/or coking of the DOC prevented the DPF filter from effective automatic or manual regeneration, and led to excessive white smoke and foul-smelling exhaust during regeneration and/or indications from the engine's onboard diagnostic (**OBD**) system that the DPF was "full".

9. This defect was inherent in the design of the DPF System. The design defect was comprised of both mechanical defects and defective control logic and associated software calibrations.

10. The defect was present in all Relevant Vehicles. The defect was latent in vehicles which did not experience symptoms and consequences of the defect, due to their usage patterns, but was nevertheless present in those vehicles.

11. The countermeasures attempted by the Respondent during the Relevant Period were ineffective to remedy the problem, and in some cases caused the DPF System to malfunction in Relevant Vehicles which had not previously suffered from any defect consequences.

12. The countermeasures put in place after the Relevant Period appear to remedy the defects in the DPF System, in those Relevant Vehicles which have received the most recent countermeasures. The documents provided for my review do not indicate if the Applicant's Vehicle has received the most recent countermeasures. If this is not the case, the defects remain present in that vehicle.

B.1.2. Alleged Consequences

13. Based on the documents from Toyota's investigation(s), and the Respondent's admissions in relation to the incidence of "DPF issues", it is clear that some Relevant Vehicles experienced at least some of the defect consequences alleged in the ASOC.

14. The Applicant's service invoices and email correspondence with the dealership establish that Applicant's Vehicle experienced (a) excessive white smoke during regeneration, and (b) foul odor during regenerations. These symptoms and consequences experienced by the Applicant's Vehicle are consistent with the DPF System design core defect. Based on the Applicant's response to the Referee's Question dated 1 October 2020, these symptoms and consequences do not appear to be due to vehicle usage contrary to warnings provided in the Owner's Manuals (e.g. persistent and/or regular low speed pattern driving).

B.2. Question 3 (unusual or abnormal maintenance)

15. The following vehicles required 'unusual or abnormal maintenance' during the Relevant Period:

(a) vehicles that:

(i) were taken to a dealership in response to DPF System warnings and/or malfunction indicator lamp (MIL) illumination, and/or to address excessive white smoke; and

(ii) during those visits, were subject diagnostic and service procedures included in Technical Newsflash (**TNF**) bulletins relating to the DPF System; or

(b) vehicles that the Respondent identified in Customer Service Exercises (**CSEs**) relating to the DPF System as "Involved Vehicles".

16. The Applicant's Vehicle was one of the vehicles that required unusual or abnormal maintenance as described in both (a) and (b) in the above paragraph.

17. I am unable to identify, based on the materials available to me, which of the remaining Relevant Vehicles required unusual or abnormal maintenance according the criteria set out in paragraph 15.(a). However, determining which Relevant Vehicles were subject to unusual or abnormal maintenance should be readily ascertainable from the Respondent's service and warranty records for each of those vehicles by application of the criteria referred to in paragraph 15.

18. All Relevant Vehicles produced from the start of production through the end of MY 2017 required unusual or abnormal maintenance according to the criteria set out in paragraph 16.(b) because they were included in at least one CSE to address the DPF System.

B.3. Question 3 (fuel efficiency / consumption)

19. I have not been provided with or reviewed any documentation, records, or test results of the fuel efficiency / fuel consumption of the Relevant Vehicles during official testing or during owner operation on public roads. For this reason, in the absence of any objective data, I cannot conclude that the core defect had any discernable impact on fuel efficiency. Even so, it appears to me that comparisons of test results on Relevant Vehicles to the original official tests used to generate fuel consumption labels will not resolve the applicant's allegations of increased fuel consumption during their vehicle usage on public roads.

B.4. Question 4 (regeneration frequency and DPF System efficacy)

20. Question 4(a): I am unable to determine whether Relevant Vehicles completed an automatic regeneration every 250 to 300 kilometers of driving, as this would be highly depending the on

driving conditions and driving style that each vehicle was subjected to. In order to do so, I would require detailed data concerning the operation of each of the Relevant Vehicles.

21. Questions 4(b)-4(d): The DPF System was not able to regenerate effectively to prevent the DPF from being full in all conditions reasonably expected to occur during normal operation and use.

C. MY EXPERIENCE AND EXPERTISE

22. I am President and Principal Consultant at Garrett & Associates, Inc., a company I established in October 2016 to advise and assist clients and their outside counsel on emissions and fuel economy regulations, certification, and compliance issues, including emission warranty and defect reporting. Current and past clients include vehicle and engine manufacturers, aftermarket part suppliers and distributors, law firms, engineering / technical service companies, consulting services, and private equity investment firms.

23. Prior to becoming a consultant, I worked at General Motors LLC (and General Motors Corporation) from 1984 to 2016 in a series of technical and leadership positions with increasing responsibility, all of which were in some way related to emission regulations and engine-emission control systems. From 2006 to 2016, I was the executive responsible for General Motors' US Emission Compliance & Certification and Global Vehicle Emission Compliance. One of my roles in this position was to review and approve all emission warranty and defect reports submitted to the California Air Resources Board and the United States Environmental Protection Agency, respectively.

24. I earned a Bachelor of Science in Mechanical Engineering from Purdue University and a Master of Science in Engineering from Stanford University. While a student at Purdue, I participated in a cooperative engineering work-education program with Cummins Engine Co. during which I accumulated two years of work experience.

25. I co-authored two SAE[1] Technical Papers, both related to vehicle emission, and I was issued a US Patent on engine controls.

[1] Formerly "Society of Automotive Engineers", now known as "SAE International".

26. I was panelist on global vehicle emission regulations during the 2016 SAE World Congress and the 2016 SAE North American International Powertrain Conference.

27. I served as an expert witness during 2019 for the Defendant in a class action in the USA regarding failures of emission control systems on certain heavy duty truck diesel engines. In this role, I prepared an expert report and was deposed by the Plaintiff's counsel.

28. I was deposed during October 2018 as a fact witness in a class action on diesel passenger cars in which my previous employer is a defendant.

D. FINDINGS - QUESTIONS 1 AND 2

1. *Does the applicant's Affected Vehicle suffer, and did it during the Relevant Period suffer, from the Vehicle Defects and Vehicle Defect Consequences?*

2. *Do the Affected Vehicles suffer, and have they suffered during the Relevant Period, from the Vehicle Defects and Vehicle Defect Consequences?*

D.1. Approach

D.1.1. Overview

29. Questions 1 and 2 require me to determine whether, during the Relevant Period, the Applicants' Vehicle and/or Relevant Vehicles "suffered" from the Vehicle Defects and the Vehicle Defect Consequences, as those terms are defined (respectively) in paragraphs 39 and 41 of the ASOC.

30. Paragraph 39 of the ASOC sets out a range of alleged attributes of the Relevant Vehicles which are said to constitute the "Vehicle Defects" (**Alleged Defects**). While the Respondent has denied the existence of a number of these attributes, it admits some of them while disputing their characterization as a "defect". The Respondent contends that these admitted attributes are either: (a) design features or incidents of the ordinary operation of the vehicles; or (b) "*DPF Issues experienced by some owners of Relevant Vehicles*" which have been addressed by a series of "field fixes" reflecting the "*usual and ordinary approach to addressing issues of this kind*".[2]

[2] Respondent's Contentions, p. 6, para 10.

31. Similarly, the Respondent contends that a number of the alleged Vehicle Defect Consequences described in paragraph 41 of the ASOC (**Alleged Consequences**) (those which it admits, or admits with qualifications) reflect the ordinary operation of the vehicles or the manifestation of the alleged "DPF Issues". Again, it denies that these were the consequence of "defects".

32. In light of the parties' divergent approaches, and in order to address what I consider to be the real issues in dispute, I have approached the Questions 1 and 2 as follows:

    (a) *first*, I have considered whether the documentary evidence supports a conclusion that the Alleged Defects (other than those which are admitted) were features of the Relevant Vehicles during the Relevant Period, without applying any qualitative judgment as to whether any such feature is properly described as a "defect";

    (b) *secondly*, where an Alleged Defect is admitted or established on the evidence, I have then considered whether that particular feature is, or is indicative of, a "defect" as I understand that term; and

    (c) *finally*, I have determined whether any or all of the defects affecting the Relevant Vehicles were features of the Applicant's Vehicle for all or part of the Relevant Period.

33. There is also debate between the parties as to whether certain contentions put by the Applicant are properly reflected in in the ASOC. I have left these disputes for determination by the Court and, where I have been provided with sufficient materials to make a determination, I have done so.

D.1.2. Meaning of 'defect'

34. There is no definition of "defect" in the ASOC or in the SOAF and I am unaware of any applicable Australian regulatory standard defining this term. Accordingly, in determining whether a particular feature is a 'defect', I have applied the US Environmental Protection Agency's regulatory definition which I consider to be a rational approach.[3] This definition provides that an emission-

[3] 40 CFR §85.1902(b)

related defect includes (relevantly) an aspect of design, materials, or workmanship in one or more emission-related parts, components, devices, systems, or controls which adversely affects or prevents any element of design of the emission control system or the on-board diagnostic (OBD) system from functioning properly.

35. I have also assumed (consistent with my own understanding) that a defect may be a latent defect – that is, one which is innate in a particular vehicle but may not have manifested itself in a defect consequence (due, for example, to not being exposed to certain driving conditions).

D.1.3. Materials relied on

36. I have reached the conclusions in section D.2 to D.5 below (and in the remainder of my report) based on documents provided by both parties including:

(a) Owner's Manuals, which describe the intended operation of the DPF System and establish operator expectations for DPF regeneration;

(b) Meeting minutes and Technical Presentations summarizing the investigations conducted by the Respondent[4], and correspondence from the Respondent to owners of the Relevant Vehicles and to Dealers; and TNFs and ADSLs, which describe:

(i) symptoms experienced by certain vehicles which are consistent with some of the Alleged Defect Consequences;

(ii) the mechanism of manifestation of the defect consequences described in paragraph 46 below;

(iii) root causes of the symptoms and the underlying defects; and

[4] I considered the Meeting Minutes documents to be interim updates which reflected recent findings, theories of possible mechanisms and/or root causes, and proposed next steps as of the date of that meeting. The primary documents upon which I relied to form my conclusions were the more extensive Technical Presentations which provided a more complete view of the internal investigations, root cause determinations, and countermeasures. From my experience, I expect these would have been prepared with more rigor and review than meeting minutes.

(iv) countermeasures implemented in production and as field fixes through for vehicles which present to the dealership with relevant symptoms according to TNFs and CSEs as detailed in ADSLs.[5] [6]

37. Key documents I have relied on are referred to in the footnotes to this report, but these references are not necessarily exhaustive.

D.2. Overview of findings – Alleged Defects and Alleged Consequences

D.2.1. Defects

38. As explained below, the DPF System was defective for the whole of the Relevant Period:

(a) because, as a result of oversights or erroneous assumptions in the Relevant Vehicles' development and validation phases, the DPF System was not designed or calibrated to function properly in vehicles exposed to regular continuous driving at approximately 100km/h (**high speed pattern**)[7]; and

(b) after December 2016, due to the introduction of countermeasures to intended to remedy the **core defect** referred to in (a).[8]

39. This core defect was present in all of the Relevant Vehicles, whether or not they suffered from the alleged Defect Consequences. The defective design adversely affected the condition and functioning of the DOC and prevented the DPF from effective regeneration. Many of the alleged Vehicle Defects set out in paragraph 39 of the ASOC are features or consequences of the core defect.

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[5] The Respondent's Customer Service Exercise (CSE) actions for ECM reprogramming and DPF Changes are materially consistent with a *Voluntary emissions recall* as defined in the US Code of Federal Regulations: "… a repair, adjustment, or modification program voluntarily initiated and conducted by a manufacturer **to remedy any emission-related defect** for which direct notification of vehicle or engine owners has been provided" [emphasis added] See 40 CFR §85.1902(d).

[6] TAL.850.001.0510, TAL.100.132.2005, TAL.100.128.0011 as well as preceding and superseding versions of these documents.

[7] See, for example, TAL.001.277.3471 at .3479 and .3481

[8] TAL.001.604.7259; TAL.001.277.3471 at .3477-8

40. The Respondent's failure to include a DPF switch to initiate manual regeneration of the DPF was a further defect in design in Relevant Vehicles manufactured from the start of production through the end of the 2017 MY. This oversight in the DPF System design failed to properly account for common Australian low-speed driving conditions during which the DPF could not automatically regenerate.[9]

41. Many (but not all) of the Vehicle Defects and Vehicle Defect Consequences alleged in the ASOC are features of or related to the core defect in design which I have identified. Accordingly, to avoid unnecessary repetition, my responses to each of those allegations are set out in Table form in Annexure F.

D.2.2. Defect consequences

42. Service records for the Applicant's Vehicle confirm that it exhibited symptoms consistent with the core defect. In particular, during the Relevant Period from at least 19 June 2017[10] to 11 June 2018[11], the Applicant's Vehicle required repeated unscheduled maintenance due to it emitting excessive white smoke and an offensive odor. These adverse effects persisted even after several unscheduled visits to a dealership to address the complaints through diagnostic and service procedures, including those detailed in Technical Newsflash bulletins (**TNFs**) and All Dealer Service Letters (**ADSLs**) provided to Australian dealers by the Respondent during the Relevant Period. [12]

43. With the exception of the Applicant's vehicle, I am unable to identify which of the Relevant Vehicles experienced symptoms of the core defect during the Relevant Period. However, this defect was a feature of all of the Relevant Vehicles during the Relevant Period (at least in latent form) and would result in one or more of the following consequences in vehicles exposed to the high-speed pattern and/or which were the subject of the ineffective countermeasures introduced by the Respondent during the Relevant Period:

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[9] TAL.001.277.3471 at.3492, TAL.001.285.7708_0005, TCO.001.001.7813
[10] APP.001.001.0012.
[11] APP.001.001.0024.
[12] APP.001.001.0005, APP.001.001.0012, APP.001.001.0014, APP.001.001.0024, APP.001.001.0023, APP.001.001.0024.

(a) excessive white smoke in exhaust during regeneration;

(b) foul odor during regeneration; and/or

(c) DPF Notifications and MILs being displayed when the DPF became full as a result of ineffective regeneration.

D.3. Mechanics of core defect and its consequences

44. The DPF System is comprised of several Key Components[13], Engine Control Module (**ECM**) software and calibrations[14], and other elements of design all of which are intended to work in concert to capture particulate matter (**PM**) in a filter which is periodically regenerated[15] in order to achieve the level of control of PM specified in the applicable regulations.[16]

45. A number of the Respondent's internal documents (**Toyota documents**) record that, during the design, development, and validation stages of the vehicles' development, the Respondent failed to anticipate that the high-speed pattern would lead to problems with the DPF System.[17] The reasons for this appear to include that, when developing the DPF System, the Respondent erroneously assumed:

(a) that "*deposit properties were … dependent on PM amount & temp* (sic) *only*" and "overlooked"[18] the amount of fuel introduced by the Additional Injector in this driving condition.[19]; and

(b) that Tokyo city traffic would be "worst case" for DOC deposit formation / accumulation, due to low-speed driving pattern. [20]

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[13] SOAF [11].
[14] SOAF [18].
[15] SOAF [10].
[16] SOAF [3-5].
[17] See e.g. TAL.001.257.7921 at 7927-7931 and TAL.001.277.3471 at 3475, 3483, and 3487.
[18] TC0.005.002.3388_0007.
[19] TAL.001.291.7233 at .7243 and TAL.001.307.4190 at .4201 which explains that the volume of fuel introduced to the DPF during active regeneration at this speed was excessive due to a lack of data at the development stage of the "GD engine" used in the Relevant Vehicles. See also TAL.001.478.6005 and TCO.005.002.3388_0007-_0008.
[20] TAL.001.291.7233 at .7241.

46. The Respondent introduced a number of countermeasures intended to remedy the design defects during the Relevant Period.[21] Following early field fix countermeasures (and corresponding production countermeasures) in late 2016 and early 2017[22], Relevant Vehicles without any prior DPF issue started to experience the defect symptoms soon after the updated ECM programming was installed.[23]

47. Numerous Toyota documents[24] recording its investigations into what the Respondent has called the "DPF issues" describe the following mechanism(s) and physical manifestations of the core defect which, when a vehicle was exposed to the high-speed pattern and/or ineffective countermeasures, led to defect consequences:

(a) unburned fuel from the Additional Injector attaches to particulate matter (**PM**) in the exhaust to form deposits on the front face of the DOC;

(b) deposits on the DOC face which reduced the effective active DOC surface area and/or coking[25] which blocked platinum group metal (PGM) catalyst material in the DOC, resulting in:

(i) portions of fuel from the Additional Injector failing to oxidize completely, resulting in excessive white smoke and unpleasant odor being emitted from the exhaust system;

(ii) the DOC failing to generate the anticipated heat release from oxidation of fuel from the additional injector;

(iii) the DPF not achieving the temperature necessary for thermal oxidation of accumulated PM and failing to run the regeneration process to effective completion;

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[21] A series of Technical Newsflash (TNF) bulletins (TAL.850.005.1996, TAL.001.601.8135, TAL.001.286.0001) were issued to dealers from December 2016 to April 2018 with countermeasures meant to address Relevant Vehicles which exhibited symptoms (Excessive white smoke from exhaust pipe and/or DPF warning message accompanied by MIL illumination and stored Diagnostic Trouble Code (DTC) P2463 Soot Accumulation) caused by DOC deposits.
[22] TC0.005.002.3388 0001.
[23] TAL.001.478.6463; TAL.850.006.0288.
[24] TAL.001.478.6005, TAL.100.085.8191, TAL.001.277.3471,TAL.100.084.4874, TAL.001.287.7921, TAL.001.496.6989; TAL.001.478.6003, TAL.001.478.6199, TAL.001.286.0192, TAL.001.478.1344, TCO.005.001.2863, TCO.005.001.2864, TJL.020.001.0010, TCO.001.002.0733.
[25] The buildup of hard, sooty residue.

(iv) PM continuing to accumulate in DPF, resulting in:

(A) DPF Notifications and MIL illumination with Diagnostic Trouble Code (DTC) P2463 stored in the onboard diagnostic (OBD) system;[26] and

(B) unscheduled maintenance.

48. Although all of the Owner's Manuals provided for my review of the Relevant Vehicles identify white smoke as a normal characteristic of DPF System regeneration[27], no guidance is provided as to the quantity or duration of white smoke which would be considered usual or normal. However, many of the Technical Reports, Meeting Minutes[28], TNFs and ADSLs[29] issued by the Respondent describe white smoke observed from certain Relevant Vehicles experiencing "DPF issues" as "excessive" or "substantial". A number of TNFs identified white smoke persisting for more than 30 seconds as a "decision criterion" to determine whether a vehicle was experiencing "excessive" white smoke.[30] Nothing in the documents I have reviewed (which include photographs of vehicles exhibiting this symptom) contradicts this description and I agree that the emission of white smoke for more than 30 seconds is unusual and excessive.

49. The elements of design of the DPF System which were the root cause contributors to the mechanism of the core defect described above are described in various Toyota documents as including at least the following DPF System components:

(a) the control strategies (software and calibrations) in the ECM which initiate and control automatic and manual regeneration of the DPF (including software and calibration changes introduced during the Relevant Period as countermeasures to the the initial defect consequences);

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[26] If DPF Notifications have been ignored for approximately 1,200 km, the control system is put into "limp mode" to protect the DPF system from damage. See TAL.001.478.6003

[27] E.g. TAL.100.004.1636 at page 2: "White smoke may be emitted from the exhaust pipe during regeneration. However, this does not indicate a malfunction."

[28] TAL.001.478.6463.

[29] TAL.850.001.0510, TAL.100.132.2005, TAL.100.128.0011 as well as preceding and superseding TNFs and/or ADSLs

[30] See, for example, TAL.850.001.0628 at.0631.

(b) the design specifications of the washcoat applied to DOC; and

(c) the design of the additional injector housing. [31]

50. Countermeasures released *after* the Relevant Period appear to have been designed to eliminate the root causes of the core defect in the DPF System identified in the above paragraph. These countermeasures were to reflash the ECM, replace the DPF Assembly (which includes the DOC), and replace the Additional Injector housing assembly.[32]

51. In my view, these post-Relevant Period countermeasures confirm the conclusions reached by the Respondent in its internal investigations that the core defect was caused by a combination of the ECM software and calibrations, the design of the DPF Assembly, and the Additional Injector Housing assembly.

52. While some documents also hypothesized that the design of the DPF Assembly Inlet was also defective, later investigation documents discredit this theory and I have no reason to question these determinations that the DPF Assembly Inlet was not one of the root causes of the defect.[33]

D.4. A further defect affecting vehicles subject to frequent low speed driving – absence of DPF switch

53. Consistent driving at low speeds and loads and/or for frequent short trips (**low-speed pattern**) is identified as potentially problematic in the Owner's Manual for each of the Relevant Vehicles[34] and is generally recognized in the industry as being unsuitable for automatic DPF regeneration. Accordingly, I do not consider the apparent inability of the DPF System to automatically

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[31] TAL.001.277.2765, TAL.001.607.3701 at .3735-.3738-; TAL.001.478.1344, TCO.005.001.2863 at_0002, TCO.005.001.2864, TJL.020.001.0010, TCO.005.001.0060 at _0003, TCO.001.002.0733 at _0003

[32] ADSL40/20 is the latest CSE applicable to all MY17 and earlier vehicles; issued 7 June 2020 (Updated 20 July 2020): TAL.100.132.2005. TNF 18/20 is a "service update" bulletin, applicable to vehicles which present to a dealership with symptoms; issued 27 May 2020 (20 July 2020): TAL.100.132.2034.

[33] TJL.020.001.0010_0012.

[34] TAL.100.004.0001 (at TAL.100.004.0216) , TAL.100.004.1096 (at TAL.100.004.1332), TAL.100.004.3293 (at TAL.100.004.3542), TAL.100.004.1636 (at TAL.100.004.1879), TAL.100.004.3729 (at TAL.100.004.3985), TAL.100.004.2183 (at TAL.100.004.2431), TAL.100.004.2738 (at TAL.100.004.2986) , TAL.100.004.4172 (at TAL.100.004.4430), TAL.100.004.0541 (at TAL.100.004.0761), TAL.100.004.4619 (at TAL.100.004.4866), TAL.100.004.5166 (at TAL.100.004.5410), TAL.100.004.5597 (at TAL.100.004.5818), TAL.100.004.6472 (at TAL.100.004.6766)

regenerate with sufficient regularity to prevent the DPF becoming "full" when exposed solely or predominantly to this driving pattern to be a design defect *per se*.

54. In apparent recognition of the high number of complaints and service visits associated with the low-speed pattern driving in the Australian market, the Respondent added a DPF switch to newly-produced Relevant Vehicles at the start of 2018 MY to enable manual regeneration in low speed conditions (for example, at mine sites). This decision was based on extensive data analysis "*enabling TMC to fully understand environment & usage conditions*".[35] The fact that the ability of a driver to initiate manual regeneration came into existence as a countermeasure after the Relevant Vehicles had been in service for 3 model years, strongly suggests insufficient understanding of vehicle usage patterns prevalent in the Australian market during the development stage. Accordingly, I find that the absence of a DPF Switch in Relevant Vehicles produced from the start of production through the end of the 2017 MY was a further design defect.

D.5. The Vehicle Defect Consequences

55. Consistent with the mechanism described in section C.2. above, many of the Relevant Vehicles regularly and/or persistently subjected to the high-speed pattern and/or which were the subject of countermeasures introduced during the Relevant Period, would have experienced one or more of the following of the **defect consequences**:[36]

    (a) malfunction of the DOC, i.e. the catalytic effect of the DOC was diminished, due to deposits forming on the face of the DOC and/or coking, blocking the catalytic material (PGM) in the DOC. Where deposits were not able to be eliminated by operation of the engine on its own, i.e. without the need for service procedures performed at a dealership, the damaged DOC required replacement;

[35] TAL.001.285.7708_0001-_0005.

[36] While the Applicant enumerated many alleged Vehicle Defect Consequences in ASOC [41 (a) – (s)], I have consolidated related and redundant or duplicative symptoms or effects into a single point. I have not included in this Report any Alleged Consequences which were not supported by the documents provided. However, I briefly summarize my findings on each of the Alleged Defects and Alleged Consequences in Annexure F.

(b) the DPF not functioning properly due to the exhaust gas temperature at the DPF inlet failing to reach a sufficiently high temperature to effect Thermal Oxidation of PM captured in the DPF. Where this occurs, the DPF becomes "full", i.e. partially or completely blocked, resulting in the DPF Notifications and/or illumination of the Malfunction Indicator Lamp (MIL) and stored DTC P2463;

(c) partially unoxidized fuel flowing through the DPF assembly and being emitted from the tailpipe as excessive white smoke, often with an offensive odor.

56. As described in response to Question 3.a below, when Relevant Vehicles experienced DPF System warnings and/or MIL illumination, consistent with instructions in the Owner's Manual, owners are directed to take the Relevant Vehicle to an authorized dealership for unscheduled maintenance to have the DPF System inspected, repaired, or replaced.

D.6. Vehicle Defect Consequences - Applicant's Vehicle

57. Documentation provided on the Applicant's vehicle[37] indicate that, from no later than 19 June 2017 until at least 11 June 2018, this vehicle was the subject of numerous complaints about and unsuccessful attempts to fix the following symptoms:

(a) excessive white smoke; and

(b) objectionable exhaust odor.

58. Based on Applicant's response to my questions about driving patterns, it appears that these symptoms are a result of the Applicant's Vehicle being exposed to the high-speed pattern and/or as a consequence of ineffective countermeasures.

E. FINDINGS - QUESTION 3.

During the Relevant Period, did the Affected Vehicles:

a. require unusual or abnormal maintenance; and/or

[37] Ibid, footnote 12.

b. have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials relevant to the Affected Vehicle and any fuel consumption label applied to the windscreen of the Affected Vehicle?

E.1. Question 3(a) – unusual or abnormal maintenance.

59. Usual or normal maintenance is generally defined or described in a vehicle's Owner's Manual, either in a narrative describing how to properly use and maintain components and systems of a vehicle and/or in a table of recommended and periodic maintenance. Usual or normal maintenance tasks (and corresponding diagnostic and service procedures) are also typically specified in a manufacturer's Service Manual (or electronic equivalent).

60. Unusual or abnormal maintenance may be the result of servicing needs which were not anticipated by the manufacturer at the time the vehicle was produced, product malfunction, or product usage beyond what was reasonably anticipated by the manufacturer. Unusual or abnormal maintenance includes product recalls such as the Respondent's CSE notifications to vehicle owners and ADSLs to dealers.

61. I have reviewed the excerpts from Owner's Manuals regarding DPF System operation and the steps to take in an emergency regarding notifications and warning messages which may be displayed to the vehicle operator. I have also reviewed communications from the Respondent to dealers in the form of TNFs and ADSLs issued during the Relevant Period to communicate diagnostic and service procedures which had not previously been included in the Respondent's Service Manual (or electronic equivalent) relating to the DPF System.

62. The Owner's Manual of each Relevant Vehicle[38] provides instruction to "… *have the vehicle inspected by your Toyota dealer immediately*" "*If the DPF System warning light flashes rapidly … or the DPF System warning message* '*DPF FULL VISIT YOUR DEALER*'/ '*DPF full Visit your dealer*' *appears on the display*" or "*If the malfunction indicator lamp comes on*".

[38] TAL.100.004.0001, TAL.100.004.1096, TAL.100.004.3293, TAL.100.004.1636, TAL.100.004.3729, TAL.100.004.2183, TAL.100.004.2738, TAL.100.004.4172, TAL.100.004.0541, TAL.100.004.4619, TAL.100.004.5166, TAL.100.004.5597, TAL.100.004.6472

63. Inspections and labor performed at a dealership in response to DPF System warnings and/or malfunction indicator lamp (MIL) illumination consistent the Owner's Manual instructions:

(a) are usual and normal when the diagnostic and service procedures performed are consistent with those prescribed in the Respondent's Service Manual (or electronic equivalent); and

(b) are unusual and abnormal when the diagnostic and service procedures performed are not those prescribed in the Respondent's Service Manual (or electronic equivalent) but are those which have been communicated by the Respondent to dealerships through TNF bulletins.

64. The Respondent issued multiple TNF bulletins applicable to the DPF System of the Relevant Vehicles during the Relevant Period. These were created as a result of investigations, studies, and verification tests, to address warranty claims from multiple customers and which had not been anticipated during the vehicle design, development, and validation process.[39] Relevant Vehicles which were taken to a dealership in response to DPF System warnings and/or malfunction indicator lamp (MIL) illumination, or to address excessive white smoke, which were addressed using diagnostic and service procedures included in relevant TNF bulletins required unusual or abnormal maintenance.

65. CSEs issued and executed by the Respondent also constitute unusual or abnormal maintenance. Based on its own investigations, the Respondent determined in October 2018, December 2018, and June 2020 that it was necessary to notify dealers and send letters to owners of certain Relevant Vehicles (those produced from start of production through the end of MY17) to schedule an appointment for unscheduled maintenance to "… *improve the operation of the … Oxidation Catalyst and Diesel Particulate Filter*" and to address conditions of "substantial" or "excessive" white smoke discharge of more than 30 seconds duration during a regeneration event.[40] All

[39] See TAL.850.005.1996, TAL.001.601.8135, TAL.001.286.0001, TAL.001.286.6290, TAL.001.286.0001, TAL.001.286.6290, TAL.100.005.3850, TAL.100.128.0011, TAL.100.128.0020, TAL.100.132.2034

[40] TAL.850.001.0628, TAL.850.001.0510, TAL.100.132.2005; APP.001.001.0028

Relevant Vehicles identified by the Respondent as "Involved Vehicles" in the CSEs for the DPF System therefore also required unusual or abnormal maintenance.

E.2. Question 3.b. – fuel efficiency

66. I have not been provided with or reviewed any documentation, records, or test results of the fuel efficiency / fuel consumption of the Relevant Vehicles during official Type 1 testing[41] or during owner operation on public roads. The Applicant has made only general, subjective, non-specific claims alleging increase in fuel consumption / decrease in fuel economy.[42]

67. Fuel consumption labels are generated based on tests conducted on representative vehicles during the Type Approval process in a laboratory, under controlled environmental conditions, according to a specified vehicle speed vs. time profile, at a standard reference loading capacity, according to applicable regulations.

68. Fuel consumption labels are not intended to provide an estimate or expectation of actual fuel efficiency / consumption when a vehicle is operated on public roads: they are intended to be used for comparison of fuel efficiency / consumption of one vehicle to others (based on the same standardized tests) when operated under exactly the same conditions, i.e. an "apples-to-apples" comparison.

69. Fuel efficiency / consumption information from owner operation on public roads is irrelevant for comparison to official Type 1 testing performed prior to production during Type Approval or to any fuel consumption label applied to a new vehicle. Fuel consumption during owner operation on public roads can vary significantly based on a variety of factors which may be very different from the conditions used for Type Approval testing and are beyond the control of the manufacturer, including but not limited to: ambient temperature, barometric pressure, and

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[41] UN ECE R101, Annex 6 1.1. prescribes that "… *fuel consumption of vehicles powered by an internal combustion engine only shall be determined according to the procedure for the Type I test as defined in Annex 4 to Regulation No. 83 in force at the time of the approval of the vehicle*."

[42] See ASOC [41(j)], [54(c)], [86(c)]. See also AS [52(j)] where the Applicant identifies comments in Respondent's presentations relating to increased fuel supplied by the additional injector during regeneration. No quantified claims are made regarding overall fuel consumption of any vehicle which could be compared to fuel efficiency stated in promotional or instructional materials or fuel consumption labels.

humidity; driving style; road surface and grade; tire inflation pressure, tire size and construction; vehicle loading (passengers, cargo); and vehicle accessories which negatively affect aerodynamics (such as roof-mounted carrier or cargo box).

70. While it may be accepted that an increase in the frequency of automatic regeneration would involve the consumption of additional fuel, the relative amount of fuel consumed during automatic regeneration is small relative to the amount of fuel consumed to propel the vehicle and, due to the periodic nature of automatic regeneration, is unlikely to have more than a marginal effect on long term fuel efficiency. For this reason, in the absence of any objective data, I cannot conclude that the core defect had any discernable impact on fuel efficiency.

71. In order to provide a response to Question 3.b., I would require:

(a) sample fuel consumption labels applied to the windscreen at the time of sale of the Relevant Vehicles;

(b) the underlying test results and calculations used to generate those fuel consumption labels;

(c) samples of any promotional or instructional materials relating to the Relevant Vehicles;

(d) Type 1 test results from each model of the Relevant Vehicles within each Type for which fuel consumption labels were generated at the time of Type Approval testing. These tests would need to be conducted in the exact same conditions and configurations (i.e. same tires, same reference mass, etc.) as for the Type Approval testing.[43]

72. The above materials would enable me to compare the fuel consumption of representative Relevant Vehicles owned by individual group members to the values on the fuel consumption

[43] During Type Approval of fuel consumption, a manufacturer may establish vehicle family groups to extend or apply the results from a tested vehicle to other similar vehicle models. As such, not all vehicle models produced would have been tested to generate official fuel consumption values. See UN ECE Regulation No. 101 Revision 3, 7.2. "*Vehicles powered by an internal combustion engine only and equipped with a periodically regenerating emission control system: The type approval can be extended to vehicles from the same type or from a different type … if the CO2 emissions measured by the Technical Service do not exceed the type approved value by more than 4 per cent for vehicles of category M1*".

labels applied to the windscreen at the time of sale, and potentially to fuel efficiency stated in promotional or instructional materials. Even so, it appears to me that comparisons of test results on Relevant Vehicles to the original Type 1 tests used to generate fuel consumption labels will not resolve the applicant's allegations of increased fuel consumption during their vehicle usage on public roads.

F. FINDINGS - QUESTION 4.

During the Relevant Period, did the Affected Vehicles have a DPF System that, in its design and manufacturing:

a. *completed an automatic regeneration every 250 to 300 kilometers of driving, depending on driving conditions and driving style;*

b. *completed a regeneration cycle with sufficient regularity to prevent the DPF from becoming partially or completely blocked;*

c. *prevented the DPF from becoming partially or completely blocked; and/or*

d. *was effective at removing sufficient particulate matter from the DPF to prevent the DPF from becoming or remaining partially or completely blocked.*

F.1. Answer to Question 4(a) – automatic regeneration frequency

73. The DPF System of the Relevant Vehicles was not designed to initiate automatic regeneration based on distance accumulated since the last regeneration: rather, it was designed to initiate automatic regeneration when the ECM calculates that the accumulated PM in the DPF has reached the predetermined PM Base Level.[44]

74. While some of the Relevant Vehicles may have completed automatic regenerations every 250 to 300 kilometers during the Relevant Period, others may have experienced automatic regenerations more frequently (shorter distance interval) or less frequently (longer distance interval). Automatic regeneration frequency is controlled by ECM calculations of how much PM is generated

[44] SOAF [21].

by the engine and accumulated in the DPF, which is heavily dependent on driving conditions and driving style. Based on the materials presented to me, I am unable to determine the range of frequency of regeneration in the Relevant Vehicles. Further, I am unable to make a global determination on this issue: I would require detailed data sets on each of the Relevant Vehicles to determine this question on an individualized basis.

F.2. Answers to Questions 4(b), 4(c) and 4(d) - DPF becoming partially or completely blocked

75. Questions 4(b), 4(c) and 4(d) all relate to the DPF becoming partially or completely blocked (due to incomplete or ineffective regeneration, whether passive regeneration or automatic or manual regeneration). As discussed above, the Relevant Vehicles rely on regeneration to remove PM that has been captured and stored in the DPF.[45]

76. Some of the Relevant Vehicles (especially those that were regularly exposed to the high speed pattern) would have periodically experienced DPF Notifications and/or MIL illumination with corresponding stored diagnostic trouble codes (DTCs) indicating "DPF full"[46] during the Relevant Period. This is an indication that the DPF System in these vehicles did not complete regeneration, either passive[47], automatic, or manual, with sufficient regularity and DPF became "full" (i.e. partially or completely blocked).

77. As noted in answers to Questions 1 and 2 above the design defects:

(a) in vehicles exposed to certain high-speed driving conditions or exposed to ineffective countermeasures, prevented the DPF from achieving the temperature required for Thermal Oxidation of PM during automatic or manual regeneration:

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[45] SOAF [Section II].

[46] DTC P2463 Diesel Particulate Filter Restriction – Soot Accumulation.

[47] The Respondent's reply to my questions regarding operating conditions necessary to achieve passive regeneration reiterated that regeneration of the DPF in the Relevant Vehicles "is principally achieved through Automatic Regeneration and, where a DPF Switch is fitted, may be achieved through Manual Regeneration." Passive regeneration occurs when the exhaust gas temperature is above 500 C. However, example data provided by the Respondent show that exhaust gas temperature above 500 C only occurs at operating conditions at or above 90% of the engine's maximum torque output. As such, passive regeneration would only happen during sustained operation at or above 90% of maximum torque, as would only be achieved when operating a heavily-loaded vehicle, when towing a heavy trailer, or during prolonged uphill driving.

(b) did not provide the ability to initiate manual regeneration in Relevant Vehicles built from start of production through the 2017 MY[48] ;

(c) resulted in incomplete and/or ineffective regeneration.

78. Because the DPF System was not able to complete effective regeneration to remove PM from the DPF, whether passive regeneration or automatic or manual regeneration, PM continued to accumulate, resulting in the DPF becoming "full" (i.e. partially or completely blocked).

79. I can be available to amend or supplement this report in the event any additional materials are presented for my review, if requested to do so by the Court.

Submitted by: Date: 15 October, 2020

David P. Garrett

[48] These vehicles were not built with a DPF Switch to initiate manual regeneration.

[ANNEXURE A]

IN THE MATTER OF A REFERENCE PURSUANT TO S.54A OF THE FEDERAL COURT OF AUSTRALIA ACT 1976 (CTH)

Kenneth John Williams
Applicant

Toyota Motor Corporation Australia Limited (ACN 009 686 097)
Respondent

APPLICANT'S STATEMENT OF PROPOSED FINDINGS OF FACT

A INTRODUCTION

1 This statement of proposed findings of fact (**Statement of Findings**) is submitted pursuant to Order 15(d) made by the Court on 26 June 2020 in the Proceeding (**June 26 Orders**) and Rule 28.65(7) of the *Federal Court Rules 2011* (Cth).

2 Capitalised terms used in this Statement of Findings have the meanings given to them in the Dictionary at Schedule 1.

3 The Applicant proposes that the Referee adopt the findings of fact set out in the Agreed Statement of Facts (**SOAF**) and in this Statement of Findings in the Report (as defined in the June 26 Orders).

4 References to the 'Applicant's Bundle' are references to the bundle of documents provided to the Referee by the Applicant in conjunction with this Statement of Findings. The documents in the Applicant's Bundle referenced below are intended only to be illustrative or exemplary. The applicant has not had the benefit of full discovery from Toyota in the Proceeding.

B OVERVIEW

5 The Applicant's Statement of Findings is divided into the following parts:

Contents **Page**

C ANSWERS TO THE QUESTIONS

6 The Applicant proposes that the Referee answer the Relevant Questions as follows:

(a) *Question 1: Does the Applicant's Vehicle suffer, and did it during the Relevant Period suffer, from the Vehicle Defects and the Vehicle Defect Consequences?*

The answer to question 1 is "yes". In support, the applicant refers to the proposed findings set out in paragraphs 7 to 57 below.

(b) *Question 2: Do the Relevant Vehicles suffer, and have they suffered during the Relevant Period, from the Vehicle Defects and Vehicle Defect Consequences?*

The answer to question 2 is "yes". In support, the applicant refers to the proposed findings set out in paragraphs 7 to 55 below.

(c) *Question 3: During the Relevant Period, did the Relevant Vehicles:*

a. require unusual or abnormal maintenance; and/or

The answer to question 3(a) is "yes". In support, the applicant refers to the proposed findings set out in paragraphs 7 to 52 and 54 to 55 below.

b. have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials relevant to the Relevant Vehicle and any fuel consumption label applied to the windscreen of the Relevant Vehicle?

The answer to question 3(b) is "no". In support, the applicant refers to the proposed findings set out in paragraph 53 below.

(d) *Question 4: During the Relevant Period, did the Relevant Vehicles have a DPF System that, in its design and manufacturing:*

a. completed an automatic regeneration every 250 to 300 kilometres of driving, depending on driving conditions and driving style;

The answer to question 4(a) is "no". In support, the applicant refers to the proposed findings set out in paragraph 7 to 52 and 54 to 55 below.

b. completed a regeneration cycle with sufficient regularity to prevent the DPF from becoming partially or completely blocked;

The answer to question 4(b) is "no". In support, the applicant refers to the proposed findings set out in paragraphs 7 to 52 and 54 to 55 below.

c. prevented the DPF from becoming partially or completely blocked; and/or

The answer to question 4(c) is "no". In support, the applicant refers to the proposed findings set out in paragraphs 7 to 52 and 54 to 55 below.

d. was effective at removing sufficient particulate matter from the DPF to prevent the DPF from becoming or remaining partially or completely blocked?

The answer to questions 4(d) is "no". In support, the applicant refers to the proposed findings set out in paragraphs 7 to 52 and 54 to 55 below.

D REGENERATION IN THE RELEVANT VEHICLES

D1 Overview of Regeneration, Oxidation and Passive vs Active Regeneration

7 The DPFs in the Relevant Vehicles have a finite capacity for capture and storage of particulate matter.

8 Accordingly, particulate matter that has been captured and stored in the DPF must be removed from the DPF from time to time.

9 The Relevant Vehicles depend upon a process known as "Regeneration" to remove particulate matter that has been captured and stored in the DPF.[1]

10 In Regeneration, the removal of particulate matter from the DPF is effected by projecting exhaust through the DPF to achieve a chemical reaction known as "oxidation". When particulate matter that has been captured and stored in the DPF oxidises, it is converted into carbon dioxide, which is then emitted from the DPF through the muffler and into the atmosphere.[2]

11 In the case of light duty diesel vehicles generally, Regeneration can be effected by the process of:

(a) NO_2 Oxidation; and/or

(b) Thermal Oxidation.

12 In order for either NO_2 Oxidation or Thermal Oxidation to occur, the exhaust projected through the DPF must reach a sufficiently high temperature.

13 NO_2 Oxidation occurs at a lower temperature than Thermal Oxidation.

14 In the case of light duty diesel vehicles generally, Regeneration may occur in the course of operating the vehicle by:

(a) Passive Regeneration; or

(b) Active Regeneration.

15 In light duty diesel vehicles generally:

(a) Passive Regeneration is ordinarily achieved by NO_2 Oxidation; and

(b) Active Regeneration is ordinarily achieved by Thermal Oxidation.

16 The Relevant Vehicles, however, are not designed to rely on NO_2 Oxidation to achieve Passive Regeneration.[3]

[1] SOAF at [19].

[2] Applicant's Bundle, **Tab 28**, TAL.001.098.4252 at .4258.

[3] Amended Defence at [23(b)].

D2 Active Regeneration in the Relevant Vehicles

17 In the Relevant Vehicles, Active Regeneration may occur by means of:

(a) Automatic Regeneration, which is initiated when the engine is operating and the ECM calculates that the accumulated particulate matter in the DPF has reached the PM Base Level; or

(b) Manual Regeneration, which is initiated when the engine is operating and the operator of the Relevant Vehicle initiates Manual Regeneration by pushing the DPF Switch (if the Relevant Vehicle is fitted with a DPF Switch).[4]

18 During Active Regeneration, Regeneration is effected as follows:

(a) the ECM causes temporary changes in the engine settings to increase the temperature of the exhaust generated by the operation of the engine;[5]

(b) if the engine is operating and the vehicle is idle, the ECM causes the engine idling speed to be increased as follows:

(i) for Relevant Vehicles with manual transmission, to 1,200 rpm; and

(ii) for Relevant Vehicles with automatic transmission, to 900 rpm;[6]

(c) the exhaust generated by the operation of the engine exits the engine and flows into the Exhaust Manifold;

(d) as the exhaust generated by the operation of the engine flows through the Exhaust Manifold, the Additional Injector sprays fuel into the exhaust;[7]

(e) the exhaust and fuel in the Exhaust Manifold flow through the Turbocharger;[8]

(f) the exhaust/fuel mixture then flows through the DPF Assembly Inlet and into the DPF Assembly;[9]

(g) as the exhaust/fuel mixture flows through the DOC, precious metals in the catalyst coating of the DOC cause a chemical reaction between the fuel and oxygen which produces heat;[10]

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[4] SOAF at [21].
[5] SOAF at [22]; Applicant's Bundle, **Tab 15**, TAL.001.144.5165 at .5166; **Tab 17**, TAL.001.287.7921 at .7926.
[6] SOAF at [22].
[7] SOAF at [22]; Applicant's Bundle, **Tab 15**, TAL.001.144.5165 at .5166; **Tab 17**, TAL.001.287.7921 at .7926.
[8] Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.1; **Tab 15**, TAL.001.144.5165 at .5166.
[9] SOAF at [22]; Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.1; **Tab 15**, TAL.001.144.5165 at .5166.
[10] Applicant's Bundle, **Tab 15**, TAL.001.144.5165 at .5166; **Tab 17**, TAL.001.287.7921 at .7926.

(h) the heated exhaust then flows from the DOC into the DPF;[11]

(i) as the heated exhaust flows through the DPF, Thermal Oxidation of the particulate matter captured and stored in the DPF occurs if the exhaust reaches a sufficiently high temperature;[12] and

(j) Thermal Oxidation converts particulate matter into carbon dioxide, which is then emitted from the DPF through the muffler and into the atmosphere.

D3 The Relevant Vehicles depend exclusively or predominantly on Thermal Oxidation to effect Regeneration

19 In the Relevant Vehicles, the Toyota NO_x Reduction Techniques have the effect of:

(a) decreasing the level of NO_x generated by the operation of the engine;[13]

(b) increasing the level of particulate matter generated by the operation of the engine;[14]

(c) decreasing the ratio of NO_x to particulate matter in the exhaust;[15]

(d) decreasing the temperature of the exhaust generated by the engine;[16] and

(e) as a result of subparagraphs (a) to (d) above, suppressing the rate of NO_2 Oxidation in the Relevant Vehicles.

20 The Relevant Vehicles experience minimal NO_2 Oxidation.[17]

21 As a result of the matters described in paragraphs 19 and 20 above, the rate of NO_2 Oxidation in the Relevant Vehicles is insufficient to prevent the DPF from accumulating, or frequently accumulating, particulate matter in excess of the PM Base Level.

22 The Relevant Vehicles depend exclusively, or alternatively predominantly, on Thermal Oxidation to effect Regeneration.[18]

[11] Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.1; **Tab 15**, TAL.001.144.5165 at .5166.

[12] Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.1; **Tab 15**, TAL.001.144.5165 at .5166; **Tab 17**, TAL.001.287.7921 at .7926.

[13] SOAF at [9].

[14] SOAF at [9].

[15] SOAF at [9].

[16] Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.2.

[17] Amended Defence at [23(b)(i)].

[18] Amended Defence at [23(b)(i)].

D4 The Relevant Vehicles depend exclusively or predominantly on Active Regeneration to effect Regeneration

23 In the Relevant Vehicles, in all or almost all driving conditions, the exhaust in the DPF will not reach a sufficiently high temperature to enable Thermal Oxidation to occur without intervention of the ECM.[19]

24 Accordingly, by reason of the findings in paragraphs 20 to 23 above:

(a) the Relevant Vehicles experience no, or alternatively minimal, Passive Regeneration; and

(b) the Relevant Vehicles depend exclusively, or alternatively predominantly, upon Active Regeneration to effect the removal of particulate matter captured and stored in the DPF.

D5 Frequent Active Regeneration has adverse consequences

25 Active Regeneration causes:

(a) increased fuel consumption;

(b) increased wear and tear on the vehicle; and

(c) increased emission of Pollutant Emissions.

26 By reason of the findings in paragraph 25 above, frequent Active Regeneration adversely affects the Relevant Vehicles.

E THE RELEVANT VEHICLE DEFECTS

E1 Insufficient Rate of Passive Regeneration

27 In the Relevant Vehicles:

(a) Passive Regeneration is reliant upon Thermal Oxidation;

(b) the exhaust temperature necessary to enable Thermal Oxidation to occur cannot be achieved, or is unlikely to be achieved, without intervention of the ECM (in particular, the injection of additional fuel into the exhaust via the Additional Injector);[20] such that

[19] Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.1; **Tab 15**, TAL.001.144.5165 at .5166; **Tab 17**, TAL.001.287.7921 at .7926; **Tab 48**, TAL.001.276.3387 at .3387.

[20] See footnote 19 above.

(c) the rate of Passive Regeneration is insufficient to prevent the DPF from accumulating, or frequently accumulating, particulate matter in excess of the PM Base Level,

(**Passive Regeneration Defects**).

E2 Excessive Active Regeneration

28 The Relevant Vehicles experience, or have a propensity to experience,[21] excessive Active Regeneration, including because:

(a) by reason of the Passive Regeneration Defects, the Relevant Vehicles depend exclusively or predominantly upon Active Regeneration to effect the removal of particulate matter captured and stored in the DPF; and

(b) by reason of the defects described in paragraphs 33 to 51 below, the efficacy of Active Regeneration in removing particulate matter from the DPF is diminished, such that Active Regeneration occurs more frequently (as measured by the kilometres travelled between occurrences of Active Regeneration) and/or for longer durations (as measured by the time taken, or kilometres travelled during, a single occurrence of Active Regeneration) than would otherwise be the case,[22]

(**Active Regeneration Defects**).

29 The Relevant Vehicles experience, or have a propensity to experience,[23] Active Regeneration that occurs at a frequency (as measured by the kilometres travelled between occurrences of Active Regeneration) that is:

(a) greater than what is reflected in the certification materials in respect of the Relevant Vehicles; and/or

(b) more frequent than the completion of a Regeneration every 250 to 300 kilometres travelled by the Relevant Vehicles.[24]

30 The Relevant Vehicles experience, or have a propensity to experience,[25] Active Regeneration that occurs for a duration (as measured by the time taken, or kilometres travelled during, a

[21] Applicant's Bundle, **Tab 19**, TAL.001.604.7259 at .7259; **Tab 26**, TAL.850.353.0100 at .0100; **Tab 45**, TAL.001.275.5930 at .5930; **Tab 55**, TAL.001.488.6734 at .6734; **Tab 61**, TAL.001.489.1507 at .1516 to .1517; **Tab 64**, TCO.003.001.1738 at .1738 to .1738_0001, .1738_0006 to .1738_0008; **Tab 66**, TAL.001.496.2593 at .2593; **Tab 73**, TAL.001.500.3222 at .3222 to .3223, .3228 to .3230.

[22] Applicant's Bundle, **Tab 2**, TAL.001.478.6005 at p.3; **Tab 3**, TAL.001.299.5495 at .5495; **Tab 4**, TAL.001.262.0455 at .0455; **Tab 15**, TAL.001.144.5165 at .5169.

[23] See footnote 21 above.

[24] Applicant's Bundle, **Tab 5**, TAL.001.372.4751 at .4751.

[25] See footnote 21 above.

single occurrence of Active Regeneration) that is greater than what is reflected in the certification materials in respect of the Relevant Vehicles.[26]

31 The percentage of total vehicle kilometres travelled by the Relevant Vehicles that are travelled whilst in Active Regeneration is greater than what is reflected in the certification materials in respect of the Relevant Vehicles.

32 The Active Regeneration Defects have a compounding effect on, and exacerbate one or more of, the Inlet Design Defect, the Additional Injector Design Defect, the Additional Injector Blockage Defect, the DOC Coking Defect, the Face Plugging Defect and/or the DPF Blockage Defects.[27]

E3 The DPF Assembly Inlet Design Defect

33 The DPF Assembly Inlet:

(a) is necessary because the diameter of the outlet of the Turbocharger is smaller than the diameter of the DOC;

(b) abruptly expands from the outlet of the Turbocharger to the face of the DOC;

(c) provides insufficient space for the exhaust flowing through the Turbocharger to expand to the diameter of the DOC; and

(d) does not contain any perforated plate or other device to distribute the flow of exhaust across the face of the DOC.[28]

34 The DPF Assembly Inlet, including the features described in paragraph 33 above, causes, or has a propensity[29] to cause:

(a) non-uniform distribution of exhaust flow through the DOC;[30]

(b) the majority of the exhaust flowing from the Exhaust Manifold to be projected through the centre of the DOC, leaving the outer perimeter of the DOC underutilised;[31]

[26] Applicant's Bundle, **Tab 17**, TAL.001.287.7921 at .7941, .7943, .7948; **Tab 20**, TAL.001.287.2421 at .2421_0012, .2421_0014, .2421_0019; **Tab 22**, TAL.001.534.7823 at .7826; **Tab 23**, TAL.001.286.1096 at .1109; **Tab 24**, TCO.005.002.3388 at .3388_0010 to .3388_0012; **Tab 26**, TAL.850.353.0100 at .0100; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 40**, TAL.001.277.3471 at .3482, .3490; **Tab 48**, TAL.001.276.3387 at .3387.

[27] Applicant's Bundle, **Tab 2**, TAL.001.478.6005 at p.3; **Tab 3**, TAL.001.299.5495 at .5495; **Tab 6**, TAL.100.084.4874 at .4875; **Tab 15**, TAL.001.144.5165 at .5169.

[28] Applicant's Bundle, **Tab 37**, TAL.001.276.1908 at p.2; **Tab 72**, TAL.001.538.7482 at .7522 to .7524.

[29] See footnote 21 above.

[30] Applicant's Bundle, **Tab 72**, TAL.001.538.7482 at .7523.

[31] Applicant's Bundle, **Tab 72**, TAL.001.538.7482 at .7523.

(c) in Active Regeneration, the exhaust/fuel mixture[32] to recirculate at a low velocity around the outer perimeter of the DOC, before passing through the DOC, which causes DOC Face Plugging at the outer perimeter of the DOC;[33] and/or

(d) in Active Regeneration, the exhaust temperatures at the outer perimeter of the DPF to fail to become sufficiently high to enable Thermal Oxidation of particulate matter at the outer perimeter of the DPF to occur,[34]

(**Inlet Design Defect**).

35 The Inlet Design Defect has a compounding effect on, and exacerbates one or more of, the Active Regeneration Defects, the Additional Injector Design Defect, the Additional Injector Blockage Defect, the DOC Coking Defect, the Face Plugging Defect and/or the DPF Blockage Defects.[35]

E4 The Additional Injector Design Defect

36 In the Relevant Vehicles, the Additional Injector:

(a) is controlled by the ECM;

(b) is mounted to the Exhaust Manifold;

(c) is located upstream of the Turbocharger;

(d) injects diesel fuel into the exhaust travelling through the Exhaust Manifold; and

(e) is included in the DPF System to inject additional fuel into the exhaust for the purpose of increasing the temperature of the exhaust gas passing through the DOC.[36]

37 The DPF System relies on the injection of diesel fuel from the Additional Injector into the exhaust gas flowing through the Exhaust Manifold to increase the temperature of the exhaust gas entering the DOC to sufficient levels to achieve Thermal Oxidation in the DPF.[37]

38 When diesel fuel combusts in the DOC, it generates heat which increases the temperature of the exhaust passing through the DOC. The more diesel fuel that combusts in the DOC, the higher the temperature of the exhaust will become.[38]

[32] See paragraphs 18(f) and 18(g) above.
[33] Applicant's Bundle, **Tab 37**, TAL.001.276.1908 at p.2; **Tab 72**, TAL.001.538.7482 at .7522 to .7523.
[34] Applicant's Bundle, **Tab 37**, TAL.001.276.1908 at p.2.
[35] See footnote 62 below.
[36] SOAF at [12]; Applicant's Bundle, **Tab 72**, TAL.001.538.7482 at .7483.
[37] SOAF at [12]; Applicant's Bundle, **Tab 72**, TAL.001.538.7482 at .7483.
[38] Applicant's Bundle, **Tab 72**, TAL.001.538.7482 at .7485 to .7486.

39 Diesel fuel must atomise into very small fuel particles in order to vaporise and combust in the DOC.[39] Diesel fuel does not atomise easily due to its high viscosity.

40 The Additional Injector in the Relevant Vehicles fails, or has a propensity to fail,[40] to achieve a sufficiently fine atomisation of the diesel fuel injected into the exhaust gas to permit vaporisation of the fuel before it enters the DOC.[41]

41 Further, the design of the DPF System prevents, or has a propensity to prevent,[42] sufficient fuel from combusting in the DOC in that:

(a) the Additional Injector is located between approximately 225 and 240 millimetres from the face of the DOC;[43]

(b) the distance between the Additional Injector and the face of the DOC, and therefore the reaction and/or processing time allowed, is too short to permit the diesel fuel sprayed by the Additional Injector to be atomised and/or vaporised to the extent required for sufficient fuel to combust in the DOC;[44]

(c) the DPF System does not contain a mixer to assist with atomising the diesel fuel particles before they enter the DOC;[45]

(d) the operation of the Turbocharger is insufficient to cause the diesel fuel sprayed by the Additional Injector to be atomised to the extent required for sufficient fuel to combust in the DOC;[46] and

(e) the DPF System is too small to allow the exhaust/fuel mixture passing through the DPF System the reaction time required to effect the combustion of sufficient fuel in the DOC.[47]

42 The use of the Additional Injector in the DPF System, as described in paragraph 37 above and including the features described in paragraphs 40 and 41 above, causes, or has a propensity to cause:[48]

(a) DOC Face Plugging; and

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[39] Applicant's Bundle, **Tab 22**, TAL.001.534.7823 at .7823, .7825; **Tab 72**, TAL.001.538.7482 at .7514, .7521.

[40] See footnote 21 above.

[41] Applicant's Bundle, **Tab 1**, TAL.001.301.4287 at .4287; **Tab 22**, TAL.001.534.7823 at .7823 to .7825; **Tab 43**, TAL.001.459.4448 at .4448; **Tab 49**, TAL.850.352.1938 at .1941 to .1942; **Tab 52**, TCO.001.001.3085 at .3085; **Tab 55**, TAL.001.480.6537 at .6539; **Tab 56**, TAL.001.481.0161 at .0161; **Tab 72**, TAL.001.538.7482 at .7483 to .7521.

[42] See footnote 21 above.

[43] Applicant's Bundle, **Tab 37**, TAL.001.276.1908 at p.2; **Tab 72**, TAL.001.538.7482 at .7515 to .7516.

[44] Applicant's Bundle, **Tab 37**, TAL.001.276.1908 at p.2; **Tab 55**, TAL.001.480.6537 at .6541, .6551; **Tab 72**, TAL.001.538.7482 at .7514 to .7521.

[45] Amended Defence at [10]; Applicant's Bundle, **Tab 11**, TAL.001.320.5408 at .5420.

[46] Applicant's Bundle, **Tab 55**, TAL.001.480.6537 at .6546. See also footnote 41 above.

[47] Applicant's Bundle, **Tab 55**, TAL.001.480.6537 at .6541, .6551; **Tab 72**, TAL.001.538.7482 at .7514 to .7521.

[48] See footnote 21 above.

(b) unburned fuel to be emitted from the Relevant Vehicles in the form of white smoke,[49]

(**Additional Injector Design Defect**).

43 The Additional Injector Design Defect has a compounding effect on, and exacerbates one or more of, the Active Regeneration Defects, the Inlet Design Defect, the Additional Injector Blockage Defect, the DOC Coking Defect, the Face Plugging Defect and/or the DPF Blockage Defects.[50]

E5 The Additional Injector Blockage Defect

44 The Additional Injector becomes, or has a propensity to become,[51] partially or completely blocked by carbon deposits on its tip (**Additional Injector Blockage Defect**).[52]

45 The Additional Injector Blockage Defect:

(a) causes, or has a propensity to cause, a deterioration in the Additional Injector spray pattern;[53]

(b) impedes or prevents, or has a propensity to impede or prevent, the Additional Injector from atomising the diesel fuel that is injected into the exhaust gas travelling through the Exhaust Manifold by the Additional Injector;[54]

(c) causes, or has a propensity to cause, DOC Face Plugging;[55]

(d) prevents, or has a propensity to prevent, sufficient diesel fuel from entering the DOC to enable the exhaust flowing through the DOC to reach a sufficiently high temperature to achieve Thermal Oxidation;[56] and

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[49] Applicant's Bundle, **Tab 9**, TAL.100.085.8191 at p.2; **Tab 17**, TAL.001.287.7921 at .7928, .7932; **Tab 22**, TAL.001.534.7823 at .7823; **Tab 37**, TAL.001.276.1908 at p.2; **Tab 72**, TAL.001.538.7482 at .7485 to .7495, .7523.

[50] Applicant's Bundle, **Tab 17**, TAL.001.287.7921 at .7932; **Tab 22**, TAL.001.534.7823 at .7823; **Tab 37**, TAL.001.276.1908 at p.2; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 43**, TAL.001.459.4448 at .4448; **Tab 46**, TAL.001.276.3660 at .3660; **Tab 51**, TCO.001.001.0168 at .0168; **Tab 53**, TAL.001.480.3588 at .3589; **Tab 55**, TAL.001.480.6537 at 6539, .6541 to .6542, .6546; **Tab 72**, TAL.001.538.7482 at .7488, .7493 to .7495, .7515 to .7521.

[51] See footnote 21 above.

[52] Applicant's Bundle, **Tab 29**, TAL.001.283.0344 at .0344; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 31**, TCO.001.001.8359 at .8359; **Tab 32**, TAL.001.449.2276 at .2276; **Tab 38**, TAL.001.457.1494 at .1494; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 41**, TAL.001.277.2124 at .2124; **Tab 44**, TAL.001.607.3701 at .3727 to .3740; **Tab 49**, TAL.850.352.1938 at .1939 to .1940; **Tab** 51, TCO.001.001.0168 at .0168; **Tab 53**, TAL.001.480.3588 at .3589 to .3590; **Tab 54**, TAL.001.480.6876 at. 6876; **Tab 55**, TAL.001.480.6537 at .6546 to .6547; **Tab 68**, TAL.001.496.6989 at .6991 to .6992; **Tab 71**, TAL.001.574.0241 at .0241.

[53] Applicant's Bundle, **Tab 51**, TCO.001.001.0168 at .0168; **Tab 53**, TAL.001.480.3588 at .3589 to .3590.

[54] See footnote 53 above.

[55] Applicant's Bundle, **Tab 22**, TAL.001.534.7823 at .7823 to .7824; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 37**, TAL.001.276.1908 at p.2; **Tab 43**, TAL.001.459.4448 at .4448; **Tab 46**, TAL.001.276.3660 at .3660; **Tab 51**, TCO.001.001.0168 at .0168; **Tab 53**, TAL.001.480.3588 at .3589 to .3590; **Tab 54**, TAL.001.480.6876 at. 6876; **Tab 55**, TAL.001.480.6537 at .6546.

[56] Applicant's Bundle, **Tab 22**, TAL.001.534.7823 at .7823 to .7825; **Tab 48**, TAL.001.276.3387 at .3387; **Tab 72**, TAL.001.538.7482 at .7483 to .7521.

(e) causes, or has a propensity to cause, unburned fuel to emitted from the Relevant Vehicles in the form of white smoke.[57]

46 The Additional Injector Blockage Defect has a compounding effect on, and exacerbates one or more of, the Active Regeneration Defects, the Inlet Design Defect, the Additional Injector Design Defect, the DOC Coking Defect, the Face Plugging Defect and/or the DPF Blockage Defects.[58]

E6 The DOC Defects

47 The DOC in the Relevant Vehicles suffers, or has a propensity to suffer,[59] from DOC Coking (**DOC Coking Defect**).[60]

48 The DOC in the Relevant Vehicles becomes, or has a propensity to become, partially or wholly blocked by DOC Face Plugging (**Face Plugging Defect**).[61]

49 The DOC Coking Defect and the Face Plugging Defect each have a compounding effect on, and exacerbate one or more of, the Active Regeneration Defects, the Inlet Design Defect, the Additional Injector Design Defect, the Additional Injector Blockage Defect and/or the DPF Blockage Defects.[62]

[57] Amended Defence at [47(h)(ii)]; Applicant's Bundle, **Tab 22**, TAL.001.534.7823 at .7823 to .7824; **Tab 31**, TCO.001.001.8359 at .8359; **Tab 55**, TAL.001.480.6537 at .6542; **Tab 68**, TAL.001.496.6989 at .6991.

[58] Applicant's Bundle, **Tab 22**, TAL.001.534.7823 at .7823 to .7826; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 31**, TCO.001.001.8359 at .8359; **Tab 37**, TAL.001.276.1908 at p.2; **Tab 43**, TAL.001.459.4448 at .4448; **Tab 46**, TAL.001.276.3660 at .3660; **Tab 51**, TCO.001.001.0168 at .0168; **Tab 52**, TCO.001.001.3085 at .3085; **Tab 53**, TAL.001.480.3588 at .3589 to .3590; **Tab 54**, TAL.001.480.6876 at. 6876; **Tab 55**, TAL.001.480.6537 at .6541 to .6542, .6546; **Tab 68**, TAL.001.496.6989 at .6991 to .6992.

[59] Applicant's Bundle, **Tab 53**, TAL.001.480.3588 at .3590. See also footnote 21 above.

[60] Applicant's Bundle, **Tab 50**, TAL.001.275.2605 at .2605; **Tab 51**, TCO.001.001.0168 at .0168; **Tab 53**, TAL.001.480.3588 at .3589 to .3590; **Tab 54**, TAL.001.480.6876 at. 6876; **Tab 55**, TAL.001.480.6537 at .6539 to .6550; **Tab 56**, TAL.001.481.0161 at .0161; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 59**, TCO.001.001.2721 at .2721; **Tab 60**, TAL.100.012.0014 at .0014; **Tab 61**, TAL.001.489.1507 at .1510; **Tab 63**, TAL.001.493.1863 at .1863; **Tab 65**, TAL.001.515.5394 at .5394; **Tab 66**, TAL.001.496.2593 at .2593; **Tab 67**, TAL.001.495.2544 at .2547; **Tab 68**, TAL.001.496.6989 at .6991 to .6992, .6999; **Tab 70**, TAL.001.497.7835 at .7835.

[61] Amended Defence at [47(d)]; Applicant's Bundle, **Tab 2**, TAL.001.478.6005 at .6005; **Tab 6**, TAL.100.084.4874 at .4874 to .4875; **Tab 7**, TAL.001.294.7151 at .7151; **Tab 8**, TAL.001.478.7098 at .7098; **Tab 9**, TAL.100.085.8191 at pp.1 to 2; **Tab 11**, TAL.001.320.5408 at .5423 to .5424; **Tab 16**, TAL.001.478.6209 at .6209; **Tab 17**, TAL.001.287.7921 at .7922 to .7923, .7927, .7930 to .7932, .7941; **Tab 18**, TJL.010.001.0319 at .0319 to .0319_0004; **Tab 20**, TAL.001.287.2421 at .2421_0007, .2421_0012 to .2421_0013; **Tab 21**, TCO.005.003.0723 at .0723_0002 to .0723_0007; **Tab 23**, TAL.001.286.1096 at .1108; **Tab 24**, TCO.005.002.3388 at .3388_0002 to .3388_0015; **Tab 25**, TAL.001.285.7708 at .7708_0008 to .7708_0015; **Tab 26**, TAL.850.353.0100 at .0100; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 31**, TCO.001.001.8359 at .8359; **Tab 35**, TCO.005.002.3326 at .3326; **Tab 36**, TCO.001.001.2395 at .2395; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 40**, TAL.001.277.3471 at .3479 to .3482, .3490; **Tab 41**, TAL.001.277.2124 at .2124; **Tab 43**, TAL.001.459.4448 at .4448; **Tab 44**, TAL.001.607.3701 at .3723, .3745; **Tab 46**, TAL.001.276.3660 at .3660; **Tab 52**, TCO.001.001.3085 at .3085; **Tab 53**, TAL.001.480.3588 at .3589; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 63**, TAL.001.493.1863 at .1863; **Tab 82**, APP.001.001.0028 at .0028.

[62] Applicant's Bundle, **Tab 2**, TAL.001.478.6005 at p.3; **Tab 9**, TAL.100.085.8191 at pp. 1 to 2; **Tab 11**, TAL.001.320.5408 at .5424; **Tab 17**, TAL.001.287.7921 at .7932, .7941; **Tab 18**, TJL.010.001.0319 at .0319, .0318_0003, .0318_0004, .0319_0006; **Tab 20**, TAL.001.287.2421 at .2421_0008, .2421_0012; **Tab 21**, TCO.005.003.0723 at .0723, .0723_0007; **Tab 23**, TAL.001.286.1096 at .1103, .1108; **Tab 24**, TCO.005.002.3388 at .3388_0012; **Tab 40**, TAL.001.277.3471 at .3479, .3482, .3490; **Tab 53**, TAL.001.480.3588 at .3590; **Tab 55**, TAL.001.480.6537 at .6541 to .6542; **Tab 68**, TAL.001.496.6989 at .6991.

E7 Blockage of the DPF

50 Active Regeneration in the Relevant Vehicles fails, or has a propensity to fail,[63] to effect the removal of sufficient particulate matter from the DPF to prevent the DPF from becoming or remaining partially or completely blocked, including as a result of the defects described in paragraphs 27 to 49 above.[64]

51 The DPF System in the Relevant Vehicles fails, or has a propensity to fail,[65] to effect the removal of sufficient particulate matter from the DPF to prevent the DPF from becoming or remaining partially or completely blocked, including as a result of the defects described in paragraphs 27 to 50 above.[66]

F CONSEQUENCES OF THE VEHICLE DEFECTS

52 As a result of the Vehicle Defects, individually and cumulatively, the Relevant Vehicles have a propensity to suffer,[67] and/or during the Relevant Period have suffered, from one or more of the following consequences:

(a) the DOC does not function effectively;[68]

(b) the DPF does not function effectively;[69]

(c) the catalytic efficiency of the DOC is diminished;[70]

(d) the DOC becomes damaged;[71]

(e) the exhaust in the DPF does not reach a sufficiently high temperature to effect Thermal Oxidation;[72]

(f) NO_2 Oxidation during Passive Regeneration is inhibited;[73]

[63] See footnote 21 above.

[64] Amended Defence at [47(e)]; Applicant's Bundle, **Tab 7**, TAL.001.294.7151 at .7151; **Tab 9**, TAL.100.085.8191 at pp.1 to 2; **Tab 17**, TAL.001.287.7921 at .7932, .7941; **Tab 18**, TJL.010.001.0319 at .0319, .0319_0003, .0319_0004, .0319_0006; **Tab 20**, TAL.001.287.2421 at .2421_0008, .2421_0012; **Tab 21**, TCO.005.003.0723 at .0723; **Tab 23**, TAL.001.286.1096 at .1103, .1108; **Tab 40**, TAL.001.277.3471 at .3479, .3490; **Tab 61**, TAL.001.489.1507 at .1509; **Tab 67**, TAL.001.495.2544 at .2546; **Tab 68**, TAL.001.496.6989 at .6991.

[65] See footnote 21 above.

[66] See footnote 64 above.

[67] See footnote 21 above.

[68] See paragraphs 47 and 48 above and the documents referenced in the footnotes to those paragraphs.

[69] See paragraphs 50 and 51 above and the documents referenced in the footnotes to those paragraphs.

[70] See paragraphs 47 and 48 above and the documents referenced in the footnotes to those paragraphs.

[71] See paragraphs 47 and 48 above and the documents referenced in the footnotes to those paragraphs.

[72] Applicant's Bundle, **Tab 7**, TAL.001.294.7151 at .7151; **Tab 9**, TAL.100.085.8191 at p.1; **Tab 15**, TAL.001.144.5165 at .5167; **Tab 17**, TAL.001.287.7921 at .7932.

[73] See paragraphs 19 to 21 above and the documents referenced in the footnotes to those paragraphs.

(g) unoxidized fuel flows through the DPF and is emitted from the Relevant Vehicle as white smoke;[74]

(h) the DPF becomes partially or completely blocked;[75]

(i) engine back-pressure is increased;[76]

(j) fuel consumption is increased and fuel economy is decreased;[77]

(k) white smoke is emitted from the exhaust pipe when the engine is on;[78]

(l) foul smelling exhaust is emitted from the exhaust pipe when the engine is on;[79]

(m) engine power is diminished;[80]

(n) engine power is intermittently lost whilst driving;[81]

(o) wear and tear on the engine components and the DPF System is increased;[82]

(p) the Relevant Vehicles must be inspected, serviced and/or repaired by a service engineer for the purpose of cleaning, repairing or replacing the DPF, the DPF System, or components thereof;[83]

(q) the Relevant Vehicles must be inspected, serviced and/or repaired more regularly than:

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[74] Amended Defence at [47(c)]; Applicant's Bundle, **Tab 5**, TAL.001.372.4751 at .4751; **Tab 6**, TAL.100.084.4874 at .4874 to .4875; **Tab 7**, TAL.001.294.7151 at .7151; **Tab 8**, TAL.001.478.7098 at .7908; **Tab 11**, TAL.001.320.5408 at .5417 to .5418; **Tab 12**, TAL.001.291.2138 at .2138_0001; **Tab 14**, TCO.001.001.9050 at .9050_0002, .9050_0007 to .9050_0008; **Tab 16**, TAL.001.478.6209 at .6209; **Tab 17**, TAL.001.287.7921 at .7922 to .7923; **Tab 24**, TCO.005.002.3388 at .3388_0002 to .3388_0003; **Tab 25**, TAL.001.285.7708 at .7708_0001, .7708_0014; **Tab 26**, TAL.850.353.0100 at .0100; **Tab 28**, TAL.001.098.4252 at .4254; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 31**, TCO.001.001.8359 at .8359; **Tab 32**, TAL.001.449.2276 at .2276; **Tab 35**, TCO.005.002.3326 at .3326; **Tab 36**, TCO.001.001.2395 at .2395; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 44**, TAL.001.607.3701 at .3723, .3744 to .3746; **Tab 46**, TAL.001.276.3660 at .3660; **Tab 52**, TCO.001.001.3085 at .3085; **Tab 53**, TAL.001.480.3588 at .3589; **Tab 55**, TAL.001.480.6537 at .6538, .6545; **Tab 57**, TAL.001.488.6734 at .6734; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 61**, TAL.001.489.1507 at .1509; **Tab 66**, TAL.001.496.2593 at .2593; **Tab 67**, TAL.001.495.2544 at .2546; **Tab 68**, TAL.001.496.6989 at .6991; **Tab 70**, TAL.001.497.7835 at .7835.

[75] See paragraphs 50 and 51 above and the documents referenced in the footnotes to those paragraphs.

[76] See paragraph 52(h) above and the footnote to that paragraph.

[77] Applicant's Bundle, **Tab 6**, TAL.100.084.4874 at .4875; **Tab 9**, TAL.100.085.8191 at pp.2 to 3; **Tab 11**, TAL.001.320.5408 at .5424; **Tab 23**, TAL.001.286.1096 at .1109; **Tab 24**, TCO.005.002.3388 at .3388_0007; **Tab 56**, TAL.001.481.0161 at .0163; **Tab 61**, TAL.001.489.1507 at 1510.

[78] See footnote 74 above.

[79] Applicant's Bundle, **Tab 75**, APP.001.001.0005 at .0005_0002.

[80] See references to "limp mode" at Applicant's Bundle, **Tab 12**, TAL.001.291.2138 at .2138 to .2138_0002; **Tab 25**, TAL.001.285.7708 at .7708_001; **Tab 73**, TAL.001.500.3222 at .3225.

[81] See footnote 80 above.

[82] See paragraphs 18(a) to (b), 24 to 25, 52(a) to (e) and 52(h) to 52(i) above and the documents referenced in the footnotes to those paragraphs.

[83] Applicant's Bundle, **Tab 19**, TAL.001.604.7259 at .7259; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 41**, TAL.001.277.2124 at .2124; **Tab 53**, TAL.001.480.3588 at .3588; **Tab 61**, TAL.001.489.1507 at .1516 to .1517; **Tab 66**, TAL.001.496.2593 at .2593; **Tab 67**, TAL.001.495.2544 at .2555; **Tab 75**, APP.001.001.0005 at .0005; **Tab 76**, APP.001.001.0012 at .0012; **Tab 77**, APP.001.001.0014 at .0014; **Tab 78**, APP.001.001.0019 at .0019; **Tab 79**, APP.001.001.0023 at .0023_0001; **Tab 80**, APP.001.001.0024 at .0024; **Tab 81**, APP.001.001.0026 at .0026; **Tab 82**, APP.001.001.0028 at .0028.

(i) would be required absent the Vehicle Defects (or any one of them); and/or

(ii) the service intervals provided in the Maintenance Schedule set out in the Warranty and Service Booklet which accompanied the Relevant Vehicles;[84]

(r) the ECM must be reprogrammed more often than would be required absent the Vehicle Defects;[85]

(s) the Relevant Vehicles inconvenience their drivers, including by reason of the matters set out in subparagraphs (p) to (r) above and having to undertake Manual Regenerations;[86] and

(t) the DPF Notifications are displayed on an excessive number of occasions and/or for an excessive period of time,[87]

(**Vehicle Defect Consequences**).

53 As a result of the increase in fuel consumption by, and decrease in fuel economy of, the Relevant Vehicles resulting from one or more of the Vehicle Defects,[88] the Relevant Vehicles do not, and during the Relevant Period did not, have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials relevant to the Relevant Vehicle and/or any fuel consumption label applied to the windscreen of the Relevant Vehicles.

G COUNTERMEASURES

54 None of the following countermeasures implemented by Toyota during the Relevant Period has had the effect of remedying the Vehicle Defects (or any one or more of them) or the Vehicle Defect Consequences (or any one or more of them):[89]

(a) the programming change to the ECM in 2016 and 2017 (known as "Countermeasure #1"), the intent of which was to increase exhaust temperature at the time of Active Regeneration by retarding main fuel injection timing and reducing turbo boost pressure during Active Regeneration;[90]

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[84] See footnote 83 above.

[85] See paragraphs 54(a), (b) and (e) below, and the documents referenced in the footnotes to that paragraph. See also Applicant's Bundle, **Tab 76**, APP.001.001.0012 at .0012; **Tab 78**, APP.001.001.0019 at .0019; **Tab 81**, APP.001.001.0026 at .0026; **Tab 82**, APP.001.001.0028 at .0028.

[86] Applicant's Bundle, **Tab 7**, TAL.001.294.7151 at "(04) OTHER INFORMATION"; **Tab 53**, TAL.001.480.3588 at .3588; **Tab 54**, TAL.001.480.6876 at .6876; **Tab 61**, TAL.001.489.1507 at .1516 to .1517.

[87] Amended Defence at [47(c)]; Applicant's Bundle, **Tab 7**, TAL.001.294.7151 at .7151; **Tab 25**, TAL.001.285.7708 at .7709; **Tab 26**, TAL.850.353.0100 at .0100; **Tab 28**, TAL.001.098.4252 at .4254; **Tab 31**, TCO.001.001.8359 at .8359.

[88] See paragraph 52(j) above.

[89] Amended Defence at [47(g)] and [47(k)].

[90] Amended Defence at [47(f)(i)(A)]; Applicant's Bundle, **Tab 10**, TAL.001.478.6463 at .6463 to .6464; **Tab 14**, TCO.001.001.9050 at .9050_0002 to .9050_0005; **Tab 15**, TAL.001.144.5165 at .5169; **Tab 17**, TAL.001.287.7921 at .7935, .7942, .7945; **Tab 18**, TJL.010.001.0319 at .0319_0002 to .0319_0003; **Tab 20**, TAL.001.287.2421 at .2421_0013, .2421_0016; **Tab 21**, TCO.005.003.0723 at .0723_0002, .0723_0006 to .0723_0007; **Tab 24**, TCO.005.002.3388 at .3388_0001, .3388_0005, .3388_0014; **Tab 25**, TAL.001.285.7708 at .7708_0002, .7708_0012, .7708_0017 to .7708_0018;

(b) the programming change to the ECM from June 2018 (known as "Countermeasure #2) which had the effect of changing the air to fuel ratio in the DPF System and reduced the amount of fuel added by the Additional Injector at the time of Active Regeneration;[91]

(c) installation of the DPF Switch from 2018;[92]

(d) changes to the distribution of precious metals in the DOC and DPF in Relevant Vehicle model years 2018 onwards;[93]

(e) the programming change to the ECM which resulted in the utilisation of inputs from the Pressure Sensor in the ECM's particulate matter accumulation calculation algorithm (prior to about December 2018, the ECM in the Relevant Vehicles did not utilise data received from the Pressure Sensor for the purpose of calculating the particulate matter accumulated in the DPF);[94]

(f) replacement of the DPF Assembly;[95] and

(g) the performance of a "superburn" on the Relevant Vehicles by authorised dealers.[96]

55 Further, none of the following countermeasures Toyota has indicated that it implemented, or proposes to implement, in 2020 has had the effect of remedying the Vehicle Defects (or any one or more of them) or the Vehicle Defect Consequences (or any one or more of them):[97]

Tab 26, TAL.850.353.0100 at .0100; **Tab 27**, TAL.001.285.1213 at .1213; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 40**, TAL.001.277.3471 at .3477 to .3478, .3481; **Tab 41**, TAL.001.277.2124 at .2124; **Tab 61**, TAL.001.489.1507 at .1511; **Tab 66**, TAL.001.496.2593 at .2593.

[91] Amended Defence at [47(f)(i)(B)(1)]; Applicant's Bundle, **Tab 29**, TAL.001.283.0344 at .0344; **Tab 30**, TAL.001.281.3264 at .3264; **Tab 31**, TCO.001.001.8359 at .8359; **Tab 33**, TAL.850.006.0290 at .0290; **Tab 34**, TCO.001.002.0061 at .0061; **Tab 35**, TCO.005.002.3326 at .3326; **Tab 36**, TCO.001.001.2395 at .2395; **Tab 38**, TAL.001.457.1494 at .1494; **Tab 39**, TAL.001.277.2765 at .2765; **Tab 40**, TAL.001.277.3471 at .3477 to .3478, .3482; **Tab** 41, TAL.001.277.2124 at .2124; **Tab 42**, TAL.001.276.7210 at .7210; **Tab 43**, TAL.001.459.4448 at .4448; **Tab 44**, TAL.001.607.3701 at .3726; **Tab 45**, TAL.001.275.5930 at .5930; **Tab 46**, TAL.001.276.3660 at .3660; **Tab 47**, TAL.001.276.3583 at .3583; **Tab 55**, TAL.001.480.6537 at .6538; **Tab 57**, TAL.001.488.6734 at .6734; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 59**, TCO.001.001.2721 at .2721; **Tab 61**, TAL.001.489.1507 at .1511, .1514; **Tab 62**, TJL.006.001.0001 at .0001; **Tab 64**, TCO.003.001.1738 at .1738 to .1738_0008; **Tab 66**, TAL.001.496.2593 at .2593; **Tab 67**, TAL.001.495.2544 at .2552; **Tab 68**, TAL.001.496.6989 at .7004; **Tab 69**, TAL.001.497.7831 at .7831; **Tab 70**, TAL.001.497.7835 at .7835; **Tab 71**, TAL.001.574.0241 at .0241; **Tab 73**, TAL.001.500.3222 at .3222 to .3230.

[92] Amended Defence at [47(f)(i)(B)(1)], [47(f)(ii)(B)(4)]; Applicant's Bundle, **Tab 13**, TCO.001.001.7813. See also references to "MY18" post production claims and/or reoccurrences in Applicant's Bundle at **Tab 57**, TAL.001.488.6734 at .6734; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 59**, TCO.001.001.2721 at .2721; **Tab 61**, TAL.001.489.1507 at .1511; **Tab 62**, TJL.006.001.0001 at .0001; **Tab 64**, TCO.003.001.1738 at .1738 to .1738_0008; **Tab 68**, TAL.001.496.6989 at .7004; **Tab 73**, TAL.001.500.3222 at .3230.

[93] Applicant's Bundle, **Tab 28**, TAL.001.098.4252 at .4257 to .4258. See also references to "MY18" post production claims and/or reoccurrences in Applicant's Bundle at **Tab 57**, TAL.001.488.6734 at .6734; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 59**, TCO.001.001.2721 at .2721; **Tab 61**, TAL.001.489.1507 at .1511; **Tab 62**, TJL.006.001.0001 at .0001; **Tab 64**, TCO.003.001.1738 at .1738 to .1738_0008; **Tab 68**, TAL.001.496.6989 at .7004; **Tab 73**, TAL.001.500.3222 at .3230.

[94] Applicant's Bundle, **Tab 17**, TAL.001.287.7921 at .7943, .7948; **Tab 20**, TAL.001.287.2421 at .2421_0019; **Tab 23**, TAL.001.286.1096 at .1109 to .1110. See also references to "MY18" post production claims and/or reoccurrences in Applicant's Bundle at **Tab 57**, TAL.001.488.6734 at .6734; **Tab 58**, TAL.001.487.4669 at .4669; **Tab 59**, TCO.001.001.2721 at .2721; **Tab 61**, TAL.001.489.1507 at .1511; **Tab 62**, TJL.006.001.0001 at .0001; **Tab 64**, TCO.003.001.1738 at .1738 to .1738_0008; **Tab 68**, TAL.001.496.6989 at .7004; **Tab 73**, TAL.001.500.3222 at .3230.

[95] See paragraphs 27 to 51 above. See also Amended Defence at [47(f)(ii)(A)(2)], [47(f)(ii)(B)(3)].

[96] Amended Defence at [47(f)(ii)(B)(2)]; Applicant's Bundle, **Tab 43**, TAL.001.459.4448 at .4448; **Tab 55**, TAL.001.480.6537 at .6538; **Tab 55**, TAL.001.480.6537 at .6544 to .6545; **Tab 56**, TAL.001.481.0161 at .0161.

[97] Amended Defence at [47(k)].

(a) installation of a Euro 6 DOC unit in the DPF Assembly;[98]

(b) installation of a modified Additional Injector assembly;[99] and

(c) programming changes to the ECM, which removes the cooling pulse previously used with the Additional Injector and added a "soot blow" prior to Active Regeneration.[100]

H THE APPLICANT'S VEHICLE

56 The Applicant's Vehicle suffers from, and during the Relevant Period suffered from, each of the Vehicle Defects.[101]

57 The Applicant's Vehicle suffers from, and during the Relevant Period suffered from, one or more of the Vehicle Defect Consequences.[102]

[98] Amended Defence at [47(i)(i)]; Applicant's Bundle, **Tab 55**, TAL.001.480.6537 at .6549 to .6550, .6556; **Tab 63**, TAL.001.493.1863 at .1863; **Tab 65**, TAL.001.515.5394 at .5394.

[99] Amended Defence at [47(i)(ii)]; Applicant's Bundle, **Tab 49**, TAL.850.352.1938 at .1941 to .1943; **Tab 51**, TCO.001.001.0168 at .0168; **Tab 53**, TAL.001.480.3588 at .3590; **Tab 55**, TAL.001.480.6537 at .6546 to .6547, .6551; **Tab 56**, TAL.001.481.0161 at .0162.

[100] Amended Defence at [47(i)(iii)]; Applicant's Bundle, **Tab 52**, TCO.001.001.3085 at .3085; **Tab 53**, TAL.001.480.3588 at .3595; **Tab 55**, TAL.001.480.6537 at .6552 to .6554; **Tab 59**, TCO.001.001.2721 at .2721_0001.

[101] Amended Defence at [43(a)(i)] and [43(b)(i)]; Applicant's Bundle, **Tab 75**, APP.001.001.0005 at .0005; **Tab 76**, APP.001.001.0012 at .0012; **Tab 77**, APP.001.001.0014 at .0014; **Tab 78**, APP.001.001.0019 at .0019; **Tab 79**, APP.001.001.0023 at .0023_0001; **Tab 80**, APP.001.001.0024 at .0024; **Tab 81**, APP.001.001.0026 at .0026; **Tab 82**, APP.001.001.0028 at .0028.

[102] See footnote 101 above.

SCHEDULE 1

DICTIONARY

"**Active Regeneration**" means Automatic Regeneration or Manual Regeneration.

"**Active Regeneration Defects**" means the defects described in paragraph 28 of this Statement of Findings.

"**Additional Injector**" means the fifth fuel injector in the Relevant Vehicles.

"**Additional Injector Blockage Defect**" means the defects described in paragraph 44 of this Statement of Findings.

"**Additional Injector Design Defect**" means the defects described in paragraph 42 of this Statement of Findings.

"**Applicant's Vehicle**" means the new 2016 Toyota Prado GXL 2.8L Diesel Automatic Wagon acquired by the Applicant on or around 8 April 2016.

"**Automatic Regeneration**" means Regeneration that occurs in the course of operating the vehicle when initiated by the ECM.

"**DOC**" means the diesel oxidation catalyst.

"**DOC Coking**" means the formation of graphitic carbon deposits on the DOC.

"**DOC Coking Defect**" means the defects described in paragraph 47 of this Statement of Findings.

"**DOC Face Plugging**" means the formation of deposits comprising a mixture of particulate matter and fuel on the face of the DOC.

"**DPF**" means the diesel particulate filter.

"**DPF Assembly**" means the DOC and the DPF.

"**DPF Assembly Inlet**" means the inlet at the entrance to the DOC.

"**DPF Blockage Defects**" means the defects described in paragraphs 50 and 51 of this Statement of Findings.

"**DPF Notifications**" means the series of symbols or messages that are displayed in the Relevant Vehicles and illuminated when the amount of accumulated particulate matter in the DPF, as calculated by the ECM, reaches predetermined levels.

"**DPF System**" means the diesel exhaust after-treatment system in the Relevant Vehicles.

"**ECM**" means the engine control module in the Relevant Vehicles.

"**EGR**" means exhaust gas recirculation.

"**Engine MIL**" means the engine malfunction indicator lamp in the Relevant Vehicles.

"**Exhaust Manifold**" means the cast exhaust manifold in the Relevant Vehicles.

"**Face Plugging Defect**" means the defects described in paragraph 48 of this Statement of Findings.

"**Inlet Design Defect**" means the defects described in paragraph 34 of this Statement of Findings.

"**Manual Regeneration**" means Regeneration which has been manually initiated by the driver by pushing the DPF Switch.

"**NO**" means nitric oxide.

"**NO_2"** means nitrogen dioxide.

"**NO_2 Oxidation**" means the chemical reaction of particulate matter with NO_2 at a sufficiently high temperature, resulting in carbon dioxide and NO.

"**NO_x"** means oxides of nitrogen.

"**Passive Regeneration**" means Regeneration that occurs in the course of operating the vehicle without further intervention by the vehicle's operator or ECM.

"**Passive Regeneration Defects**" means the defects described in paragraph 27 of this Statement of Findings.

"**PM Base Level**" means the amount of particulate matter accumulated in the DPF calculated by the ECM at which the ECM is programmed to trigger Automatic Regeneration.

"**Pollutant Emissions**" means:

(a) carbon monoxide;

(b) NO_x, including NO_2 and NO;

(c) hydrocarbons; and

(d) particulate matter.

"**Pressure Sensor**" means the differential pressure sensor in the Relevant Vehicles.

"**Proceeding**" means Federal Court of Australia proceedings numbered NSD 1210/2019.

"**Regeneration**" means the oxidation of particulate matter captured in the DPF.

"**Relevant Period**" means 1 October 2015 to 23 April 2020.

"**Relevant Vehicles**" means those models of Toyota motor vehicles in the Hilux, Fortuner and Prado ranges which are fitted with a 1GD-FTV engine or 2GD-FTV diesel combustion engine acquired in Australia during the Relevant Period.

"**Temperature Sensors**" means the exhaust gas temperature sensors in the Relevant Vehicles

"**Thermal Oxidation**" means the chemical reaction of particulate matter with oxygen at a sufficiently high temperature, resulting in carbon dioxide and water vapour.

"**Toyota**" means TMCA and its affiliates, including Toyota Motor Corporation and Toyota Industries Corporation.

"**Toyota NO_X Reduction Techniques**" means EGR and electronically controlled fuel injection employed to reduce the level of NO_x generated by the operation of the engine.

"**Turbocharger**" means the variable nozzle turbocharger in the Relevant Vehicles.

"**Vehicle Defect Consequences**" means the consequences described in paragraph 52 of this Statement of Findings.

"**Vehicle Defects**" means:

(a) the Passive Regeneration Defects;

(b) the Active Regeneration Defects;

(c) the Inlet Design Defect;

(d) the Additional Injector Design Defect;

(e) the Additional Injector Blockage Defect;

(f) the Face Plugging Defect; and

(g) the DPF Blockage Defects.

[ANNEXURE B]

FEDERAL COURT OF AUSTRALIA **NSD 1210 OF 2019**
DISTRICT REGISTRY: NSW
DIVISION: GENERAL

Kenneth John Williams
Applicant

Toyota Motor Corporation
Australia Limited
Respondent

RESPONDENT'S STATEMENT OF CONTENDED FINDINGS

I. INTRODUCTION

1. The Referee has been provided with a Statement of Agreed Facts and Dictionary in accordance with paragraph 15(c) of the Orders made by the Court on 26 June 2020.

2. This Statement of Contended Findings assumes acceptance of those Agreed Facts and the Dictionary and refers to them below wherever possible to narrow the issues in dispute for consideration by the Referee. Terms in **bold** below are terms that have been agreed by the parties and are included in the Dictionary.

3. The Relevant Questions, which are at Annexure E to the Orders made on 26 June 2020 (set out in Section V below), are drawn from the concepts pleaded in paragraphs 39 and 41 of the Amended Statement of Claim (**ASOC**) where "Vehicle Defects" and "Vehicle Defect Consequences" as referred to in the Relevant Questions are defined.

4. The use of "Vehicle Defects" and "Vehicle Defect Consequences" are tethered to and rely upon a number of other defined terms, additional concepts and allegations that are pleaded by the applicant in its ASOC.

5. The respondent (**TMCA**) considers that in order to understand the parties' pleaded positions and, ultimately, to answer the Relevant Questions, it is necessary for the Referee to first consider a series of preliminary issues.

6. In the circumstances, TMCA has approached this Statement of Contended Findings in the following way:

   (a) by setting out its understanding of the applicant's case on the relevant factual matters (**Section II**);

   (b) by setting out its response to that case on the relevant factual matters (**Section III**);

(c) by identifying a series of preliminary issues which TMCA contends are relevant to and connected with the resolution of the Relevant Questions and setting out:

(i) the Statement of Agreed Facts;

(ii) a brief statement of the issues in dispute; and

(iii) TMCA's Statement of Contended Findings (in green text boxes in **Section IV**);

in relation to each preliminary issue; and

(d) by addressing the Relevant Questions and TMCA's Contended Findings having regard to the answers in Section IV (**Section V**).

II. RESPONDENT'S UNDERSTANDING OF THE APPLICANT'S CASE

1. TMCA understands that the applicant's case is that **Regeneration** in the **Relevant Vehicles** may occur in one of two ways:

(a) **Passive Regeneration**, which occurs without intervention of the driver or the **ECM**, using "NO_2 Oxidation" (as that term is defined by the applicant in the ASOC); and

(b) **Automatic Regeneration**, which occurs with intervention of either the driver or the **ECM**, using **Thermal Oxidation** (ASOC, 26).

2. As to "NO_2 Oxidation", the applicant contends that:

(a) it is the oxidation of particulate matter with **NO_2**;

(b) it occurs at a lower temperature than **Thermal Oxidation**; and

(c) it is the only means by which **Passive Regeneration** is achieved.

3. As to **Passive Regeneration**, the applicant contends that:

(a) it occurs when the temperature and chemical composition of the exhaust generated by the operation of the engine are sufficient to enable "NO_2 Oxidation" of the particulate matter in the **DPF**;

(b) the **Toyota NO_X Reduction Techniques** suppress the rate of "NO_2 Oxidation";

(c) "in all, or almost all, driving conditions" (whatever that may mean), the operation of the engine does not reach a sufficiently high temperature for a sufficiently long period of time to achieve **Passive Regeneration**; and therefore

(d) the **Relevant Vehicles** depend predominantly on **Thermal Oxidation** to effect **Regeneration**.

4. As to **Automatic Regeneration** and **Manual Regeneration**, the applicant contends that it is:

(a) necessary when the rate of **Passive Regeneration** is insufficient to prevent the **DPF** from accumulating particulate matter in excess of the **PM Base Level**;

(b) initiated upon the intervention of the **ECM** or the driver when the particulate matter in the **DPF** reaches the **PM Base Level**.

5. The applicant contends that **Automatic Regeneration** and **Manual Regeneration** cause the **Relevant Vehicles** to:

(a) consume more fuel;

(b) suffer greater wear and tear;

(c) emit more **Pollutant Emissions**;

(d) emit white smoke; and

(e) emit exhaust with a noticeably different odour,

than otherwise would be caused by or occur during **Passive Regeneration**.

6. The applicant contends that the **Relevant Vehicles** suffer from Vehicle Defects, which are alleged to be one or more of the following:

(a) the rate of **Passive Regeneration** is insufficient to prevent accumulation of particulate matter in the **DPF** in excess of the **PM Base Level**;

(b) the **Relevant Vehicles** experience excessive **Automatic Regeneration**;

(c) the design of the **DPF Assembly Inlet** causes or has a propensity to cause non-uniform distribution of exhaust flow through the **DOC**;

(d) the **Additional Injector** becomes or has a propensity to become partially or completely blocked by carbon deposits on its tip;

(e) the **Additional Injector** causes or has a propensity to cause deposits on the face of the **DOC** and unburned fuel to be emitted as white smoke;

(f) the **DOC** in the **Relevant Vehicles** becomes, or has a propensity to become, partially or wholly blocked by deposits comprising a mixture of particulate matter and fuel forming on the face of the **DOC**;

(g) **Manual Regeneration** cannot be performed unless the **Relevant Vehicle** is fitted with a DPF Switch, is parked in an unenclosed space with the engine running for a period of approximately 30 minutes and the driver remains with the **Relevant Vehicle**;

(h) **Automatic Regeneration** and **Manual Regeneration** fail, or have a propensity to fail, to effect the removal of sufficient particulate matter from the **DPF** to prevent the **DPF** from becoming or remaining partially or completely blocked; and

(i) the DPF System in the **Relevant Vehicles** fails or has a propensity to fail, to prevent the **DPF** from becoming or remaining partially or completely blocked.

7. The applicant contends that the Vehicle Defects give rise to the specific Vehicle Defect Consequences as set out in paragraph 41 of the ASOC.

III. RESPONDENT'S ANSWER TO THE APPLICANT'S CASE

1. Italicised terms below are terms that are defined in TMCA's Amended Defence but which were not agreed and therefore do not form part of the Dictionary.

2. The respondent accepts that **Thermal Oxidation** is the reaction of particulate matter captured and stored in the **DPF** with oxygen at sufficiently high temperature.

3. TMCA says that **Regeneration** in the **Relevant Vehicles** may occur in one of two ways, which both rely upon **Thermal Oxidation**:

(a) **Passive Regeneration**, which occurs without intervention of the **ECM** or the driver; and

(b) **Automatic Regeneration**, which occurs with intervention of the **ECM** or **Manual Regeneration**, which occurs with the intervention of the driver.

4. As to the applicant's theory concerning the role of "NO_2 Oxidation" in **Passive Regeneration**, TMCA says that:

(a) while the presence of precious metals, including platinum and palladium, in both the **DOC** and the **DPF** also causes a catalytic oxidation of **NO_X** present in engine exhaust systems in the *Toyota DPF System*;

(b) the *Toyota DPF System* is not designed to rely upon the reaction of particulate matter with **NO_X** to achieve **Regeneration**.

5. As to **Passive Regeneration**, TMCA says that:

(a) the **Toyota NO_X Reduction Techniques**, may variably raise or lower the temperature of the exhaust generated by the engine;

(b) the **Relevant Vehicles** use **EGR**, together with the **Turbocharger** to manage the effects of the **Toyota NO_X Reduction Techniques**;

(c) the **Relevant Vehicles** depend on **Thermal Oxidation** to effect **Regeneration**; and

(d) **Passive Regeneration** occurs when the heat generated by the operation of the engine alone is sufficient to trigger **Thermal Oxidation**.

6. TMCA says that :

(a) **Automatic Regeneration** occurs when the temperature in the *Toyota DPF System* does not reach a sufficient level to enable **Passive Regeneration** to occur and the **ECM** calculates that the accumulated particulate matter in the **DPF** has reached the **PM Base Level**;

(b) **Automatic Regeneration** is initiated by the **ECM** and **Manual Regeneration** is initiated by the driver (where a manual switch is fitted); and

(c) both **Automatic Regeneration** and **Manual Regeneration** cause:

(i) temporary changes in the engine settings, including the air to fuel ratio, which increases the exhaust emission temperature: and

(ii) after combustion in the engine, a small additional amount of diesel fuel is injected by the **Additional Injector** through the **Exhaust Manifold** and **Turbocharger** thereby further increasing the temperature within the *Toyota DPF System*; and, as a result there may be:

(iii) a noticeably different exhaust smell to an engine not undergoing **Regeneration**; and

(iv) a small amount of white smoke may be emitted from the tail pipe.

7. TMCA otherwise denies the applicant's contentions that **Automatic Regeneration** and **Manual Regeneration** cause the **Relevant Vehicles** to:

(a) consume more fuel;

(b) suffer greater wear and tear;

(c) emit more **Pollutant Emissions**;

(d) emit white smoke; and

(e) emit exhaust with a noticeably different odour,

than otherwise would be caused by or occur during **Passive Regeneration**.

8. In response to the applicant's contentions that the **Relevant Vehicles** suffer from one or more of the alleged Vehicle Defects, TMCA says that:

(a) the rate of **Passive Regeneration** is not relevant to the effective operation of the *Toyota DPF System*;

(b) neither the use nor rate nor consequences of **Automatic Regeneration** and **Manual Regeneration** are defects in *Toyota DPF System*;

(c) the design of the **DPF Assembly Inlet** does not adversely affect the operation and is not a defect in the *Toyota DPF System*;

9. Since February 2016, TMCA has been aware that some owners of **Relevant Vehicles** have experienced one or more of the following:

(a) emission of excessive white smoke from the exhaust of **Relevant Vehicles**;

(b) display of **DPF Notifications**; and

(c) display of the **Engine MIL**,

(*DPF Issues)*.

10. Since 2016, TMCA has been investigating the cause of the *DPF Issues* experienced by some owners of **Relevant Vehicles** and concluded that the *DPF Issues* were caused by a build-up of particulate matter and unburnt fuel from the **Additional Injector** on the front face of the **DOC** (*DOC Build-up*). TMCA has progressively worked to address the *DOC Build-up* in those vehicles affected by *DPF Issues* through a series of countermeasures. These countermeasures have been introduced as "field fixes" in existing vehicles that experienced *DPF Issues* and in new vehicle production. TMCA consider the *DPF Issues* arising in certain vehicles as a result of *DOC Build-up* has now been resolved. The counter measures and enhancements which have been implemented reflect a usual and ordinary approach to addressing issues of this kind.

11. In the circumstances, TMCA denies the Vehicle Defects and the Vehicle Defect Consequences.

IV. PRELIMINARY ISSUES

Preliminary Issue 1:

In what way does the *Toyota DPF System* address the accumulation of particulate matter?

1.1 The parties agree that:

(a) **Regeneration** is the oxidation of particulate matter captured in the **DPF**; and

(b) the **Relevant Vehicles** utilise **Regeneration** to remove particulate matter that has been captured and stored in the **DPF**.

1.2 As to this preliminary issue, the parties are in dispute as to what the process of **Regeneration** in the *Toyota DPF System* requires in order to occur.

Proposed Finding 1:

The *Toyota DPF System*:

(a) addresses the accumulation of particulate matter in the **DPF** through the process of **Regeneration**;

(b) **Regeneration** occurs when, together with the presence of oxygen, the temperature of the exhaust emissions in the engine, the **DOC** and the **DPF** are high enough to enable oxidation of the particulate matter in the DPF.

Preliminary Issue 2:

How does the *Toyota DPF System* achieve Regeneration?

2.1 The parties agree that **Thermal Oxidation** is the chemical reaction of particulate matter with oxygen at a sufficiently high temperature, resulting in carbon dioxide and water vapour.

2.2 As to this preliminary issue, the parties are in dispute as to whether it is appropriate for TMCA to predominantly rely upon **Thermal Oxidation** to achieve Regeneration.

Proposed Finding 2:

The *Toyota DPF System* is designed to and does achieve **Regeneration** through **Thermal Oxidation**, which is the reaction of particulate matter with oxygen at sufficiently high temperatures in the **DPF**.

Preliminary Issue 3:

When does Passive Regeneration occur?

3.1 The parties agree that **Passive Regeneration** is **Regeneration** that occurs in the course of operating the vehicle without further intervention by the vehicle's operator or **ECM.**

3.2 As to this preliminary issue, the parties are in dispute as to the applicant's assertion that Passive Regeneration occurs using what the applicant defines as "NO_2 Oxidation".

Proposed Finding 3:

Passive Regeneration in the Toyota DPF System occurs when the heat generated by the operation of the engine alone is sufficient to trigger **Thermal Oxidation**.

Preliminary Issue 4:

What is the Passive Regeneration process?

4.1 As to this preliminary issue, the parties are in dispute as to what occurs in the *Toyota DPF System* during **Passive Regeneration**.

Proposed Finding 4:

In the *Toyota DPF System* during **Passive Regeneration***:*

1. the exhaust gas from the engine flows through:
   - (a) the Exhaust Manifold;
   - (b) the **Turbocharger**;
   - (c) the DPF Assembly Inlet;
   - (d) the **DOC**;
   - (f) the **DPF**; and

   is then emitted through the muffler into the atmosphere;
2. as the exhaust gas flows through the **DOC**, the precious metals in the catalyst coating of the **DOC** cause oxidation of carbon monoxide and hydrocarbons, which produces carbon dioxide and water vapour; and
3. as the exhaust gas flows through the **DPF**, **Thermal Oxidation** converts captured particulate matter into carbon dioxide and water vapour, which is then emitted from the **DPF** through the muffler and into the atmosphere.

Preliminary Issue 5:

What factors, if any, affect the rate of Passive Regeneration?

5.1 As to this preliminary issue, the parties are in dispute as to the factors that affect the rate of **Passive Regeneration** and the significance of that issue, if any, in the context of the **Regeneration** process as a whole.

Proposed Finding 5:

In the *Toyota DPF System*:

1. the rate at which oxidation of particulate matter that is captured and stored in the **DPF** occurs during **Passive Regeneration** is dependent upon:
   (a) the temperature of the exhaust that is generated by the operation of the engine; and
   (b) the presence of oxygen in the **DPF;**
2. in certain conditions, such as frequent short trips, the temperature may not reach a sufficient level to enable **Passive Regeneration** to occur.

Preliminary Issue 6

Does the Toyota DPF System facilitate catalytic conversion of NOX in the exhaust in:

(a) the DOC; and / or

(b) the DPF,

in a way that is material to the operation of the system?

6.1 As to this preliminary issue, the parties are in dispute as to whether the DOC and / or the DPF are designed to facilitate the catalytic conversion of NO_X in the exhaust and, if so, whether this is material to the operation of the *Toyota DPF System*.

Proposed Finding 6:

In the *Toyota DPF System*:

1. the **DOC** is designed to and does:
   (a) facilitate the catalytic oxidation of carbon monoxide and hydrocarbon present in engine exhaust emissions, resulting in conversion of those pollutants into carbon dioxide and water vapour; and
   (b) increase the temperature in the **DPF** in the *Toyota DPF System* during **Automatic Regeneration** and **Manual Regeneration**;
2. the **DPF** is designed to and does:
   (a) capture particulate matter;
   (b) enable the passage of carbon dioxide and water vapour oxidised in the **DOC** through the exhaust;
   (c) facilitate **Regeneration**;
3. the presence of precious metals, including platinum and palladium, in both the **DOC** and the **DPF**, also causes a catalytic oxidation of **NO_X** present in engine exhaust emissions;
4. the *Toyota DPF System* is not designed to and does not rely upon the reaction of particulate matter with **NO_2** to achieve **Regeneration**.

Preliminary Issue 7

In what way do the Relevant Vehicles manage the effects of the Toyota NO_X Reduction Techniques?

7.1 The parties agree that:

(a) to reduce the level of **NO_X** generated by the operation of the engine, the **Relevant Vehicles** employ the **Toyota NO_X Reduction Techniques;**

(b) the **Toyota NO_X Reduction Techniques** can have the following effects, among others:

(i) decreasing the level of **NO_x** generated by the operation of the engine;

(ii) increasing the level of particulate matter generated by the operation of the engine; and

(iii) decreasing the ratio of **NO_x** to particulate matter in the exhaust.

7.2 As to this preliminary issue, the parties are in dispute as to the extent of the effect of the **Toyota NO_X Reduction Techniques** (specifically whether the temperature of the exhaust is decreased or whether it is varied, either up or down) and the mitigating factors that the *Toyota DPF System* employs to manage the effect of the **Toyota NO_X Reduction Techniques**.

Proposed Finding 7:

In the *Toyota DPF System*:

1. the **Toyota NO_X Reduction Techniques** may variably raise or lower the temperature of the exhaust generated by the engine;
2. the **Relevant Vehicles** use **EGR**, together with the **Turbocharger**, to manage the effects of the **Toyota NO_X Reduction Techniques**;
3. the *Toyota DPF System* is not designed to and does not rely upon the reaction of particulate matter with **NO_2** to achieve **Regeneration**.

Preliminary Issue 8:

When does Automatic Regeneration occur?

8.1 The parties agree that:

(a) in the **Relevant Vehicles**:

(i) **Automatic Regeneration** may be initiated when the engine is operating and the **ECM** calculates that the accumulated particulate matter in the **DPF** has reached the **PM Base Level**; or

(ii) **Manual Regeneration** may be initiated when the engine is operating and the operator of the **Relevant Vehicle** initiates **Manual Regeneration** by pushing the DPF Switch (if the **Relevant Vehicle** is fitted with a DPF Switch);

(b) in the **Relevant Vehicles**, once **Automatic Regeneration** or **Manual Regeneration** is initiated, **Automatic Regeneration** or **Manual Regeneration** continues until such time as:

(i) the engine ceases to operate; or

(ii) the level of particulate matter captured and stored in the **DPF**, as calculated by the **ECM**, falls below a predetermined level.

8.2 As to this preliminary issue, the parties are in dispute as to whether it is appropriate for the *Toyota DPF System* to rely upon **Automatic Regeneration** in circumstances where **Passive Regeneration** alone may not achieve **Regeneration**.

Proposed Finding 8:

In the *Toyota DPF System*:

1. when **Passive Regeneration** does not occur, and the **ECM** calculates that the accumulated particulate matter in the **DPF** has reached a predetermined level, the **ECM** causes the following to occur:
   (a) temporary changes in the engine settings, including the air to fuel ratio, which increases the exhaust emission temperature; and
   (b) after combustion in the engine, a small additional amount of diesel fuel is injected by the **Additional Injector** through the **Exhaust Manifold** and the **Turbocharger**, thereby further increasing the temperature within the *Toyota DPF System* and triggering **Automatic Regeneration;**
2. **Automatic Regeneration** is part of the normal operation of the **Relevant Vehicles**.

Preliminary Issue 9

When does Manual Regeneration occur?

9.1 The parties agree that:

(a) for **Relevant Vehicles** fitted with a DPF Switch, **Manual Regeneration** can be manually initiated by the driver;

(b) in order for **Manual Regeneration** to occur:

(i) the driver must push the DPF Switch when the **Relevant Vehicle** is stationary with the engine running; and

(ii) the **Relevant Vehicle** must remain stationary and the engine must remain running until the **Manual Regeneration** has completed;

(c) during **Manual Regeneration**, a **DPF Notification** appears to indicate that **Manual Regeneration** has commenced.

9.2 As to this preliminary issue, the parties are in dispute as to whether it is appropriate for the *Toyota DPF System* to rely upon **Manual Regeneration**.

Proposed Finding 9:

In the *Toyota DPF System*:

1. Once **Manual Regeneration** is complete, the **DPF Notification** turns off and the engine idling speed returns to normal;

2. **Manual Regeneration** is part of the normal operation of the **Relevant Vehicles**.

Preliminary Issue 10:

What is the Automatic Regeneration process?

10.1 The parties agree that:

(a) in the **Relevant Vehicles**, during **Automatic Regeneration** and **Manual Regeneration**:

(i) the **ECM** causes temporary changes in the engine settings to increase the temperature of the exhaust generated by the operation of the engine;

(ii) if the engine is operating and the vehicle is idle, the **ECM** causes the engine idling speed to be increased as follows:

A. for **Relevant Vehicles** with manual transmission, to 1,200 rpm; and

B. for **Relevant Vehicles** with automatic transmission, to 900 rpm;

(iii) as the exhaust generated by the operation of the engine flows through the **Exhaust Manifold**, the **Additional Injector** sprays fuel into the exhaust;

(iv) the exhaust/fuel mixture then flows into the **DPF Assembly Inlet** and into the **DPF Assembly**;

(v) there may be a noticeably different exhaust smell compared to a diesel engine not undergoing **Regeneration**; and

(vi) an amount of white smoke may be emitted from the exhaust tail pipe.

10.2 As to this preliminary issue, the parties are in dispute as to what occurs in *Toyota DPF System* during **Automatic Regeneration**.

Proposed Finding 10:

During **Automatic Regeneration** and **Manual Regeneration** in the *Toyota DPF System*:

1. the exhaust gas from the engine flows through:
   (a) the **Exhaust Manifold**;
   (b) the **Turbocharger**;
   (c) the **DPF Assembly Inlet**;
   (d) the **DOC**;
   (e) the **DPF**; and
   is then emitted through the muffler into the atmosphere;
2. as the exhaust gas flows through the **DOC**, the precious metals in the catalyst coating of the **DOC** cause oxidation of carbon monoxide and hydrocarbons, which produces carbon dioxide and water vapour;
3. as the exhaust gas flows through the **DPF**, **Thermal Oxidation** converts captured particulate matter into carbon dioxide and water vapour, which is then emitted from the **DPF** through the muffler and into the atmosphere.

Preliminary Issue 11:

Having regard to the answers to preliminary issues 1 to 10 above, is it correct to say that the Relevant Vehicles suffer from the Vehicle Defects (as defined in ASOC)?

11.1 As to this preliminary issue, the parties are in dispute as to what constitutes Vehicle Defects, as defined by the applicant in the ASOC.

Proposed Finding 11:

Having regard to the matters contended in response to preliminary issues 1 to 10 above, in relation to the matters pleaded in paragraphs 39(a), (b), (c), (g), (h) and (i) of the ASOC:

1. the rate of **Passive Regeneration** is not insufficient to the effective operation of the *Toyota DPF System* in achieving **Regeneration**;
2. the **Relevant Vehicles** do not experience excessive **Automatic Regeneration**;
3. the design of the **DPF Assembly Inlet** does not adversely affect the flow of exhaust through and the operation of the *Toyota DPF System*;
4. **Manual Regeneration** is performed when the **Relevant Vehicle** is fitted with a DPF Switch, the **Relevant Vehicle** is parked in an unenclosed space with the engine

running for a period of approximately 30 minutes, and the driver remains with the **Relevant Vehicle** for that period;

5. **Automatic Regeneration** and **Manual Regeneration** does not fail, or have a propensity to fail, to effect the removal of sufficient particulate matter from the **DPF** to prevent the **DPF** from becoming or remaining partially or completely blocked; and

6. the *Toyota DPF System* in the **Relevant Vehicles** does not fail or have a propensity to fail, to prevent the **DPF** from becoming or remaining partially or completely blocked.

In relation to the remaining matters pleaded in paragraph 39 of the ASOC:

7. the first notification TMCA had identified of a consumer experiencing issues with the *Toyota DPF System* in a **Relevant Vehicle** was communicated to TMCA on 26 February 2016 when a Dealer Product Report was submitted to TMCA (*First DPR*);

8. *following* the *First DPR*, TMCA received further complaints from some owners of **Relevant Vehicles** that were experiencing issues related to the *Toyota DPF System* (*DPF Issues*);

9. the *DPF Issues* experienced by some owners of **Relevant Vehicles** included one or more of the following:

   (a) emission of excessive white smoke from the exhaust of **Relevant Vehicles**;

   (b) display of **DPF Notifications**;

   (c) display of the **Engine MIL**;

10. TMCA subsequently concluded that the *DPF Issues* experienced by some owners of **Relevant Vehicles** were caused by a build-up of particulate matter and unburnt fuel from the **Additional Injector** on the front face of the **DOC** (*DOC Build-up*).

11. Where it occurs the *DOC Build-up* may reduce the thermal efficiency of the **DOC** such that the temperature required to achieve oxidisation may not be reached or maintained for a sufficient period of time.

12. To address the *DOC Build-up*, TMCA:

   (a) implemented the following countermeasures in the production of new **Relevant Vehicles**:

      (i) during 2016 and 2017, implemented a programming change to the **ECM** in new **Relevant Vehicles** which increased engine emission temperature at the time of **Automatic Regeneration**;

      (ii) from June 2018:

         A. implemented a programming change to the **ECM** for all new **Relevant Vehicles** which changed the Air Fuel Ratio and

reduced the amount of fuel added by the **Additional Injector** at the time of **Automatic Regeneration**; and

B. installed a DPF Switch in all new **Relevant Vehicles**;

(b) implemented the following "field fixes" free of charge to **Relevant Vehicles** that presented to dealers with one or more *DPF Issues*:

(i) during 2016 and 2017, reprogrammed the **ECM** to implement the changes described in paragraph 12(a)(i) above;

(ii) during 2018:

A. reprogrammed the **ECM** to implement the changes described in paragraph 12(a)(ii)(A) above;

B. introduced a software programme to enable authorised Toyota dealers to perform a "superburn", in which the *DOC Build-up* is eliminated by exposure to temperatures in the range of approximately 500°C - 550°C; and

C. introduced a test to enable dealers to determine:

1) the existence of white smoke following the superburn; or

2) if the dealer regeneration was not successfully completed within 15 minutes, and, if so, the **DPF Assembly** was replaced;

D. fitted a DPF Switch to some **Relevant Vehicles**;

(c) in July 2018, extended the TMCA warranty for all **Relevant Vehicles** with *DPF Issues* regardless of age and kilometres;

(d) has instructed dealers to repair individual **Relevant Vehicles** presenting with *DPF Issues*, at no cost to consumers, and reimbursed dealers for those repairs;

14. There have been some **Relevant Vehicles** that have presented with *DPF Issues* following the implementation of the field fixes referred to in paragraph 12(b) above.

15. After ongoing investigations, in July 2019, TMCA concluded that the *DOC Build-up* occurring in some **Relevant Vehicles**:

(a) is a consequence of a reaction between carbon and precious metals present in the **DOC**; and

(b) may be affected by a deterioration in the **Additional Injector** spray pattern;

16. Commencing in January 2020, it implemented the following "field fixes" free of charge to **Relevant Vehicles** that presented to dealers with one or more *DPF Issues*:

(a) use of a Euro 6 DOC unit, which contains a modified substrate that does not contain silicon oxide and has a different distribution of precious metals;

(b) introduction of a modified **Additional Injector** assembly, which incorporates a narrower fuel passage, together with a cooling jacket; and

(c) programming changes to the **ECM**, which removed the cooling pulse previously used with the **Additional** Injector and added a "soot blow", which clears the front of the **DOC** prior to **Automatic Regeneration** or **Manual Regeneration.**

17. From June 2020, the enhancements referred to in paragraph 16 above, will be included in the production of new **Relevant Vehicles**.

18. TMCA is continuing to investigate the *DOC Build-up* in some **Relevant Vehicles** and is in the process of validating and implementing further enhancements.

19. The *DPF Issues* arising in certain vehicles as a result of *DOC Build-up* were resolved progressively as a result of the steps set out in paragraphs 12 to 16 above and have now been resolved. The counter measures and enhancements which have been implemented reflect a usual and ordinary approach to addressing issues of this kind.

Preliminary Issue 12

Having regard to the answers to Questions 1 to 11 above, to what extent (if at all) and in what way do the Relevant Vehicles suffer from the Vehicle Defect Consequences (as defined in the ASOC)?

12. As to this preliminary issue, the parties are in dispute as to what, if anything, constitutes the Vehicle Defect Consequences.

Proposed Finding 12

1. The Vehicle Defects as alleged in paragraph 39 of the ASOC does not cause one or more of the following Vehicle Defect Consequences:

(a) the **DOC** does not function effectively;

(b) the **DPF** does not to function effectively;

(c) the catalytic efficiency of the **DOC** is diminished;

(d) the **DOC** becomes damaged;

(e) the exhaust in the **DPF** does not reach a sufficiently high temperature to effect **Thermal Oxidation**;

(f) "NO2 Oxidation" during **Passive Regeneration** is inhibited;

(g) unoxidized fuel does flows through the **DPF** and is emitted from the **Relevant Vehicles** as white smoke;

(h) the **DPF** becomes partially or completely blocked;

(i) engine back-pressure is increased;

(j) fuel consumption is increased and fuel economy is decreased;

(k) foul smelling white smoke is emitted from the exhaust pipe when the engine is on;

(l) engine power is diminished;

(m) engine power is intermittently lost whilst driving;

(n) wear and tear on the engine components and the *Toyota DPF System* is increased;

(o) the **Relevant Vehicles** need to be inspected, serviced and/or repaired by a service engineer for the purpose of cleaning, repairing or replacing the *Toyota DPF System*, or components thereof;

(p) the **Relevant Vehicles** need to be inspected, serviced and/or repaired more regularly than would be otherwise be required;

(q) the **ECM** needs to be reprogrammed more often than would otherwise be required;

(r) the **Relevant Vehicles** inconvenience their drivers, including by reason of having to undertake **Manual Regeneration** and **Automatic Regenerations**; and

(s) the **DPF Notifications** are incorrectly displayed.

2. Notwithstanding the finding in paragraph 1 above, some owners of the **Relevant Vehicles** experienced one or more of the following *DPF Issues*:

(a) emission of **excessive** white smoke from the exhaust of **Relevant Vehicles**;

(b) display of **DPF Notifications**;

(c) display of the **Engine MIL**;

3. Where it occurred, the *DPF Issues* experienced by some owners of **Relevant Vehicles** were caused by *DOC Build-up,* which is a build-up of particulate matter and unburnt fuel from the **Additional Injector** on the front face of the **DOC**;

4. The DOC *Build-up* may reduce the thermal efficiency of the **DOC** such that the temperature required to achieve oxidisation may not be reached or maintained for a sufficient period of time.

5. TMCA has addressed the *DPF Issues* as described in Proposed Finding 11.

V. THE RELEVANT QUESTIONS

Relevant Question 1

Does the Applicant's Vehicle suffer, and did it during the Relevant Period suffer, from the Vehicle Defects and Vehicle Defect Consequences?

Proposed finding:

In response to Relevant Question 1, the Applicant's Vehicle experienced the *DPF Issues* and has been (or can be) addressed through the process described in Proposed Finding 11.

Relevant Question 2

Do the Affected Vehicles suffer, and have they suffered during the Relevant Period, from the Vehicle Defects and Vehicle Defect Consequences?

Proposed finding:

In response to Relevant Question 2, TMCA repeats Proposed Findings 11 and 12.

Relevant Question 3

During the Relevant Period, did the Affected Vehicles:

(a) **require unusual or abnormal maintenance; and/or**

(b) **have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials relevant to the Affected Vehicle and any fuel consumption label applied to the windscreen of the Affected Vehicle?**

Proposed finding:

In response to:

1. Relevant Question 3(a), TMCA repeats the Proposed Findings 11 and 12, and answers no; and
2. Relevant Question 3(b), TMCA answers yes.

Relevant Question 4

During the Relevant Period, did the Affected Vehicles have a DPF System that, in its design and manufacturing:

(a) **completed an automatic regeneration every 250 to 300 kilometres of driving, depending on driving conditions and driving style;**

(b) **completed a regeneration cycle with sufficient regularity to prevent the DPF from becoming partially or completely blocked;**

(c) **prevented the DPF from becoming partially or completely blocked; and/or**

(d) **was effective at removing sufficient particulate matter from the DPF to prevent the DPF from becoming or remaining partially or completely blocked.**

Proposed finding:

In response to:

1. Relevant Question 4(a), TMCA contends that the Toyota DPF System was not designed or manufactured to necessarily complete an automatic regeneration every 250 to 300 kilometres of driving, but rather was designed to complete Automatic Regeneration as and when needed which, depending on driving conditions and driving style could be more or less frequently than every 250 to 300km.
2. Relevant Questions 4(b), (c) and (d), TMCA repeats Proposed Findings 1, 2, 6, 8, 10, 11 and 12.

The respondent's Statement of Contended Findings was prepared by Andrew Morrison and Emma Mawson of Clayton Utz, solicitors for the respondent and settled by Jeremy Slattery SC and Xuelin Teo of Counsel.

24 July 2020

[ANNEXURE C]

IN THE MATTER OF A REFERENCE PURSUANT TO S.54A OF THE FEDERAL COURT OF AUSTRALIA ACT 1976 (CTH)

Kenneth John Williams
Applicant

Toyota Motor Corporation Australia Limited (ACN 009 686 097)
Respondent

APPLICANT'S RESPONSE TO THE RESPONDENT'S STATEMENT OF CONTENDED FINDINGS

A INTRODUCTION

1 This Response (**Response**) to the respondent's Statement of Contended Findings dated 24 July 2020 (**Toyota's Statement**) is submitted by the applicant pursuant to Order 2 made by the Court on 14 August 2020 in the Proceeding.

2 Capitalised terms used in this Response have the meanings given to them in the applicant's Statement of Proposed Findings of Fact dated 24 July 2020 (**Applicant's Statement**).

B INEQUALITY OF ACCESS TO DOCUMENTS

3 The applicant refers to the email communication received from Counsel Assisting on 19 August 2020, which conveyed a direction by the Referee that "the responsive statements are to include pinpoint documentary references in relation to all disputed contentions of fact" and "may be accompanied by electronic copies of such further documents", and expressed the Referee's current intention that "the content of the responsive statements (and any further documents provided with those statements) will dispense with the need for any further documentary requests from the referee".

4 The applicant's ability to comply with those directions, and to respond to or make submissions in respect of Toyota's Statement, as well as any preliminary findings to be proposed by the Referee, is severely curtailed by its lack of access to all documents relevant to the issues raised by the Relevant Questions. The applicant has not had the benefit of full documentary discovery in the Proceeding, as Toyota's general discovery was suspended in June 2020. Consequently, the applicant does not have access to potentially material documents to which the Referee might need to have regard in answering the Relevant Questions, including:

(a) the further offshore Priority Documents, which Toyota is required to discover to the applicant pursuant to Order 25(a) made by the Court on 26 June 2020 (none of which have been discovered to the applicant as of today); and

(b) other internal Toyota documents which support the applicant's proposed findings and which are adverse to Toyota's proposed findings.

5 It is unlikely that Toyota will cite or provide to the Referee documents that are adverse to its case. In light of the inequality of access to documents, and as a matter of procedural fairness, the applicant considers that if the Referee is unable to make the findings proposed in the

Applicant's Statement by reference to the documents presently available to him, then before the Referee makes any findings in the Reference:

(a) Toyota should be required to provide to the Referee and the applicant all documents adverse to Toyota's case and favourable to the applicant's case relating to the issues raised by the Relevant Questions and the Applicant's Statement; and

(b) the Referee should consider what testing may be required to determine whether such findings are available.

6 The applicant submits that:

(a) the absence of documentation relating to a Vehicle Defect cannot support a conclusion that such Vehicle Defect does not exist, as this may be a consequence of the suspension of discovery in the Proceeding or simply an indication that Toyota has not previously appreciated or considered that Vehicle Defect in the way in which the applicant has articulated it; and

(b) unlike documents reflecting an admission by Toyota as to the existence of a Vehicle Defect (which constitute powerful evidence of the existence of that Vehicle Defect), internal Toyota documents which reflect a view that a particular Vehicle Defect does not exist, or has been resolved, cannot answer the question whether that Vehicle Defect in fact exists or has been resolved. Any such views expressed in Toyota's own documents should be scrutinised and tested, and should not be accepted at face value.

C PROPER RESOLUTION OF THE RELEVANT QUESTIONS

7 Pursuant to Order 15 of the June 26 Orders, the Referee is to conduct an inquiry into the Relevant Questions and to make a report in writing to the Court on the Relevant Questions stating, with reasons, the Referee's opinion on the Relevant Questions.

8 In the Respondent's Statement, Toyota contended that "in order to answer the Relevant Questions, it is necessary for the Referee to first consider a series of [twelve] preliminary issues".[1] That contention is incorrect. The "twelve preliminary issues" do not reflect or otherwise correspond to the Relevant Questions that the Referee has been tasked with answering, nor do they accurately reflect the issues in dispute between the parties arising on the pleadings. Indeed, the so-called "preliminary issues" appear designed to distract from the Relevant Questions.

9 It should also be observed that, having regard to:

(a) the June 26 Orders; and

(b) Rule 28.61 of the *Federal Court Rules 2011* (Cth), which empowers the Court to refer questions or issues arising in a proceeding, whether of fact or law or both, and whether raised by pleadings, agreement of parties or otherwise,

[1] *See* Toyota's Statement, Introduction, at [5].

this Reference is not confined to the issues in dispute between the parties on the pleadings, much less does it require Toyota's twelve "preliminary issues" to be answered.

10 The Referee should disregard the parts of Toyota's Statement which constitute submissions as to the issues between the parties raised on the pleadings, and have regard only to the Proposed Findings set out in the green text boxes in Toyota's Statement.

D TOYOTA'S PROPOSED FINDINGS ARE DEFICIENT

11 The Proposed Findings set out in Toyota's Statement are deficient. Even if such findings were made, they would not provide a complete answer to the Relevant Questions, including for the reasons set out in paragraphs 12 to 18 below.

Relevant Question 1

12 In response to Relevant Question 1, which asks "*Does the Applicant's Vehicle suffer, and did it during the Relevant Period suffer, from the Vehicle Defects and Vehicle Defect Consequences?"*, Toyota proposes a finding that "*the Applicant's Vehicle experienced the DPF Issues and has been (or can be) addressed through the process described in Proposed Finding 11.*"

13 The Applicant wishes to draw to the Referee's attention the lack of identity between the term "DPF Issues", which is used in the Proposed Findings in Toyota's Statement, and the terms "Vehicle Defects" and "Vehicle Defect Consequences" used in the Relevant Questions.

14 The term "DPF Issues" is used by Toyota in Toyota's Statement to mean something far more limited in scope than the Vehicle Defects and Vehicle Defect Consequences, namely only:

(a) emission of excessive white smoke from the exhaust of the Relevant Vehicles;

(b) display of DPF Notifications; and

(c) display of the Engine MIL.[2]

15 In using the term "DPF Issues", instead of Vehicle Defects or Vehicle Defect Consequences, Toyota confines its proposed answer to Relevant Question 1 to those few Vehicle Defect Consequences which fall within the definition of "DPF Issues". Toyota does not propose any answer to Question 1 in respect of the other Vehicle Defects or Vehicle Defect Consequences.[3]

Relevant Question 2

16 In response to Relevant Question 2, which asks "*Do the Affected Vehicles suffer, and have they suffered during the Relevant Period, from the Vehicle Defects and Vehicle Defect Consequences?"*, Toyota "*repeats Proposed Findings 11 and 12.*"

[2] Toyota's Statement, para. 9.

[3] If Toyota intends to rely on the proposed findings for Question 2 to support a negative answer for Question 1, its proposed findings are also deficient for the reasons set out in paragraphs 16 to 18 below.

17 Notably, Toyota's Proposed Finding 11 does not include any proposed findings that the Affected Vehicles do not, and during the Relevant Period did not, suffer from the Vehicle Defects set out in paragraphs 39(d), (e) or (f) of the ASOC.

18 Rather, in respect of those Vehicle Defects, Toyota proposes a number of findings relating to certain countermeasures and enhancements which Toyota says it has implemented.[4] These proposed findings, even if made, are inadequate to support a conclusion that the Affected Vehicles do not, and during the Relevant Period did not, suffer from these Vehicle Defects because:

(a) they relate only to resolution of the "DPF Issues", not the Vehicle Defects and Vehicle Defect Consequences, and consequently only concern those few Vehicle Defect Consequences which fall within the definition of "DPF Issues";

(b) the implementation of countermeasures and enhancements during and after the Relevant Period cannot be a complete answer to the question of whether the Affected Vehicles suffered from the Vehicle Defects and Vehicle Defect Consequences during the Relevant Period (to the contrary, it demonstrates that the Affected Vehicles were defective in some respect warranting the implementation of the aforesaid countermeasures and enhancements); and

(c) whether or not the countermeasures and enhancements implemented by Toyota "reflect a usual and ordinary approach to addressing issues of this kind"[5] (which the applicant denies) is not a relevant consideration for the purposes of the Referee's inquiry into and answering of Relevant Question 2, which simply requires the Referee's opinion on whether the Affected Vehicles suffer, or during the Relevant Period did suffer, from the Vehicle Defects and Vehicle Defect Consequences.

E THE PASSIVE REGENERATION DEFECTS

19 In response to Proposed Findings 2 to 7 of Toyota's Statement, the applicant says that "Passive Regeneration", as that term is used in the Applicant's Statement, is not limited to Passive Regeneration achieved using NO_2 Oxidation. The parties have agreed that, for the purposes of the Reference, the term "Passive Regeneration" means "Regeneration that occurs in the course of operating the vehicle without further intervention from the vehicle's operator or ECM".[6]

20 Although it is not necessary for the Referee to consider how the issue of Passive Regeneration is developed in the pleadings, a brief summary of the evolution of that issue is set out herein, in the event that it assists the Referee's understanding of the issue. In the ASOC, the applicant defined Passive Regeneration by reference to NO_2 Oxidation, on the basis of its initial understanding that light duty diesel vehicles, including the Relevant Vehicles, rely upon NO_2

[4] See Toyota's Statement, Proposed Finding 11, at [7] to [19].
[5] See Toyota's Statement, Proposed Finding 11, at [10], [19].
[6] See Statement of Agreed Facts, Schedule 1 (Dictionary).

Oxidation to effect Passive Regeneration because in all or almost all driving conditions the exhaust temperature necessary to enable Thermal Oxidation cannot be achieved without further intervention from the vehicle's operator or ECM. In its Amended Defence, Toyota alleged that the Relevant Vehicles were not designed to rely upon NO_2 Oxidation to achieve Regeneration,[7] and that Passive Regeneration occurs using Thermal Oxidation.[8] In its Amended Reply, the applicant accepted that the Affected Vehicles depend predominantly on Thermal Oxidation to effect Regeneration,[9] and contended that in the Affected Vehicles, in all or almost all driving conditions the exhaust temperature necessary to enable Thermal Oxidation cannot be achieved without further intervention from the vehicle's operator or ECM (i.e. it cannot be achieved outside of Active Regeneration).

21 Accordingly, the applicant contends that the Affected Vehicles depend exclusively or predominantly on Active Regeneration to effect Regeneration, and experience excessive Active Regeneration, which has adverse consequences for the Affected Vehicles.[10] The findings proposed by the applicant in respect of the "Passive Regeneration Defects" reflect the evolution of that issue as explained in the preceding paragraph.[11] In Toyota's Statement, Toyota contends for a finding that in the Affected Vehicles, "Passive Regeneration occurs when the heat generated by the operation of the engine alone [i.e. without intervention by the vehicle's operator or the ECM] is sufficient to trigger Thermal Oxidation".[12] In response, the applicant contends that in all or almost all driving conditions, the heat generated by the operation of the engine alone [i.e. without intervention by the vehicle's operator or the ECM] is insufficient to trigger Thermal Oxidation, and therefore to prevent the DPF from accumulating, or frequently accumulating, particulate matter in excess of the PM Base Level.

22 The applicant submits that the Referee must inquire into the existence of the Passive Regeneration Defects for the purposes of opining on the Relevant Questions. This is because:

(a) the Passive Regeneration Defects are Vehicle Defects;[13] and

(b) the existence of the Passive Regeneration Defects is relevant to the Referee's findings in respect of the Active Regeneration Defects, in that to determine whether the Relevant Vehicles experience excessive Active Regeneration (another Vehicle Defect), the Referee will need to opine on whether the Relevant Vehicles suffer from the Passive Regeneration Defects.[14]

[7] Toyota's Defence, [23(b)(i)].
[8] Toyota's Defence, [27(b)].
[9] Applicant's Reply, [6(c)(iii)].
[10] Applicant's Statement, [24], [25].
[11] Applicant's Statement, [27].
[12] Toyota's Statement, Part III, [5(d)].
[13] ASOC, [39(a)].
[14] Applicant's Statement, [28(a)].

[ANNEXURE D]

FEDERAL COURT OF AUSTRALIA
DISTRICT REGISTRY: NSW
DIVISION: GENERAL

NSD 1210 OF 2019

Kenneth John Williams
Applicant

Toyota Motor Corporation Australia Limited
Respondent

RESPONSE TO THE APPLICANT'S STATEMENT OF PROPOSED FINDINGS OF FACT

This document is prepared pursuant to order 2 of the orders made by Justice Lee on 14 August 2020 and direction (a) made by the Referee in the email from Counsel Assisting dated 19 August 2020. It sets out the response of the respondent (TMCA) to the Applicant's Statement of Proposed Findings of Fact (AS).

I. THE SCOPE OF THE INQUIRY

1. The Referee has been tasked with conducting an inquiry into the questions set out in Annexure E to the orders made on 26 June 2020 (the Relevant Questions) and to report to the Court stating, with reasons, the Referee's opinion on the Relevant Questions. TMCA contends that the applicant seeks to broaden the scope of the inquiry to be conducted by the Referee.
2. In answering questions 1 and 2 of the Relevant Questions, the Referee is constrained by the terms "Vehicle Defects" and "Vehicle Defect Consequences" as defined in paragraphs 39 and 41 of the Amended Statement of Claim (ASOC). TMCA contends that at least the following matters alleged in the AS are not included in the definition of "Vehicle Defects" and therefore do not rise for consideration by the Referee in answering questions 1 and 2 of the Relevant Questions, either in isolation or insofar as it is contended that they have a "compounding effect" (AS [32], [35], [46], [49]):

AS	TMCA's response
[27]	The foundational subparagraph (b) forms no part of any "Vehicle Defect", such that the new concept of "Passive Regeneration Defect" cannot be a "Vehicle Defect".
[28]	The new concept of "Active Regeneration Defects", which is said to occur "by reason of the Passive Regeneration Defect" (which as noted above is also new) cannot be a "Vehicle Defect".
[34(d)]	This forms no part of any "Vehicle Defect".
[47]	"Vehicle Defects" do not include the alleged "DOC Coking Defect".

3. Further, AS [52(q)(ii)] does not form part of the "Vehicle Defect Consequences" as defined in the ASOC [41] and therefore does not rise for consideration by the Referee in answering questions 1 and 2 of the Relevant Questions.
4. TMCA also contends that the applicant seeks to broaden the scope of the inquiry by asking the Referee to make the proposed finding of fact in AS [15]. The Relevant Questions relate to "Affected Vehicles" as defined in ASOC [1(a)] and Schedule 1 of the ASOC. The Referee has not been asked to consider what occurs in "light duty diesel vehicles" "generally" and / or "ordinarily".
5. Finally, the applicant contends that "none of the … countermeasures implemented by Toyota during the Relevant Period had the effect of remedying the Vehicle Defects (or any one or more of them) or the Vehicle Defect

Consequences (or any one or more of them)": AS [54] and [55]. These expansive contentions raise issues beyond the Relevant Questions.[1] Even assuming that the "Vehicle Defects" and "Vehicle Defect Consequences" did exist in the "Affected Vehicles", it is a separate question, requiring further, broader, more detailed inquiries, as to how many and to what extent different "Affected Vehicles" suffered each "Vehicle Defect" and each "Vehicle Defect Consequence", both before and after each countermeasure. To properly address these issues, at the very least, the following information and data would need to be analysed:

(a) the total number of Relevant Vehicles the subject of this proceeding;

(b) information with respect to the number of Relevant Vehicles that had countermeasures implemented by way of a production change or field fix and of that set of vehicles, the number of vehicles that have subsequently presented in relation to DPF issues;

(c) data extracted from WINPAQ, which is TMCA's purpose-built SAP module used for handling warranty reimbursement claims submitted by Dealers. WINPAQ is the only source of data TMCA has with respect to repairs undertaken by Dealers on particular vehicles, including whether or not a countermeasure has been implemented. Five extracts from WINPAQ containing 307,504 line items of data have been discovered in this proceeding, along with 32,104 relevant attachments;

(d) Dealer Product Reports, which are reports submitted by Dealers to TMCA to alert TMCA of vehicle issues in the field, including issues with the DPF. 4,674 relevant Dealer Product Reports have been discovered in this proceeding;

(e) Field Technical Reports, which are reports submitted by TMCA to Toyota Motor Corporation (TMC) to alert TMC to vehicle issues in the Australian market. 305 relevant Field Technical Reports have been discovered in this proceeding.

6. Given the large volume of data to be collated and analysed (as described in paragraph 5 above), TMCA has engaged a third party to assist. That process is not yet complete and may not be able to properly be completed within the parameters of the current reference, noting that discovery is not complete (by Court order) and no evidence has been filed.

II. MISDESCRIPTION OF AGREED FACTS

7. The AS has misdescribed aspects of the parties' Statement of Agreed Facts (SOAF), such that the AS presents contentions on the basis that part or all of a particular contention is an agreed fact, where, in fact, unilateral changes have been made to the form in which they were agreed. The table below identifies parts of the AS which contain such anomalies (Column 1), the correlative part of the SOAF upon which the Referee ought to rely (Column 2) and a brief description of the inconsistency (Column 3).

AS	SOAF	Description of inconsistency
[17] and [18]	[20] and [22]	AS [17] and [18] are said to reflect SOAF [20] and [22]. However, the chapeau to AS [17] and [18] refers to "Active Regeneration", when that term is not used in the SOAF at all.

[1] They also extend well beyond the contentions set out in proposed finding 11 in TMCA's Statement of Contended Findings dated 24 July 2020.

AS	SOAF	Description of inconsistency
[36]	[12]	AS [36] is said to reflect SOAF [12]. However, AS [36] includes a new sub-paragraph (c), which is not agreed.
[37]	[12]	AS [37] is said to be based on SOAF [12]. However, SOAF [12] does not say that the DPF relies on the Additional Injector to achieve Thermal Oxidation, as suggested by AS [37]. This is significant because: (i) TMCA maintains that the DPF System is designed to achieve Thermal Oxidation and carries out both Passive and Automatic Regeneration; (ii) the Additional Injector is only active in Automatic Regeneration; and (iii) due to (i) and (ii), suggesting that the DFP System relies on the Additional Injector to achieve Thermal Oxidation amounts to saying that Passive Regeneration does not occur. It is not agreed that Passive Regeneration does not occur; rather, the applicant contends that Passive Regeneration does not occur frequently enough.

III. DOCUMENTS RELIED ON IN SUPPORT OF THE APPLICANT'S CONTENTIONS

8. The applicant refers to documents said to be "illustrative or exemplary" of his proposed findings of fact: AS [4]. TMCA contends: (a) the documents do not support the applicant's proposed findings of fact; (b) some of the documents are misleading absent further context; and (c) lay or other evidence (which has not been prepared at this stage of the proceeding) may be relevant to a contended finding of fact. The examples in the table below demonstrate the problem with the approach that has been taken.

FOOTNOTE / DOC	CONTENTION IN AS	TMCA'S RESPONSE
Footnote 19: tab 9, page 1; tab 15, page 5166; tab 17, page 7926; and tab 48, page 3387.	[23] "[I]n all or almost all driving conditions, the exhaust in the DPF will not reach a sufficiently high temperature to enable Thermal Oxidation to occur without intervention of the ECM.[19]" [27(b)]: "… the exhaust temperature necessary to enable Thermal Oxidation to occur cannot be achieved, or is unlikely to be achieved, without intervention of the ECM (in particular, the injection of additional fuel into the exhaust via the Additional Injector)".	The documents referred to by the applicant in footnote 19 do not support the proposed finding.
Footnote 24: tab 5, page 4751	[29(b)] The "Relevant Vehicles experience, or have a propensity to experience,[23] excessive Active Regeneration … that is … more frequent than the completion of a Regeneration every 250 to 300 kilometres travelled by the Relevant Vehicles.[24]"	The applicant relies on a document that refers to white smoke being emitted in 21 reported cases every 200km (tab 5, page 4751; TAL.001.372.4751). The following documents, which are not referred to in footnote 24 but referred to elsewhere in the AS, indicate regeneration occurred every 300 to 400km: tab 8; tab 11, page 5418; tab 17, page 7923; tab 25, page 1; and tab 28, page 4254. Accordingly, the reference to one document in footnote 24 is misleading. This document is inadequate to establish this contention, including because white smoke can be emitted under normal or other driving conditions, for example such as downhill driving in cool weather.

FOOTNOTE / DOC	CONTENTION IN AS	TMCA'S RESPONSE
Footnote 27: tab 2, page 3; tab 3, page 5495; tab 6, page 4875; tab 15, page 5169	[32]: "The Active Regeneration Defects have a compounding effect on, and exacerbate one or more of, the Inlet Design Defect, the Additional Injector Design Defect, the Additional Injector Blockage Defect, the DOC Coking Defect, the Face Plugging Defect and/or the DPF Blockage Defects".	The applicant relies on page 3 of tab 2 (TAL.001.478.6005), but this does not provide any information that supports the contention that the Active Regeneration Defect compounds the other alleged defects. There needs to be a strong evidence chain to prove a positive feedback loop such as that alleged. On this point, page 3 of tab 2 (TAL.001.478.6005) contains minutes for a meeting on 22 June 2016 which conclude "No fault found". The applicant relies on tab 3 (TAL.001.299.5495) which is an internal email querying a matter ("Please tell me if the following explanation is now correct …"). The other two documents relied on by the applicant (tabs 6 and 15) provide some support for compounding of the Face Plugging Defect but not the other alleged defects.
Tab 22, TAL.001.534.7823 and Tab 49, TAL.850.352.1938	[30], [39], [40], 42(b)], [43], [44], [45(c)-(e)], [46].	These documents are email chains containing the opinions of technical staff based in regional offices without consultation with relevant divisions with relevant technical knowledge and do not represent the applicant's position. These documents should not be relied upon with respect to the contentions they are purported to support.
Tab 72, TAL.001.538.7482	[33(d)], [34(a)-(c)], [36(e)], [37], [38], [39], [40], [41(a) and (e)], [42(b)], [43] and [45(d)]. This document is referenced in support of a number of contentions and is the sole document referenced in support of [34(a) and (b)], [36(e)], [37] and [38].	This presentation was delivered on 27 March 2019 and was prepared by a regional office of TMCA which does not have full technical understanding of the DPF System. This document should not be relied upon with respect to the contentions it is purported to support.
Tab 37, TAL.001.276.1908	[33(d)], [34(c)], [34(d)], [41(a)], [41(b)], [42(b)], [43], [45(c)] and [46]. This document is the sole document referenced in support of [34(d)]. This document, and Tab 72 above are the only documents referenced in support of [33(d)], [34(c)], [41(a)].	These meeting minutes note the key findings from TAL.001.538.7482. Those findings are not endorsed by TMCA. The portion titled "SRO Presentation Key Points" should not be relied upon for the reasons set out above.
Tab 7, TAL.001.294.7151	[48], [50] and [52(e), (g), (s) and (t)].	This document is an unsigned draft.
N/A	[24]: "… by reason of the findings in paragraphs 20 to 23 above … the Relevant vehicles experience no, or alternatively minimal, Passive Regeneration; and …depend exclusively, or alternatively predominantly upon Active Regeneration …" [28]: "The Relevant Vehicles experience, or have a propensity to	These contentions are mere assertions and no supporting documents or data are provided by the applicant. Of paragraphs 20 to 23, only paragraph 23 refers to evidentiary documents (as opposed to TMCA's defence). As noted above, the documents referred to at paragraph 23 (footnote 19) do not support its proposed finding.

FOOTNOTE / DOC	CONTENTION IN AS	TMCA'S RESPONSE
	experience, excessive Active Regeneration …"	
N/A	[41]: "… the design of the DPF System prevents, or has a propensity to prevent, sufficient fuel from combusting in the DOC" due to the distance of the Additional Injector from the face of the DOC, the absence of a mixer to assist atomisation of the diesel fuel, the Turbocharger not atomising the diesel fuel and the DPF System being too small.	Distance is not the only factor affecting sufficient fuel combustion within the DOC, therefore the presence of a short distance is not indicative (on its own) of any problem. The Turbocharger assists mixing and atomisation of the fuel and may serve as a mixer. The effectiveness of the Turbocharger as a mixing device is very difficult to quantify either by measurement or simulation due to the many influencing factors, including geometry, flow pulsation, gas and fuel properties, rotating flow field, heat transfer. Accordingly, this contention cannot be established.
N/A	[53]: "As a result of the increase in fuel consumption by, and decrease in fuel economy of, the Relevant Vehicles resulting from one or more of the Vehicle Defects, the Relevant Vehicles do not, and during the Relevant Period did not, have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials relevant to the Relevant Vehicle and/or any fuel consumption label applied to the windscreen of the Relevant Vehicles".	This contention cannot be established when one considers that fuel economy, even in a fault-free vehicle of any type, can vary significantly from a declared value based on driving style, driving conditions and vehicle health.

9. In addition to the matters set out in the table above, TMCA notes that, in purported reliance on "the proposed findings set out in paragraphs 7 to 57" of the AS, the applicant proposes that the Referee answer question 1 of the Relevant Questions, "yes". However, only AS [56] and [57] specifically address the Applicant's Vehicle. The applicant has not addressed how his vehicle is said to have suffered from each Vehicle Defect (or any of them, and if so, which and when) and each Vehicle Defect Consequence (or any of them, and if so, which and when). The applicant only refers to service invoices for the Applicant's Vehicle and a pro forma letter to him from TMCA. TMCA contends that there is insufficient evidence to establish that the Applicant's Vehicle suffered from the Vehicle Defects (let alone any of them, and if so, which and when) and Vehicle Defect Consequences (let alone any of them, and if so, which and when).

10. Finally, the applicant says that the answer to the question of whether the Affected Vehicles "have a fuel efficiency consistent with the fuel efficiency stated in the promotional and instructional materials … and any fuel consumption label applied to the windscreen of the Relevant Vehicle" should be "yes" (AS [6(c)]). The applicant bases this answer solely on AS [53]. There is no basis for answering this question "yes" when the applicant has not provided the promotional or instructional materials or the label applied to the windscreen upon which he relies.

Date: 21 August 2020 Clayton Utz, solicitors for the Respondent

[ANNEXURE E]

15 July 2020

IN THE MATTER OF A REFERENCE PURSUANT TO S.54A OF THE FEDERAL COURT OF AUSTRALIA ACT 1976 (CTH)

KENNETH JOHN WILLIAMS

V

TOYOTA MOTOR CORPORATION AUSTRALIA LIMITED (NSD1210/2019)

STATEMENT OF AGREED FACTS

1 This statement of agreed facts is submitted pursuant to Order 15(c) made by the Court on 26 June 2020 in the Proceeding (**26 June Orders**).

2 Capitalised terms used in this statement have the meanings given to them in the Dictionary at Schedule 1.

3 The parties request that the referee adopt the following agreed findings of fact in the Report (as defined in the 26 June Orders):

No	Fact	Pleading
I. THE DPF SYSTEM IN THE RELEVANT VEHICLES		
A. Overview		
1.	The Relevant Vehicles are fitted with a 1GD-FTV or 2GD-FTV diesel combustion engine, which is controlled by the ECM and generates exhaust emissions that are directed through the DPF System.	ASOC [6] AD [6] AD [11(a)(ii)]
2.	The operation of a diesel combustion engine, including the 1GD-FTV and 2GD-FTV engines in the Relevant Vehicles, generates the Pollutant Emissions.	ASOC [7] AD [7]
3.	Throughout the Relevant Period, the minimum emissions standard for new light vehicles in Australia was regulated by: (a) ADR 79/03 for vehicles manufactured on or after 1 November 2013 but before 1 November 2016; and (b) ADR 79/04 for vehicles manufactured on or after 1 November 2016.	ASOC [8(a)] AD [8(a)] AR [3(a)]
4.	ADR 79/03 and ADR 79/04 adopt the United Nations Regulation UN-R83 Revision 4, known as "Euro 5".	AD [8(b)] AR [3(b)]

No	Fact	Pleading
5.	ADR 79/03 and ADR 79/04 are performance standards, which define the maximum level of exhaust emissions permitted under the Type I test specified by Annex 4a of ADR 79/03 and Annex 4a of ADR 79/04, respectively.	AD [8(c)] AR [3(c),(d)]
6.	During the Relevant Period, ADR 79/03 and ADR 79/04 imposed standards limiting the level of NO_X that the Relevant Vehicles were allowed to emit.	ASOC [30] AD [30]
7.	During the Relevant Period, to comply with emission limits in ADR 79/03 and ADR 79/04 in respect of Pollutant Emissions, the Relevant Vehicles were fitted with the DPF System.	ASOC [9] AD [9]
8.	To reduce the level of NO_X generated by the operation of the engine, the Relevant Vehicles employ the Toyota NO_X Reduction Techniques.	ASOC [31] AD [31]
9.	The Toyota NO_X Emissions Reduction Techniques can have the following effects, among others: (a) decreasing the level of NO_x generated by the operation of the engine; (b) increasing the level of particulate matter generated by the operation of the engine; and (c) decreasing the ratio of NO_x to particulate matter in the exhaust.	ASOC [32] AD [32]
10.	The DPF System is designed to capture and convert the Pollutant Emissions into carbon dioxide and water vapour through a combination of filtration, combustion and chemical reactions.	ASOC [9] AD [9]
B. Key Components of the DPF System		
11.	The DPF System comprises the following components: (a) the Exhaust Manifold; (b) the Additional Injector; (c) the Turbocharger; (d) the DPF Assembly Inlet; (e) the DOC; (f) the DPF; (g) the Temperature Sensors; and	ASOC [10] AD [10]

No	Fact	Pleading
	(h) the Pressure Sensor.	
12.	The Additional Injector: (a) is controlled by the ECM; (b) is mounted to the Exhaust Manifold; (c) injects diesel fuel into the exhaust travelling through the Exhaust Manifold; and (d) is included in the DPF System to inject additional fuel into the exhaust for the purpose of increasing the temperature of the exhaust gas passing through the DOC.	ASOC [12] AD [12]
13.	The DPF Assembly Inlet connects the outlet of the Turbocharger to the entrance of the DOC.	ASOC [10(d)] AD [10(a)(iv)], [13(a)(ii), 13(b)]
14.	The DOC: (a) comprises a honeycomb ceramic flow-through monolith substrate with a catalyst coating containing precious metals, including platinum and palladium; (b) is designed to: (i) facilitate the catalytic oxidation of carbon monoxide and hydrocarbons present in engine exhaust emissions, resulting in conversion of those Pollutant Emissions into carbon dioxide and water vapour; and (ii) increase the temperature in the DPF during Automatic Regeneration and Manual Regeneration.	ASOC [14] AD [14] AR [6]
15.	The DPF: (a) comprises a porous ceramic monolith wall-flow filter, with a catalyst coating containing precious metals, including platinum and palladium; (b) captures particulate matter; (c) enables the passage of carbon dioxide and water vapour oxidised in the DOC through the exhaust; and (d) is designed to facilitate Regeneration.	ASOC [15] AD [15] AR [7]

No	Fact	Pleading
16.	The Temperature Sensors: (a) are located at the following three points: (i) the entrance to the DOC; (ii) between the DOC and the DPF; and (iii) the exit from the DPF; and (b) measure the temperature of the exhaust at each point and transmit that information to the ECM.	AD [11(a)(iii)]
17.	The Pressure Sensor measures the difference between the pressure of exhaust emissions at the front and the back of the DPF.	AD [11(a)(iv)] AR [4]
18.	The following components of the Relevant Vehicles also contribute to the operation of the DPF System: (a) the ECM, which is a computer system that: (i) manages the operation of the engine and associated component parts within the Relevant Vehicle, utilising data received from sensors, including the Temperature Sensors; (ii) calculates the amount of particulate matter captured by the DPF; (iii) is programmed to trigger Regeneration when: A. the engine is operating; and B. the particulate matter accumulated in the DPF, as calculated by the ECM, reaches the PM Base Level; (b) the diesel combustion engine; (c) the DPF Notifications, which are: (i) a series of symbols or messages that are displayed in the Relevant Vehicles; and (ii) illuminated when the amount of accumulated particulate matter in the DPF, as calculated by the ECM, reaches predetermined levels; (d) the Engine MIL, which is a symbol or message which is illuminated on the dashboard of the Relevant Vehicles, together with the DPF Notifications, when the amount of accumulated particulate matter in the DPF, as calculated by the ECM, reaches a predetermined level; and	ASOC [11] AD [11] AR [4] ASOC [19] AD [16(b)(i)] AD [16(b)(iii)] ASOC [35]

No	Fact	Pleading
	(e) in some Relevant Vehicles, the DPF Switch, which: (i) enables Regeneration to be initiated manually; (ii) is installed in all Relevant Vehicles manufactured after June 2018; and (iii) has been retrospectively fitted to some Relevant Vehicles manufactured prior to June 2018.	
II. REGENERATION IN THE RELEVANT VEHICLES		
A Overview		
19.	The Relevant Vehicles utilise a process known as Regeneration to remove particulate matter that has been captured and stored in the DPF.	ASOC [21]
20.	In order for Thermal Oxidation to occur, the exhaust projected through the DPF must reach a sufficiently high temperature.	ASOC [24]
B. Automatic and Manual Regeneration		
21.	In the Relevant Vehicles: (a) Automatic Regeneration may be initiated when the engine is operating and the ECM calculates that the accumulated particulate matter in the DPF has reached the PM Base Level; or (b) Manual Regeneration may be initiated when the engine is operating and the operator of the Relevant Vehicle initiates Manual Regeneration by pushing the DPF Switch (if the Relevant Vehicle is fitted with a DPF Switch).	ASOC [35] AD [17]
22.	In the Relevant Vehicles, during Automatic Regeneration and Manual Regeneration: (a) the ECM causes temporary changes in the engine settings to increase the temperature of the exhaust generated by the operation of the engine; (b) if the engine is operating and the vehicle is idle, the ECM causes the engine idling speed to be increased as follows: (i) for Relevant Vehicles with manual transmission, to 1,200 rpm; and (ii) for Relevant Vehicles with automatic transmission, to 900 rpm; (c) as the exhaust generated by the operation of the engine flows through the Exhaust Manifold, the Additional Injector sprays fuel into the exhaust;	ASOC [36] AD [17(b)(v)] AD [36]

No	Fact	Pleading
	(d) the exhaust/fuel mixture then flows into the DPF Assembly Inlet and into the DPF Assembly; (e) there may be a noticeably different exhaust smell compared to a diesel engine not undergoing Regeneration; and (f) an amount of white smoke may be emitted from the exhaust tail pipe.	
23.	In the Relevant Vehicles, once Automatic Regeneration or Manual Regeneration is initiated, Automatic Regeneration or Manual Regeneration continues until such time as: (a) the engine ceases to operate; or (b) the level of particulate matter captured and stored in the DPF, as calculated by the ECM, falls below a predetermined level.	
C. Manual Regeneration		
24.	For Relevant Vehicles fitted with a DPF Switch, Regeneration can be manually initiated by the driver.	AD [17] AR [8]
25.	In order for Manual Regeneration to occur: (a) the driver must push the DPF Switch when the Relevant Vehicle is stationary with the engine running; and (b) the Relevant Vehicle must remain stationary and the engine must remain running until the Manual Regeneration has completed.	AD [17] AR [8(g)]
26.	During Manual Regeneration, a DPF Notification appears to indicate that Manual Regeneration has commenced.	AD [17] AR [8]
III. THE APPLICANT'S VEHICLE		
27.	The Applicant's Vehicle is a Relevant Vehicle.	ASOC [3] AD [3]

SCHEDULE 1

DICTIONARY

Term	Meaning	Pleading
Additional Injector	the fifth fuel injector in the Relevant Vehicles	ASOC [10]
ADR 79/03	Vehicle Standard (Australian Design Rule 79/03 - Emission Control for Light Vehicles) 2011	ASOC [8]
ADR 79/04	Vehicle Standard (Australian Design Rule 79/04 - Emission Control for Light Vehicles) 2015	ASOC [8]
Applicant's Vehicle	the new 2016 Toyota Prado GXL 2.8L Diesel Automatic Wagon acquired by the Applicant on or around 8 April 2016	ASOC [3] AD [3]
Automatic Regeneration	Regeneration that occurs in the course of operating the vehicle when initiated by the ECM	ASOC [26] AD [17(b)(iv)]
DOC	diesel oxidation catalyst	ASOC [10]
DPF	diesel particulate filter	AD [10]
DPF Assembly	the DOC and the DPF	ASOC [10]
DPF Assembly Inlet	the inlet at the entrance to the DOC	AD [10]
DPF Notifications	a series of symbols or messages described in paragraph 18(c) above	ASOC [19] AD [11(v)]
DPF System	the diesel exhaust after-treatment system in the Relevant Vehicles	AD [9]
ECM	the engine control module in the Relevant Vehicles	ASOC [11]
EGR	exhaust gas recirculation	ASOC [31]
Engine MIL	the engine malfunction indicator lamp in the Relevant Vehicles	ASOC [11]
Exhaust Manifold	the cast exhaust manifold in the Relevant Vehicles	AD [10]

Term	Meaning	Pleading
Manual Regeneration	Regeneration which has been manually initiated by the driver by pushing the DPF Switch	ASOC [35] AD [17]
NO	nitric oxide	ASOC [7] AD [7]
NO_2	nitrogen dioxide	ASOC [7] AD [7]
NO_x	oxides of nitrogen	ASOC [7] AD [7]
Passive Regeneration	Regeneration that occurs in the course of operating the vehicle without further intervention by the vehicle's operator or ECM	ASOC AD [17(b)(ii)]
PM Base Level	the amount of particulate matter accumulated in the DPF, as calculated by the ECM, at which the ECM is programmed to trigger Automatic Regeneration	ASOC [34] AD [17]
Pollutant Emissions	1. carbon monoxide; 2. NO_x, including NO_2 and NO; 3. hydrocarbons; and 4. particulate matter.	ASOC [7]
Pressure Sensor	the differential pressure sensor in the Relevant Vehicles	ASOC [10]
Proceeding	Federal Court of Australia proceedings numbered NSD 1210/2019	
Regeneration	the oxidation of particulate matter captured in the DPF	AD [15]
Relevant Period	1 October 2015 to 23 April 2020	ASOC [1]
Relevant Vehicles	those models of Toyota motor vehicles in the Hilux, Fortuner and Prado ranges which are fitted with a 1GD-FTV engine or 2GD-FTV diesel combustion engine acquired in Australia during the Relevant Period	ASOC [1] AD [5]

Term	Meaning	Pleading
Temperature Sensors	the exhaust gas temperature sensors in the Relevant Vehicles	AD [10]
Thermal Oxidation	the chemical reaction of particulate matter with oxygen at a sufficiently high temperature, resulting in carbon dioxide and water vapour	ASOC [23] AD [23]
Toyota NO_X Reduction Techniques	EGR and electronically controlled fuel injection employed to reduce the level of NO_x generated by the operation of the engine	ASOC [31] AD [31]
Turbocharger	the variable nozzle turbocharger in the Relevant Vehicles	AD [10] AR [5(a)]

Annexure F – Summary of Findings

This annexure provides a summary of my findings in relation to each of the alleged Vehicle Defects and Vehicle Defect Consequences enumerated in paragraphs 39 and 41, respectively, of the Amended Statement of Claim.

As explained in my report, and acknowledged in the Statement of Agreed Facts, the DPF System is comprised of several key components, Engine Control Module (ECM) software and calibrations, and other elements of design all of which are intended to work in concert to capture particulate matter (PM) in a filter which is periodically regenerated. While some of the individual components or elements of design were identified in Toyota's investigations as root cause contributing factors to the defect, my finding is that the DPF system as a whole was defective in its design. Because of this finding, I consider many alleged Vehicle Defects set out in paragraph 39 of the ASOC to be consequences of the core defect, not defective in and of themselves.

This summary is to be read in conjunction with the report as a whole and is not intended to be a stand-alone documentation of my findings.

ALLEGED VEHICLE DEFECTS (ASOC, [39])			
Ref.	**Allegation**	**Valid Claim[1]**	**Referee Finding**
39(a)	Insufficient passive regeneration	[redacted]	Relevant Vehicles were not designed to rely upon passive regeneration to remove PM from DPF. Regeneration of the DPF in the Relevant Vehicles "… is principally achieved through Automatic Regeneration and, where a DPF Switch is fitted, may be achieved through Manual Regeneration."[2]
39(b)	Automatic regeneration at a frequency and/or duration that is excessive	[redacted]	Frequency of automatic regeneration in some of the Relevant Vehicles is a consequence of the DPF System design defects. Automatic regeneration is initiated based on ECM calculations of PM accumulated in the DPF, not based on distance. Comparisons of regeneration frequency to other light duty vehicles are beyond the scope of this reference due to differences in design strategies among manufacturers as well as different driving patterns, operating conditions, and vehicle usage.
39(c)	Design of DPF Assembly Inlet	N	The design of the DPF Assembly inlet is consistent with current industry practices. Although this element may have been designed differently, I do not consider the inlet design to be a root cause contributor to the core defect.
39(d)	Additional Injector becomes blocked by carbon deposits on its tip.	C	Deposits on the additional injector tip are a consequence of the DPF System design defects in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures. In particular, the design elements of the additional injector housing, including the geometry of the housing and thermal management capabilities, were key contributing factors to the formation of deposits which blocked the additional injector tip.

[1] N = Not a found to be a valid claim; D = found to be a valid claim of a defect; C = found to be a valid claim of a defect consequence

[2] See Respondent's response to Referee's Question dated 1 October 2020 [9]

ALLEGED VEHICLE DEFECTS (ASOC, [39])			
Ref.	**Allegation**	**Valid Claim[1]**	**Referee Finding**
39(e)	Additional Injector causes deposits on the face of the DOC, and causes white smoke.	C	Use of an Additional Injector as part of the DPF System is not a design defect: it is part of the overall system design. The presence of particulate matter on the face of the DOC when the Additional Injector begins providing fuel to the DOC at the start of a regeneration event can lead to deposits on the face of the DOC under certain conditions. White smoke from the exhaust when the Additional Injector is active is a consequence of the DPF System design core defects which reduce the catalytic efficiency of the DOC due to face deposits or coking in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
39(f)	the DOC becomes blocked by deposits forming on the face of the DOC	D	This is part of the mechanism and physical manifestation of the core defect in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
39(g)	Manual Regeneration cannot be completed performed unless the Relevant Vehicle is fitted with a DPF Switch.	D	The absence of a DPF Switch in Relevant Vehicles produced from the start of production through the end of the 2017 MY was an element of the DPF System design defect. Relevant Vehicles produced from the start of the 2018 MY were equipped with a DPF Switch as original equipment from the factory.
39(h)	Regeneration events fail to remove sufficient PM from the DPF to prevent the DPF from becoming “full”.	D	This is part of the mechanism and physical manifestation of the core defect in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
39(i)	the DPF System fails to prevent the DPF from becoming “full” or blocked	D	This is an element of the core defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.

ALLEGED VEHICLE DEFECT CONSEQUENCES (ASOC, [41])			
Ref.	**Allegation**	**Valid Claim[3]**	**Referee Finding**
41(a)	the DOC does not function effectively	D	This is part of the mechanism and physical manifestation of the core defect, and is a key element of the core defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(b)	the DPF does not function effectively	D	This is part of the mechanism and physical manifestation of the core defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(c)	the catalytic efficiency of the DOC is diminished	D	This is part of the mechanism and physical manifestation of the core defect, occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(d)	the DOC becomes damaged	C	This is a consequence of the DPF System design defect, occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(e)	the exhaust in the DPF does not reach a sufficiently high temperature to effect Thermal Oxidation	D	This is part of the mechanism and physical manifestation of the core defect , occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(f)	NO2 Oxidation during Passive Regeneration is inhibited	N	This is NOT part of the mechanism and physical manifestation of the core defect, and is not a defect consequence. Neither NO2 oxidation nor passive regeneration are relied upon as elements of this DPF System design.
41(g)	unoxidized fuel flows through the DPF and is emitted from the Affected Vehicle as white smoke	C	This is a consequence of the DPF System design defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(h)	the DPF becomes partially or completely blocked	C	This is a consequence of the DPF System design defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(i)	engine back-pressure is increased	N	No evidence or suggestion of increased engine back-pressure was noted in the materials available.
41(j)	fuel consumption is increased and fuel economy is decreased	N	No evidence or objective data of any discernable impact of increased fuel consumption was noted in the materials available.

[3] N = Not a found to be a valid claim; D = found to be a valid claim of a defect; C = found to be a valid claim of a defect consequence

ALLEGED VEHICLE DEFECT CONSEQUENCES (ASOC, [41])			
Ref.	**Allegation**	**Valid Claim[3]**	**Referee Finding**
41(k)	foul smelling white smoke is emitted from the exhaust pipe when the engine is on	C	White smoke from the tailpipe during and immediately following an automatic regeneration event was a consequence of the DPF System design defect. No evidence of white smoke occurring any time other than during regeneration was noted in the materials available.
41(l)	engine power is diminished;	N	No evidence of diminished engine power was noted in the materials available. While it appears that the engine will enter "limp mode" after DPF Notifications are ignored by the driver for approximately 1,200 km of driving, I do not consider this loss of engine power to be a defect, but rather a consequence of inappropriate use.
41(m)	engine power is intermittently lost whilst driving	N	No evidence of intermittent power loss (other than as a result of the vehicle entering limp mode) was noted in the materials available. See previous comment
41(n)	wear and tear on the engine components and the DPF System is increased	N	No evidence or suggestion of increased wear and tear on the engine was noted in the materials available.
41(o)	Affected Vehicles must be inspected, serviced and/or repaired by a service engineer for the purpose of cleaning, repairing or replacing the DPF, the DPF System, (or components thereof)	C	This is a consequence of the DPF System design defect.
41(p)	Affected Vehicles must be inspected, serviced and/or repaired more regularly than would be required absent the Vehicle Defects	C	This is a consequence of the DPF System design defect.
41(q)	the ECM must be reprogrammed more often than would be required absent the Vehicle Defects	C	This is a consequence of the DPF System design defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.
41(r)	Affected Vehicles inconvenience their drivers, including by reason of having to undertake Manual Regenerations	N	Manual regenerations are a normal and expected as a consequence of consistent or regular driving at low speeds and loads and/or for frequent short trips which are unsuitable for automatic DPF regeneration. The need to undertake manual regenerations as a result of these low-speed driving patterns is not a defect or a consequence of a defect of the DPF System.

ALLEGED VEHICLE DEFECT CONSEQUENCES (ASOC, [41])			
Ref.	**Allegation**	**Valid Claim[3]**	**Referee Finding**
41(s)	DPF Notifications are displayed on an excessive number of occasions and/or for an excessive period of time.	C	This is a consequence of the DPF System design defect occurring in Relevant Vehicles subject to certain driving conditions and/or in response to ineffective countermeasures.