

State of California  
AIR RESOURCES BOARD

**Notice of Public Availability of Modified Text and  
Availability of Additional Documents and Information**

**PROPOSED REVISIONS TO ON-BOARD DIAGNOSTIC SYSTEM REQUIREMENTS,  
INCLUDING THE INTRODUCTION OF REAL EMISSIONS ASSESSMENT LOGGING  
(REAL), FOR HEAVY-DUTY ENGINES, PASSENGER CARS, LIGHT-DUTY TRUCKS,  
AND MEDIUM-DUTY VEHICLES AND ENGINES**

Public Hearing Date: November 15, 2018

Public Availability Date: June 4, 2019

Deadline for Public Comment: June 19, 2019

At its November 15, 2018, public hearing, the California Air Resources Board (CARB or Board) approved for adoption proposed amendments to sections 1968.2, 1971.1, and 1971.5, Title 13 California Code of Regulations. The proposed amendments would update monitoring requirements for gasoline and diesel engines, incorporate new requirements to assist in the introduction of REAL (e.g., adding more data parameters required to be tracked and reported by the engine/vehicle), modify manufacturer self-testing requirements to address manufacturers' workload issues, and clarify the regulations.

At the hearing, staff presented, and the Board approved for adoption, modified regulatory language developed in response to comments received since the Initial Statement of Reasons (Staff Report) was released to the public on September 25, 2018. These modifications include extending the implementation dates of the amendments and revisions to the REAL requirements and to the deficiency fines provisions.

The Board directed the Executive Officer to make the modified regulatory language, and any additional conforming modifications, available for public comment, with any additional supporting documents and information, for a period of at least 15 days as required by Government Code section 11346.8. The Board further directed the Executive Officer to consider written comments submitted during the public review period and make any further modifications that are appropriate available for public comment for at least 15 days and present the regulation to the Board for further consideration if warranted or take final action to adopt the regulation after addressing all appropriate modifications.

The resolution and all other regulatory documents for this rulemaking are available online at the following CARB website:

<http://www.arb.ca.gov/regact/2018/hdobd18/hdobd18.htm>

The text of the modified regulatory language for the heavy-duty on-board diagnostic (HD OBD) regulations, sections 1971.1 and 1971.5, is shown in Attachment A. The text of the modified regulatory language for the light-duty and medium-duty on-board diagnostic (OBD II) regulation, section 1968.2, is shown in Attachment B. The originally proposed regulatory language is shown in ~~striketrough~~ to indicate deletions and underline to indicate additions. New deletions and additions to the proposed language that are made public with this notice are shown in ~~double striketrough~~ and double underline format, respectively.

In addition, Attachment C to this notice is being provided as an addendum to the Staff Report. More specifically, staff is adding language to further explain potential impacts to California businesses in Chapter VI, section E. of the Initial Statement of Reasons.

In the Final Statement of Reasons, staff will respond to all comments received on the record during the comment periods. The Administrative Procedure Act requires that staff respond to comments received regarding all noticed changes. Therefore, staff will only address comments received during this 15-day comment period that are responsive to this notice, documents added to the record, or the changes detailed in the attachments.

### **Summary of Proposed Modifications**

The following summary does not include all modifications to correct typographical or grammatical errors, changes in numbering or formatting, nor does it include all of the non-substantive revisions made to improve clarity.

#### **Modifications to HD OBD Regulation (section 1971.1) and OBD II Regulation (section 1968.2)**

1. Following sections from section 1971.1: (c), (d)(2.1.2), (d)(2.3.1)(A), (d)(2.3.2)(A), (d)(3.1.3), (d)(3.2.2), (d)(4.3.2)(F), (d)(4.3.2)(G), (d)(4.3.2)(H), (d)(4.3.2)(K), (d)(4.5.4), (d)(5.5.1)(C), (d)(5.5.2)(C), (d)(5.6.2)(B)(iii), (d)(6.3), (d)(8.3), (e)(2.4.2)(B)(ii), (e)(3.3.1), (e)(3.4.2), (e)(4.3.1), (e)(4.4.2), (e)(8.2.1)(D), (e)(8.2.1)(E), (e)(8.2.4)(A)(i)a., (e)(8.2.4)(A)(i)b., (e)(8.3.2), (f)(1.2.4)(A), (f)(1.2.4)(B), (f)(1.3.2), (f)(1.4.4)(A), (f)(2.4.3)(A), (g)(1.1.3)(B), (g)(1.2.2)(B)(i)a., (g)(1.2.2)(B)(i)b., (g)(3.1.1), (g)(3.1.5)(B), (g)(3.4.2), (h)(4.1.3)(H)(i), (h)(4.1.3)(H)(ii), (h)(4.1.3)(I)(i), (h)(4.1.3)(I)(ii), (h)(4.2.1)(D), (h)(4.2.2)(H), (h)(4.2.2)(I), (h)(4.2.3)(G), (h)(5.2.1)(D), (h)(5.2.1)(E), (h)(5.8), (h)(6.1), (i)(2.3.3), (i)(2.3.4), (i)(4.3.2)(C), (i)(4.3.3), (j)(2.23), (j)(2.25), (j)(2.28), (j)(2.31), (k)(3.1), (k)(3.2), and (l)(2.3.7); the following sections from section 1971.5: (b)(6)(B)(iii) and (b)(6)(B)(iv); and the following sections from section 1968.2: (c),

(d)(4.3.2)(G), (d)(4.3.2)(H)(v), (d)(4.3.2)(I)(iii), (f)(6.3.1)(B), (f)(6.3.3), (f)(6.4.2), (f)(7.3.1), (f)(7.4.2), (f)(9.2.1)(A)(ii)c., (f)(9.2.1)(A)(ii)d., (f)(9.2.4)(A)(i)a.2., (f)(9.2.4)(A)(i)a.3., (f)(9.3.2), (g)(4.2.2)(B)(v), (g)(4.2.2)(B)(vi), (g)(6.1.7), (g)(6.13), (g)(8.1), and (i)(2.31): As described in the 45-day notice, staff proposed new requirements that manufacturers would need to meet starting in the 2022 model year and, if needed, concurrently proposed that 2021 be the last year manufacturers would need to meet the previous requirements. Manufacturers have asked for more leadtime to meet the requirements, based on anticipated workloads involved with implementing the requirements associated with REAL, which include the new tracking and reporting requirements in sections 1971.1(h)(5.3) through (5.7) and 1968.2(g)(6.12). As stated in the Staff Report, the implementation of REAL is an important and necessary step to address issues with high-emitting, in-use vehicles and ensure the emissions reductions projected from the vehicle standards are realized in the real world. The data associated with REAL would also provide valuable information to assist CARB staff in improving and developing OBD and other CARB programs. Therefore, to ensure early and robust implementation of REAL and to address manufacturer's workload concerns, staff is proposing to delay the start date for most of these new requirements from the 2022 model year to the 2024 model year and delay the end date of the previous requirement from the 2021 model year to the 2023 model year. This delay would not be applied to proposed requirements related to REAL, specifically the requirements in sections 1971.1(e)(9.2.2)(E), 1971.1(h)(5.3) through (h)(5.7), 1971.1(j)(2.24), 1971.1(j)(2.26), 1971.1(j)(2.32), 1971.1(j)(2.33), 1971.1(j)(2.34), 1971.1(l)(3.4.1), 1968.2(f)(5.2.2)(E), 1968.2(g)(6.12), 1968.2(i)(2.30), 1968.2(i)(2.32), 1968.2(i)(2.33), and the data stream parameters "engine rated power," "vehicle speed," "NOx mass emission rate-engine out," and "NOx mass emission rate – tailpipe" (sections 1971.1(h)(4.2.2)(H), 1971.1(h)(4.2.3)(F) (previously (h)(4.2.3)(G)), 1968.2(g)(4.2.2)(B)(iv), and 1968.2(g)(4.2.3)(I)).

2. Sections 1971.1(d)(4.3.2)(B), (L), and (M), 1971.1(d)(4.5.4), and 1968.2(d)(4.3.2)(M): As part of the 45-day notice, staff proposed new monitoring requirements for crankcase ventilation (CV) systems in the HD OBD regulation under section 1971.1(g)(2.2.3) to align with the existing requirement in the OBD II regulation in sections 1968.2(e)(9.2.3) and (f)(10.2.3). The proposed requirement would require these monitors to use an in-use monitor performance denominator that increments in accordance with the criteria under sections 1971.1(d)(4.3.2)(B) or 1968.2(d)(4.3.2)(B). Manufacturers have indicated that because forced induction engines can only monitor the lines between the crankcase and fresh air intake under boost conditions, they are concerned that the denominator will increment more frequently than conditions under which boost conditions occur, thus possibly resulting in low in-use monitor performance ratios (IUMPR). To address these concerns, staff is proposing to require new incrementing criteria for the CV monitor denominator for lines through which crankcase vapor flows under conditions where the intake manifold pressure is

greater than ambient pressure (sections 1971.1(d)(4.3.2)(L) and 1968.2(d)(4.3.2)(M)). Specifically, the denominator would increment if (1) the criteria under section 1971.1(d)(4.3.2)(B) or (J) or 1968.2(d)(4.3.2)(B) or (K) is met, whichever is applicable, (2) the cumulative time since engine start (or cumulative propulsion system active time for hybrid vehicles) is greater than or equal to 600 seconds while at an ambient temperature of greater than or equal to 40 degrees Fahrenheit (or 4.4 degrees Celsius), and (3) high-load purging conditions occur 2 or more times for greater than 2 seconds or for a cumulative time greater than or equal to 10 seconds, whichever occurs first, with “high-load purging conditions” defined as an event when the engine manifold pressure is greater than or equal to 7 kilopascals above atmospheric pressure. This requirement would apply to vehicles with forced induction engines that meet the CV monitoring requirements under section 1971.1(g)(2.2.3), 1968.2(e)(9.2.3), or 1968.2(f)(10.2.3). Further, to account for this new proposed section in the HD OBD regulation, staff is also proposing to revise the section numbering of the previous section 1971.1(d)(4.3.2)(L) to (d)(4.3.2)(M), the language in section 1971.1(d)(4.3.2)(B) from “sections (d)(4.3.2)(C) through (L)” to “sections (d)(4.3.2)(C) through (M),” and the language in section 1971.1(d)(4.5.4) from “sections (d)(4.3.2)(C) through (I) and (K)” to “sections (d)(4.3.2)(C) through (I), (K), and (L).”

3. Sections 1971.1(d)(7.3.2) and 1968.2(d)(9): As mentioned above, staff is proposing to delay many of the new requirements proposed as part of the 45-day notice from a 2022 model year start date to a 2024 model year start date due to manufacturer’s workload issues with meeting the proposed requirements. While staff agreed to delay most of these new requirements, staff also believed that such delays should not be applied to the implementation of the REAL requirements considering their importance. However, to address the workload issue for diesel engines, staff will consider some relaxations associated with the REAL proposal. Specifically, staff is proposing that manufacturers of heavy-duty and medium-duty diesel engines be allowed to implement one of two possible options. For the first option, manufacturers would track and report all the parameters under sections 1971.1(h)(5.3) through (5.7) and 1968.2(g)(6.12) as proposed as part of the 45-day notice starting in the 2022 model year for diesel engines. Manufacturers meeting this option would be allowed to reduce the amount of testing required under sections 1971.1(i) and 1968.2(h) for the 2022 and 2023 model years. Specifically, if a diesel engine is selected as a demonstration test engine for the 2022 or 2023 model year, manufacturers would be allowed to test only 15 monitors selected by CARB staff. For the second option, on 2022 and 2023 model year engines, manufacturers would track and report all the parameters under sections 1971.1(h)(5.3) through (5.7) and 1968.2(g)(6.12) with the exception of the active 100 hour array and stored 100 hour array parameters (i.e., the parameters under sections 1971.1(h)(5.3.2)(A), 1971.1(h)(5.3.2)(B), 1971.1(h)(5.7.2)(A), 1971.1(h)(5.7.2)(B), 1968.2(g)(6.12.2)(A), and 1968.2(g)(6.12.2)(B)). The manufacturers would then be required to meet all the requirements in sections 1971.1(h)(5.3) through (5.7)

and 1968.2(g)(6.12), including the active 100 hour array and stored 100 hour array parameters, starting in the 2024 model year.

4. Sections 1971.1(e)(9.2.2)(E) and 1968.2(f)(5.2.2)(E): As part of the 45-day notice, staff proposed that the OBD system detect oxides of nitrogen (NOx) sensor activity faults that cause the NOx sensor to not actively report NOx concentration data under conditions when it is technically feasible for a properly-working NOx sensor to be actively reporting NOx concentration data. Manufacturers have expressed confusion about the specific malfunctions that would need to be detected. Staff intended for the monitor to detect all types of malfunctions that affect NOx sensor activity, including but not limited to inappropriate delays in the time to reach the specific conditions (e.g., specific dewpoint, sensor operating temperature, stability conditions) needed to make the NOx sensor “active” and, after the NOx sensor has become “active,” malfunctions that cause the NOx sensor to inappropriately become “inactive” for long periods of time during a driving cycle. Therefore, staff is proposing language indicating that examples of NOx sensor-specific malfunctions required to be detected include faults where the “internal sensor temperature” or “stabilization criteria” are “not properly achieved/maintained” and that the malfunctions to be detected would include, at a minimum, “faults that delay the time it takes for the NOx sensor to become “active” after start (e.g., time after start to satisfy NOx sensor stabilization criteria takes longer than normal) and faults that cause the NOx sensor to not be “active” for longer periods of time than normal (e.g., ratio of sensor “inactive” time to “active” time is higher than normal).”
5. Sections 1971.1(h)(1) and 1968.2(g)(1): Staff is making available recently updated versions of several International Organization of Standards (ISO) and Society of Automotive Engineers International (SAE) technical standards. As is common practice with technical standards, industry periodically updates the standards to add specification or clarity and the references in the regulation have been updated to refer to the latest versions. Specifically, the HD OBD regulation would now incorporate the April 2016 version of ISO 15765-4 “Road Vehicles- Diagnostic communication over Controller Area Network (D<sub>o</sub>CAN) - Part 4: Requirements for emission-related systems” and the September 2018 version of SAE J3162 “Heavy Duty OBD IUMPR Data Collection Tool Process.” Further, both the HD OBD and OBD II regulations would now incorporate the April 2019 version of SAE J1939-DA “Digital Annex of Serial Control and Communication Heavy Duty Vehicle Network Data” and the May 2019 version of “SAE J1979-DA “Digital Annex of E/E Diagnostic Test Modes.”
6. Sections 1971.1(h)(4.2.3)(G) and 1968.2(g)(4.2.2)(B)(v): As part of the 45-day notice, staff proposed to require the OBD system to report the “engine operating state.” In discussions with manufacturers after the Board Hearing, the need and definition of the parameter remained unclear to the point that staff concluded that inclusion of the parameter should be postponed for possible reconsideration in a

future rulemaking. Therefore, staff is proposing to delete this parameter from the regulations.

7. Sections 1971.1(h)(5.3.2)(A)(ii), 1971.1(h)(5.3.2)(B)(i), 1971.1(h)(5.7.2)(A), 1971.1(h)(5.7.2)(B), 1968.2(g)(6.12.2)(A)(ii), and 1968.2(g)(6.12.2)(B)(i): Staff is proposing language in these sections indicating that for hybrid vehicles, the data in the active 100 hour array/category must reset to zero when the “propulsion system active” run time reaches 100 hours, not when the engine run time value reaches 100 hours. These changes are necessary because, unlike conventional vehicles, hybrid vehicles can operate under both engine power and hybrid powertrain power, so “propulsion system active” run time more accurately reflects vehicle operation time for hybrid vehicles. Staff is also proposing language in section 1971.1(h)(5.7.2)(B) clarifying that “engine run time” values would not be required to be transferred to the “stored 100 hour category” for conventional vehicles, and that the “propulsion system active” values would not be required to be transferred to the “stored 100 hour category” for hybrid vehicles. For conventional vehicles, “engine run time” values would not have to be transferred since, by definition, “engine run time” would always have a value of 100 hours. For similar reasons, the “propulsion system active” values for hybrid vehicles would not have to be transferred. However, because the hybrid vehicle “engine run time” values may be less than 100 hours when transferred to the “stored 100 hour” category, staff is also proposing language clarifying that for hybrid vehicles, “engine run time” values would be required to be transferred to the “stored 100 hour” category.
8. Sections 1971.1(h)(5.3.2), 1971.1(h)(5.3.3)(H), 1971.1(h)(5.3.6), 1968.2(6.12.3)(H), and 1968.2(g)(6.12.5): As part of the 45-day notice, staff proposed to add NOx emission tracking requirements for heavy-duty and medium-duty diesel engines. The proposal would require engine control modules to estimate a list of parameters and store them in data arrays. Staff originally proposed that the data for each parameter in each array will be split up and stored as cumulative values in 16 defined bins. Manufacturers have raised concerns about ensuring the integrity of the data, both in the case that a malfunction occurs such that the NOx emission data required to be tracked become inaccurate and in the case where a malfunction occurs that affects engine-out NOx emissions or tailpipe NOx emissions. As part of the 45-day notice, staff proposed language in section 1971.1(h)(5.3.2) indicating that the OBD system would not be required to continue tracking and reporting the data in the case that a malfunction is detected that “prevents one of the parameters listed in section (h)(5.3.1) from being determined.” However, staff believes further changes are needed to better address this issue. Therefore, staff is proposing to add one new NOx tracking data storage bin (Bin 17) in both the HD OBD and OBD II regulations. Bin 17 would store the total value of the parameter within each given array; data would only accumulate in this “Bin 17” when the specific conditions detailed in section 1971.1(h)(5.3.6)(A) or 1968.2(g)(6.12.5)(A) are met. Furthermore, the accumulation of data in the other bins (Bins 1 through

16) would be paused when the specific conditions detailed in these sections are met. The OBD system would only be required to accumulate and store data in Bin 17 when a malfunction has been detected and the malfunction indicator light (MIL) is commanded on. Staff believes these “MIL-on” data would help staff quantify the emissions impact a malfunction will have on the diesel engine.

Further, staff is also proposing exceptions to tracking NOx data in any array in sections 1971.1(h)(5.3.6)(B) and 1968.2(g)(6.12.5)(B). Specifically, the OBD system would be required to pause the accumulation of the NOx tracking data in any bin when any of the following conditions occur: 1) a malfunction that prevents the vehicle speed from being determined and commands the MIL on; 2) a NOx sensor malfunction that commands the MIL on; or 3) the engine stop lamp (if equipped) is commanded on. The occurrence of any one of the conditions would impact the accuracy of the NOx tracking data, thus rendering the NOx tracking data accumulated and stored under these conditions rather useless. Staff is also proposing language in sections 1971.1(h)(5.3.6)(C) and 1968.2(g)(6.12.5)(C) that would allow manufacturers to request Executive Officer approval to pause tracking for other malfunctions that are not mentioned above. Examples of such malfunctions may include a malfunction of a component used as a primary input to the exhaust gas flow model, a malfunction that commands a light on for vehicles with no engine stop lamps such that the driver is likely to stop the vehicle, or a malfunction that causes the odometer signal to be lost. The Executive Officer would approve the request if the manufacturer demonstrates that malfunction will significantly affect the accuracy of the NOx tracking data.

9. Sections 1971.1(h)(5.3.2)(A)(i), 1971.1(h)(5.3.2)(C)(i), 1968.2(g)(6.12.2)(A)(i), and 1968.2(g)(6.12.2)(C)(i): As part of the 45-day language, staff proposed language indicating that data for all parameters listed under sections 1971.1(h)(5.3.1) and 1968.2(g)(6.12.1) are required to be stored in the Active 100 Hour Array and Lifetime Array when the NOx sensors used to determine the NOx mass parameters listed in section (h)(5.3.1) and section 1968.2(g)(6.12.1) “are both reporting valid NOx concentration data.” This language was drafted based on diesel aftertreatment systems most commonly being configured with one selective catalytic reduction (SCR) catalyst and two NOx sensors. However, not all diesel aftertreatment systems are configured in this manner; manufacturers have also incorporated multiple SCR catalysts and more than two NOx sensors on diesel systems to meet and maintain emissions compliance and to detect malfunctions that impact the NOx conversion capability of the emission control system. In addition, as diesel aftertreatment technologies continue to make advancements in the on-road industry, staff wants to take into account manufacturers investigating and implementing any alternative system configurations (e.g., multiple SCR catalysts utilized on engines with more than one cylinder bank) in the future. Therefore, staff is proposing to change the word “both” to “all” in these sections.

10. Sections 1971.1(h)(5.3.4) and 1968.2(g)(6.12.4): As part of the 45-day notice,

staff proposed language requiring that the engine-out and tailpipe NO<sub>x</sub> mass parameters that would be calculated by the OBD system to fulfill the requirements in sections 1971.1(h)(5.3) and 1968.2(g)(6.12) and data stream requirements in sections 1971.1(h)(4.2) and 1968.2(g)(4.2) should not have an error of more than 20 percent, or alternatively 0.10 grams per brake horsepower-hour (g/bhp-hr), when divided by the net brake work of the engine. Manufacturers have wrongly interpreted the language to mean that the both the 20 percent error and 0.10 g/bhp-hr criteria had to be met to meet the requirement, while CARB staff intended only one of the criteria to be met. Therefore, staff is proposing language to clarify this. Staff is also proposing to change the phrase “an error of more than 20 percent” to “an error of more than +/- 20 percent” at the request of manufacturers for clarity. Staff is additionally proposing to include language indicating that manufacturers are prohibited from including any calibration or software features that adversely impact the accuracy of the calculated NO<sub>x</sub> mass values. As mentioned in the Staff Report and above, the implementation of REAL is an important and necessary step in addressing issues with high-emitting in-use vehicles and ensuring the emissions reductions projected from the standards programs are realized in the real world. The data associated with REAL would also provide valuable information to help assist CARB staff in improving and developing OBD and other CARB programs. Therefore, the NO<sub>x</sub> mass values calculated by the system need to be as accurate as possible to ensure useful data.

11. Sections 1971.1(h)(5.3.5), 1971.1(h)(5.7.3), 1971.1(h)(5.7.4), and 1968.2(g)(6.6.1)(C): As part of the 45-day notice, staff proposed to require manufacturers to store all the newly proposed parameters under sections 1971.1(h)(5.3) through (h)(5.6) and 1968.2(g)(6.12) in non-volatile random access memory (NVRAM). The intent was to prevent the data from being erased during routine services and to help ensure that a useful amount of data is available at the time of request. Manufacturers, however, have indicated that requiring all the data to be stored in NVRAM would require a significant amount of memory space. Staff understands manufacturers’ concerns and, after further reviewing the data, determined that there is not a great need to store the active 100 hour array/category parameters in NVRAM. Staff also determined that storing these active 100 hour array/category parameters in NVRAM may not be convenient. Specifically, in the event a vehicle undergoes an in-use driving test where drive cycle-specific tracking data are collected for analysis, resetting these parameter values to zero at the start of the test would require manufacturer-specific tools to perform an NVRAM reset (e.g., reprogramming event), but the tools may be difficult to procure. If the numbers for these parameters are stored in keep alive memory (KAM), the values could be reset to zero with a battery disconnect event, which would more conveniently allow data to be reset to zero at the start of the test. Further, an NVRAM reset could potentially erase existing emission control adaptation/compensation values that the system would have collected to maintain emission compliance. The loss of this information could affect emission control system performance and affect readings collected during



a confirmatory or enforcement test. Therefore, staff is now proposing amendments that would allow manufacturers to store the active 100 hour array/category parameters in KAM instead of NVRAM. Additionally, as it has been brought to staff's attention that an interruption in electrical power to the control module (e.g., battery disconnect) could also potentially erase existing emission control adaptation/compensation values, staff is also proposing to allow the OBD system to reset the active 100 hour array/category parameter data to zero after a scan tool command to clear fault codes is received.

Additionally, staff did not include proposed language regarding the timing for storing some of the data under sections 1971.1(h)(5.3) through (5.6) and 1968.2(g)(6.12). Specifically, the proposed language made available as part of the 45-day notice did not indicate when the parameters required to be stored in NVRAM (i.e., active 100 hour data stored in NVRAM, stored 100 hour data, and lifetime data) should actually be stored in NVRAM. Therefore, staff is proposing the data to be stored within 600 seconds after the end of a driving cycle, which is an appropriate time to store such data.

12. Sections 1971.1(h)(5.8.1), 1968.2(g)(4.2.3)(I), and 1968.2(g)(6.13): As part of the 45-day notice, staff proposed that manufacturers track and report the "distance since the last 3 particulate matter (PM) filter regeneration events" in sections 1971.1(h)(5.8.1) and 1968.2(g)(4.2.3)(I). The parameter would be used to improve the ability to track the in-use activity and performance of manufacturers' regeneration strategies as well as provide CARB staff with real-world data that could be compared against manufacturers' estimated regeneration frequency factors that are part of the infrequent regeneration adjustment factor calculations. Manufacturers, however, have expressed concerns with this parameter, indicating that based on prior discussions with CARB staff, they had believed the parameter would be based on the vehicle distance readings during the last 3 regeneration events and would not be a dynamic quantity that would change as the vehicle is driven. Further, for heavy-duty engines, they recommended that the parameter be based on the engine's total vehicle distance reading when it is available and not the chassis odometer reading, which is the responsibility of the vehicle manufacturer. Therefore, staff is proposing to change the parameter name in the HD OBD regulation (section 1971.1(h)(5.8.1) from "distance since the last 3 PM filter regeneration events" to "engine odometer reading at the beginning and end of the last 3 PM filter regeneration events." If the manufacturer has not made engine odometer readings available, then chassis odometer values are to be used. The name would be changed to "odometer reading at the beginning and end of the last 3 PM filter regeneration events" in the OBD II regulation. Further, staff is proposing to move this requirement in the OBD II regulation from section 1968.2(g)(4.2.3)(I), which describes the "data stream" requirements, to section 1968.2(g)(6.13), which describes "vehicle operation tracking" requirements. Staff believes section 1968.2(g)(6.13) is the more appropriate place for this requirement, and would match the placement of the corresponding requirement

in the HD OBD regulation. Additionally, staff did not propose requirements in section 1968.2(g)(6.13) that align with the requirements proposed in the HD OBD regulation (section 1971.1(h)(5.8)). Therefore, staff is proposing to add sections 1968.2(g)(6.13.2) and (g)(6.13.3) to be consistent, which would require the tracking and reporting of the “lifetime counter of PM filter regeneration events” and require parameters under section 1968.2(g)(6.13) to be stored in NVRAM.

13. Sections 1971.1(h)(6.2) and 1968.2(g)(8.2): As part of the 45-day notice, staff proposed new data reporting requirements for over-the-air (OTA) reprogramming events. As part of the proposal, manufacturers would be required to submit a report contain the required data within 60 calendar days of the availability of the calibration/software update to the affected engines. Further, in the “Data Record Reporting Procedures for Over-the-Air Reprogrammed Vehicles and Engines” (dated August 16, 2018), which the proposal references, CARB staff indicated that the manufacturer should not aggregate the data until after 45 days from the release of the software. Manufacturers have indicated that the 60-day deadline may be too short and is unlikely to capture the data from the majority of the fleet vehicles. Further, manufacturers indicated that considering the 45-day aggregate start date, that would only leave 15 calendar days to review the data and ensure that the submission to CARB is correct. CARB staff believes that most vehicle operators will accept the OTA software updates within the 60-day time period. Otherwise, CARB staff believes the owners are not likely to accept the update at all. In any event, manufacturers are only required to collect and submit the data for those vehicle operators that do accept the software update. There is no requirement for the manufacturer to ensure that a certain percentage of the fleet has been captured. Nonetheless, to address the manufacturers’ concerns, CARB staff is proposing to increase the submission deadline from 60 calendar days to 75 calendar days of the availability of the calibration/software update.
14. Sections 1971.1(j)(2.23), 1971.1(j)(2.25), 1971.1(j)(2.26), 1968.2(i)(2.31), and 1968.2(i)(2.32): As part of the 45-day notice, staff proposed that manufacturers would be required to include specific information collected from engines on test cycles as part of the certification application. Specifically, section 1971.1(j)(2.23) would require net brake torque information, sections 1971.1(j)(2.25) and 1968.2(i)(2.31) would require NOx sensor status information, and sections 1971.1(j)(2.26) and 1968.2(i)(2.32) would require NOx mass emission rate data. Manufacturers have asked CARB to make clear in the regulation language that manufacturers should collect the information during “baseline” testing, (i.e., testing with an engine with no malfunctions on the engine, emissions controls, and aftertreatment). Therefore, staff is proposing language to make this clear in the regulation.

Additionally, manufacturers have expressed confusion about the language in sections 1971.1(j)(2.26) and 1968.2(i)(2.32). These include questions about which Federal Test Procedure (FTP) tests they are required to collect the NOx

mass emission rate data from, what specific data are required to be summed (engine-out or system-out (tailpipe) NO<sub>x</sub> mass data), and which net brake work values to use. To clear up confusion, staff is proposing clarifying language to these sections. Staff's proposed clarifications would identify more precisely which data must come from the engine's electronic control unit and which data must come from the test facility and also make clear staff's intent that the same net brake work value be used in the denominator of the g/bhp-hr calculation for both the OBD NO<sub>x</sub> and test cell NO<sub>x</sub>. These changes also make it clear to manufacturers that they are not required to submit engine-out NO<sub>x</sub> mass data measured by the test facility. Staff is also proposing to add language to better distinguish the preparatory FTP cycle from the FTP cycle over which the comparison of NO<sub>x</sub> mass values would be made to determine compliance with the NO<sub>x</sub> mass accuracy specification defined in sections 1971.1(h)(5.3.4) and 1968.2(g)(6.12.4). Finally, staff is proposing language indicating that for net brake work, the value measured in the test cell would be used if engine dynamometer testing is conducted and the value calculated using OBD parameters would be used if chassis dynamometer testing is conducted since no test cell equivalent value is available.

15. Sections 1971.1(j)(2.34) and 1968.2(i)(2.33): Staff is proposing that for vehicles/engines meeting the proposed tracking requirements under sections 1971.1(h)(5.3) through (5.6) and 1968.2(g)(6.12), manufacturers would be required to provide a list of the monitors and respective fault codes for malfunctions that pause tracking of these parameters (i.e., malfunctions listed under sections 1971.1(h)(5.3.6)(B), 1971.1(5.3.6)(C), 1971.1(h)(5.7.5), 1971.1(h)(5.7.6), 1968.2(g)(6.12.5)(B) and 1968.2(g)(6.12.5)(C)). This information would help CARB staff determine if manufacturers are appropriately identifying malfunctions that would affect tracking performance. It is staff's intent to prohibit manufacturers from inappropriately suspending tracking for a malfunction when it is not necessary.
16. Sections 1971.1(l)(2.3.1), 1971.1(l)(2.3.5), 1968.2(j)(2.3.1), and 1968.2(j)(2.3.5): As part of the 45-day notice, staff proposed that manufacturers submit a testing plan for Executive Officer approval that ensures that the OBD system is able to store and erase a subset of permanent fault codes during section 1971.1(l)(2) testing and section 1968.2(j)(2) testing. The criteria for the testing plan that CARB staff proposed was based on an agreement between industry and CARB regarding the required testing that would be involved. After the 45-day notice was published, manufacturers suggested language that they want CARB staff to adopt that would clarify some of the requirements. Manufacturers have also identified a specific test that was part of the agreement but that CARB had inadvertently left out of the proposed regulation language. The test involved diagnostics and permanent fault code erasure protocols covered under sections 1971.1(d)(2.3.1)(C)(ii)b., 1971.1(d)(2.3.2)(D)(ii)b., and 1968.2(d)(2.5.2)(B) (e.g., erasure after a battery disconnect, erasure after a scan tool code clear command), and would require manufacturers to verify that the permanent fault

code is not erased if the diagnostic “passes” but the criteria described under section 1971.1(d)(2.3.1)(C)(ii)b.3., 1971.1(d)(2.3.2)(D)(ii)b.3., or 1968.2(d)(2.5.2)(B)(iii) are not met. Therefore, staff is proposing language that would include this missing test and to clarify a few parts of the proposed regulation language. Specifically, in section 1971.1(l)(2.3.1) and 1968.2(j)(2.3.1), staff is proposing language that would make clear that the manufacturer is required to verify permanent fault code erasure “for each unique pathway within the software that manages the erasing of the permanent fault codes.” Staff is also proposing language clarifying that for the last procedure that would be performed on the vehicle, where a manufacturer has to verify that any remaining permanent fault code(s) stored is erased without any reprogramming events, the procedure would involve erasing of the permanent fault codes through “natural” erasure. Finally, staff is proposing to separate the testing requirements originally proposed in sections 1971.1(l)(2.3.5)(A) and 1968.2(j)(2.3.5)(A) into two separate sections (sections 1971.1(l)(2.3.5)(A) and (B) and sections 1968.2(j)(2.3.5)(A) and (B), respectively) for better readability.

#### Additional Modifications to HD OBD Regulation (section 1971.1)

17. Section 1971.1(c): Staff is proposing new definitions for “chassis odometer” and “engine odometer” to accompany the proposed changes to sections 1971.1(h)(4.2.3)(G), 1971.1(h)(5.8.1), and 1971.1(l)(3.4).
18. Sections 1971.1(c), (h)(5.4.14), and (j)(2.33): Staff is proposing to change the phrase “stop-start” to “start-stop” to be consistent throughout the regulation.
19. Sections 1971.1(d)(2.2.1)(D) and (d)(2.2.2)(D): As part of the 45-day notice, staff proposed language indicating that, in the event a malfunction is detected and a pending fault code is stored, if all available freeze frames are filled and freeze frame conditions are currently stored for a confirmed or previously MIL-on fault code that is not currently commanding the MIL on, the freeze frame conditions would be replaced with freeze frame conditions for the pending fault code. The intent was to address issues where a repair technician tries to fix a fault and sees freeze frame data that do not correspond to the fault that caused the MIL to be illuminated. Manufacturers have argued that such an issue is already addressed on engines that store more than one set of freeze frame data, and that this new requirement would have little real benefit for the workload required. Additionally, manufacturers have expressed concern about the ability to build engines that meet both the HD OBD requirements in section 1971.1 and the OBD II requirements in section 1968.2, which does not have this requirement. Therefore, staff is proposing to delete this proposed requirement in sections 1971.1(d)(2.2.1)(D)(vi) and (d)(2.2.2)(D)(vii) and delete reference to these sections in sections 1971.1(d)(2.2.1)(D)(iii)b., (d)(2.2.1)(D)(v), (d)(2.2.2)(D)(iv), and (d)(2.2.2)(D)(vi).
20. Section 1971.1(d)(3.1.3): As part of the 45-day notice, staff proposed that

starting with 2022 model year engines, manufacturers may request Executive Officer approval to define monitoring conditions that occur during the Supplemental Emission Test (SET) cycle (in lieu of the FTP cycle) only for monitors for which the IUMPR data are tracked and reported as required by the HD OBD regulation. Manufacturers have expressed concern that certain monitors for which the IUMPR data are not tracked and reported but that need to run during SET cycle-based monitoring conditions would not be able to use such conditions due to the proposed amendment. They argued that since CARB's purpose behind the proposed amendment was to ensure that such monitors run frequently in-use, they should be allowed to provide IUMPR data for these monitors of concern demonstrating that they meet the minimum acceptable IUMPR. Though the intent of the 45-day proposed language was to limit the number of monitors that run on the SET cycle instead of the FTP cycle, due to concerns about poor monitoring frequency, staff also understands that certain monitors may need such SET-cycle-based monitoring conditions. Thus, to address manufacturers' concerns, staff is proposing changes to allow manufacturers to design monitoring conditions for such monitors to ensure monitoring occurs on the SET cycle if certain criteria are met. First, the manufacturer would be required to provide information showing the need for the SET-cycle-related monitoring conditions based on the considerations specified under section 1971.1(d)(3.1.3). Second, the manufacturer would be required to implement "enhanced" tracking and reporting of the IUMPR data for the monitor – specifically, manufacturers would need to implement software algorithms to track the IUMPR data in accordance with the specifications in the HD OBD regulation and report the data through an engineering or manufacturer-specific tool (not through Mode 09 or Diagnostic Message (DM) 20). Third, the manufacturer would be required to submit a plan to collect IUMPR data from in-use vehicles and submit the data to CARB no later than 12 months after the production vehicles were first introduced into commerce. The manufacturer may design the plan to collect and report the data from the same vehicles as those described under the production vehicle IUMPR data collection requirement (section 1971.1(l)(3)).

21. Section 1971.1(d)(3.1.4): As part of the 45-day notice, staff proposed new amendments restricting implementation of intrusive diagnostics that reduce the effectiveness of the emission control system during any reasonable in-use driving conditions, specifically only allowing them to run once after the MIL is illuminated for the fault by a non-intrusive diagnostic. Manufacturers have argued that such a restriction would prevent manufacturers from using some current monitors. Examples include gasoline catalyst monitors that require forced air-fuel ratio switching and monitors that intrusively take over fueling activations after deceleration fuel cuts. Staff's intent with the proposed amendment was to prohibit the implementation of monitors where the effectiveness of major emission control components are reduced for extended periods. The in-use emission benefits of the OBD program cannot be undermined by manufacturers' continual execution of emissions-increasing intrusive diagnostics. However, staff

also did not intend to prevent manufacturers from using monitors such as those described above. Thus, to address manufacturers' concerns, staff is proposing changes that would allow manufacturers to use such intrusive diagnostics if the manufacturer has employed the best available monitoring technology that, to the extent feasible, results in the smallest emissions impact (for example, the exhaust gas sensor rationality monitor that runs during a fuel cut event). For purposes of this proposed requirement, "to the extent feasible" is defined as described in section 1971.1(g)(5.9), which takes into consideration "the best available monitoring technology to the extent that it is known or should have been known to the manufacturer and given the limitations of the manufacturer's existing hardware, the extent and degree to which the monitoring requirements are met in full, the limitations of monitoring necessary to prevent significant errors of commission and omission, and the extent to which the manufacturer has considered and pursued alternative monitoring concepts to meet the requirements in full."

22. Sections 1971.1(d)(4.3.2)(C) and (L): As mentioned above, staff is proposing new denominator incrementing criteria in section 1971.1(d)(4.3.2)(L) to apply to CV monitors for lines through which crankcase vapor flows under boosted conditions. The criteria would require the denominator to increment when boosted conditions are met (i.e., when the engine manifold pressure is greater than or equal to 7 kPa above atmospheric pressure). Manufacturers have requested that CARB staff adopt the same denominator incrementing criteria for the newly proposed evaporative system high-load purge monitor (details provided in sections 1971.1(f)(7.2.2), (f)(7.2.6), and (f)(7.3.1) below) on gasoline forced induction engines, similar to what is currently required in the OBD II regulation. Therefore, staff is proposing to require that the evaporative system high-load purge monitor use the denominator incrementing criteria specified under section 1971.1(d)(4.3.2)(L). To allow leadtime, staff is proposing that manufacturers could continue to use the current denominator incrementing criteria under section 1971.1(d)(4.3.2)(C) for the high-load purge monitor up through the 2023 model year. Finally, staff is proposing changes to section 1971.1(d)(4.3.2)(C) to indicate that the denominator incrementing criteria in that section apply to the evaporative system monitors in sections 1971.1(f)(7.2.2)(A) and (B) (i.e., the normal purge flow and leak monitors).
23. Sections 1971.1(d)(4.3.2)(H): As part of the 45-day notice, staff proposed to require the diesel non-methane hydrocarbon (NMHC) converting catalyst conversion efficiency monitor to use the denominator incrementing criteria under sections 1971.1(d)(4.3.2)(H) and 1968.2(d)(4.3.2)(I), which requires a "regeneration event" to be commanded for a time greater than or equal to ten seconds. Staff had been concerned that manufacturers have not been including certain events as "regeneration events" when incrementing the denominator. Though section 1971.1(d)(6.2.1) defines "regeneration" as "an event during which emissions levels change while the emission control performance is being restored by design" and should be applicable to the denominator incrementing

sections mentioned above as well, the section indicated that the definition was “for purposes of sections (d)(6.2) and (d)(6.3).” Given that staff proposed to require the diesel NMHC converting catalyst conversion efficiency monitor to use the denominator incrementing criteria under section 1971.1(d)(4.3.2)(H) starting in the 2024 model year, staff wants to ensure that “regeneration events” such as desulfurizations and decrystallization are included. Therefore, staff is proposing to add language to section 1971.1(d)(4.3.2)(H) clarifying that examples of a “regeneration event” include parked/manual regeneration, desulfurization, decrystallization, and desoot events.

24. Sections 1971.1(e)(10.1) and (f)(9.1): As part of the 45-day notice, staff proposed language indicating that for variable valve timing, lift, and/or control (VVT) system monitoring, the manufacturer would be required to perform a “comprehensive failures modes and effects analysis for every reasonable hydraulic or mechanical failure...to identify target error and slow response malfunctions.” Manufacturers have expressed concern about the usage of the phrase “failure modes and effects analysis,” which has traditionally been used in industry to involve a very detailed, extensive, and complex analysis that they indicated would require a lot of work to complete. Staff used the phrase “failure modes and effects analysis” to convey the level of detail and quality of the analysis required for compliance, but have not specified a particular standard to allow manufacturers sufficient flexibility to carry out this analysis according to their own internal company policies and procedures. Therefore, staff is proposing to change the language to indicate that “manufacturers must submit data and/or an analysis identifying all possible failure modes of the VVT system (e.g., partial or complete blockage of hydraulic passages, broken return springs, a failure of a single cylinder-specific pin to move into the desired position on a lift mechanism) and the effect each has (e.g., failure modes and effects analysis) across the entire range of operating conditions.”
25. Sections 1971.1(f)(7.2.2), (f)(7.2.6), and (f)(7.3.1): In 2015, CARB staff adopted changes to the OBD II regulation to separate the monitoring requirements for “normal” purge flow and “high-load” purge flow for gasoline vehicles with forced induction engines. This included adopting new denominator incrementing criteria for the high-load purge monitor that require the denominator to increment when boosted conditions are met. This separation was adopted to address manufacturers’ difficulties with designing robust monitoring strategies for the high-load purge lines and also issues with low monitoring frequency for these high-load purge monitors. Manufacturers have requested the same changes be applied to the HD OBD regulation. Therefore, staff is proposing to separate out the high-load purge flow monitoring requirements into its own section (section 1971.1(f)(7.2.2)(C)) for gasoline forced induction engines. Additionally, staff is proposing to allow manufacturers to request Executive Officer approval to be exempt from monitoring all disconnections, broken lines, blockages, or any other malfunctions that can impact high-load purge flow delivery up through the 2023 model year. Approval for the monitoring exemption would be granted based

upon manufacturers submitting data and/or engineering evaluation that demonstrates the following factors: the unmonitored portion is small compared to the fully monitored portion, leak detection for the unmonitored portion of the high-load purge lines cannot be fully achieved when employing proven monitoring technology (i.e., a technology that provides for compliance with these requirements on other engines), and the high-load purge system design is inherently resistant to deterioration (e.g., breakage, disconnections, blockage) of the unmonitored portions of the purge lines. Staff is also proposing amendments to section 1971.1(f)(7.3.1) to account for the newly proposed section 1971.1(f)(7.2.2)(C). Additionally, as already mentioned above in the discussion for sections 1971.1(d)(4.3.2)(C) and (L), staff is proposing new denominator incrementing criteria for the high-load purge monitor.

26. Section 1971.1(g)(3.1.1): The regulation currently requires manufacturers to monitor comprehensive components if a malfunction “can affect emissions during any reasonable in-use driving condition.” Manufacturers have asked CARB to clarify which specific emissions are involved. Therefore, staff is proposing language to clarify that this section involves NMHC, NO<sub>x</sub>, carbon monoxide (CO), and PM emissions.
27. Section 1971.1(g)(5.7): Staff is proposing a new section (section 1971.1(g)(5.7.2)) that would allow manufacturers to be exempt from monitoring a component if a failure of that component affects emissions or other diagnostics only during conditions where the vehicle speed is greater than 82 miles-per-hour. The OBD system would be required to monitor the sensor determining the vehicle speed (e.g., vehicle speed sensor) in this case. Staff adopted the same allowance in the OBD II regulation in 2015 to address manufacturers’ concerns about expending resources to monitor components that only affect emissions or other diagnostics during extreme conditions, with the 82 miles-per-hour threshold based on the peak vehicle speed on the US06 cycle. Staff believes there is not much benefit in monitoring components that only affect emissions under these extreme driving conditions, considering the limited amount of time vehicles are operated in this vehicle speed range. Manufacturers have requested that the same allowance be applied to the HD OBD regulation. To maintain consistency between the regulations, staff agrees to propose the same language in the HD OBD regulation. Further, staff is proposing amendments that would move the current language in section 1971.1(g)(5.7) to (g)(5.7.1) and would group both monitoring exemption language in sections 1971.1(g)(5.7.1) and (g)(5.7.2) under section 1971.1(g)(5.7) for better readability.
28. Section 1971.1(h)(2.3): As part of the 45-day notice, staff proposed new language regarding the requirements for the diagnostic link connector (DLC) location to address vehicles with no drivers’ side doors. Specifically, staff proposed language in section 1971.1(h)(2.2.1) to require the DLC on such vehicles to be located in the driver’s side foot-well region of the vehicle interior in the area bound by the driver’s side of the vehicle and the driver’s side edge of the



center console (or the vehicle centerline if the vehicle does not have a center console) and at a location no higher than the bottom of the steering wheel when in the lowest adjustable position. Further, staff proposed language in section 1971.1(h)(2.3) requiring the connector to be easily identified and accessed by a “crouched technician.” Manufacturers have indicated that the connector may not be easily identified and accessed by a crouched technician if the connector is located in the proposed area described in section 1971.1(h)(2.2.1), since the technician will be on the opposite side of the vehicle centerline and may have his or her sightline obstructed by the center console. To avoid confusion, staff is proposing to delete the word “crouched” that was added as part of the 45-day language and to modify the language as follows: “For vehicles not equipped with a driver’s side door, the connector shall be capable of being easily identified and accessed by a technician inside the vehicle and observing the foot-well region from an eyesight level located at the bottom of the steering wheel.”

29. Sections 1971.1(h)(4.2.1)(D) and (h)(4.2.2)(A): Staff is proposing to clarify the names for engine torque-related data stream parameters to address confusion about which specific parameters are to be reported by the OBD system. The proposed changes would better align the regulatory names with industry standards incorporated by reference. Specifically, staff is proposing to amend the parameter names “actual engine – percent torque” and “engine friction – percent torque” in section 1971.1(h)(4.2.1)(D) to “actual indicated engine – percent torque” and “nominal engine friction – percent torque,” respectively. Staff is also proposing to amend the parameter “actual engine torque” in section 1971.1(h)(4.2.2)(A) to “actual indicated engine torque” and “nominal engine friction – percent torque,” which would both be a percentage of the maximum engine torque value.
30. Section 1971.1(h)(4.2.3)(G): As part of the 45-day notice, staff proposed to require manufacturers to report the “odometer reading” as part of the data stream parameters. The purpose for the amendment was to provide assistance to future inspection and maintenance programs and other in-use fleet evaluations. Engine manufacturers have indicated that the odometer reading is the responsibility of the vehicle manufacturer, and that the engine control unit typically provides a vehicle distance value for the engine that is installed. The two values will generally be highly correlated to each other until the vehicle has been repowered with another engine. In order to distinguish between the vehicle distance readings, staff is proposing to change the terminology and instead propose that the OBD system report the “chassis odometer reading,” which all vehicles should have, and to report the “engine odometer reading” parameter if the engine is so equipped.
31. Section 1971.1(h)(4.10.1): As part of the 45-day notice, staff proposed to add language indicating that the “emission-related diagnostic information” is required to include “at least” the information described in section 1971.1(h)(4.10.1). The phrase “at least” was intended to clarify what information are required to be

included. However, manufacturers have mistakenly interpreted the language to mean that they would be required to include more information than those listed under section 1971.1(h)(4.10.1). Therefore, staff is proposing to delete the phrase “at least” to avoid further confusion.

32. Section 1971.1(h)(5.3.7): As part of the 45-day notice, staff proposed language that indicated that the NOx emission tracking data (section 1971.1(h)(5.3)) would reflect vehicle operation that may not correspond to regulated test procedures, so the data cannot be used to determine compliance with other requirements such as the applicable NOx standards. Further, the proposed language states that compliance with the applicable NOx standards will be determined “in accordance with the applicable standards and test procedures applicable to the test cycle.” The language was added to address manufacturers’ concerns about CARB using only the data to determine emission standard compliance or seek enforcement action. However, some tests that are used to determine compliance with emission standards such as the Not-To-Exceed standards do not use “test cycles” (e.g., portable emission measurement system testing is conducted on-road). Therefore, staff is proposing to change the phrase “applicable standards and test procedures applicable to the test cycle” to “applicable standards and corresponding test procedures.”
33. Section 1971.1(h)(5.4): As part of the 45-day notice, staff proposed that manufacturers track and report parameters that would help characterize a vehicle’s greenhouse gas (GHG) emissions in the real world. Staff is proposing several changes to these parameters. For the parameters in sections 1971.1(h)(5.4.6) and (h)(5.4.13) through (h)(5.4.21), staff is adding the phrase “if so equipped” to clarify that each of the technology parameters identified in these sections is only required to be tracked and reported if the engine is equipped with the identified technology. Staff is also proposing to delete the parameter “WHR output energy” (previously section 1971.1(h)(5.4.8)) since inclusion of this parameter would have conflicted with an overarching principle of the GHG tracking requirements, which was to only identify parameters that can be met using existing data, signals, and messages. To that end, “WHR output energy” is being deleted since it is not a parameter that is currently determined on board and cannot be calculated using other existing parameters. Additionally, staff is proposing to include kilometer-per-hour values to accompany the miles-per-hour values already proposed in sections 1971.1(h)(5.4.10) and (h)(5.4.11) to provide units of measurement consistent with existing data protocols. Finally, while staff originally proposed to define “urban speed” as vehicle speed between 1 mile per hour and 40 miles per hour as part of the 45-day notice, industry had requested that “urban speed” be aligned with the “city speed” vehicle speeds (specifically 1.6 kilometers per hour to 60 kilometers per hour) that are already defined in the respective SAE standards for light- and medium-duty vehicles meeting the OBD II GHG tracking requirements of section 1968.2. Staff agrees and is therefore proposing modifications to section 1971.1(h)(5.4.11) to change “40 miles per hour” to “37 miles per hour.”

34. Sections 1971.1(h)(5.7.5) and (h)(5.7.6): Staff is proposing to add language requiring the OBD system to pause tracking of the GHG parameters when certain conditions are met. In establishing these pausing conditions, staff's goal was to create a single list of conditions that would apply to all of the REAL GHG and NOx parameters under sections 1971.1(h)(5.3) through (h)(5.6). This would ensure that the pause conditions were applied consistently when either GHG or NOx parameter values were compromised due to component or sensor malfunctions. Therefore, these proposed conditions are identical to the pausing conditions identified in sections 1971.1(h)(5.3.6)(B) and (C) for the NOx emission tracking parameters.
35. Section 1971.1(h)(7): As part of the 45-day notice, staff proposed GHG tracking requirements in the HD OBD regulation (sections 1971.1(h)(5.4) through (5.7)) that differ from the GHG tracking requirements in the OBD II regulation (sections 1968.2(g)(6.3), (6.4), (6.5), (6.6.2), and (6.8)). Engine manufacturers have requested relief for engines that are used in both medium-duty and heavy-duty vehicles. Given that the OBD II GHG tracking requirements are required to be phased-in starting with the 2019 model year, with 100 percent of vehicles required to meet the requirements by the 2021 model year, manufacturers of these engines would have already developed and implemented OBD II GHG tracking on the medium-duty vehicles by the time the HD OBD GHG tracking is required in the 2022 model year. Therefore, instead of developing and implementing two unique software sets for the same engine to meet the GHG tracking requirements of both the OBD II and HD OBD regulations, manufacturers want to implement only the OBD II GHG tracking requirements for use in both medium-duty and heavy-duty vehicles for these engines. Staff agrees that there should be some relief to alleviate the burden of developing two different software sets for the same engine. However, since an "active off-cycle credit technology" is defined in the OBD II regulation (section 1968.2(c)) as a technology "that generates off-cycle credits," staff is concerned that an engine in a heavy-duty vehicle that meets the OBD II GHG tracking requirements would not track the activity of the "active off-cycle credit technologies" because no off-cycle credits are being generated for the heavy-duty product. Therefore, staff is proposing to allow manufacturers to request Executive Officer approval to implement the OBD II GHG tracking requirements in sections 1968.2 (g)(6.3), (6.4), (6.5), (6.6.2), and (6.8) in lieu of the HD OBD GHG tracking requirements in sections 1971.1(h)(5.4) through (5.7) on their heavy-duty engines. The Executive Officer would approve the request upon determining that the engine is indeed used in both medium-duty and heavy-duty vehicles and that engine will meet the "active off-cycle credit technology" tracking requirements in sections 1968.2(g)(6.5) and (6.8) for technologies installed on the heavy-duty vehicle that are also installed on its medium-duty counterpart.
36. Sections 1971.1(i)(4.1), (i)(4.2.1), and (j)(2.4): As part of the 45-day notice, staff proposed language clarifying the testing sequence when conducting HD OBD

demonstration testing as required under section 1971.1(i)(3). The proposed language included requirements specifically for “malfunction preconditioning cycles”. The “malfunction preconditioning cycles” phrase was not used consistently throughout the proposed 45-day language, with both “malfunction preconditioning cycle” and “preconditioning cycle” used to mean the same cycle. To avoid confusion, staff is proposing to change mentions of “preconditioning cycle” to “malfunction preconditioning cycle” in these sections for consistency. Additionally, staff is proposing language in sections 1971.1(i)(4.1.2) and (4.1.3) to clarify when manufacturers are allowed to use these cycles. Specifically, some manufacturers have been incorrectly using the malfunction preconditioning cycles solely for the purposes of adding time for monitors to be able to detect malfunctions during demonstration testing. The intent of these cycles, however, is to allow the emission control system to stabilize emissions after the malfunction has been implanted. While staff tried to explain this in the Staff Report, staff believes clarifying language is needed in the regulation to make this clear.

37. Section 1971.1(i)(4.3.2)(C): As part of the 45-day notice, staff proposed that manufacturers be required to collect carbon dioxide (CO<sub>2</sub>) emission data during durability demonstration engine testing. The data are intended to assist CARB staff in determining and proposing appropriate emission malfunction thresholds based on CO<sub>2</sub> in future rulemaking actions. Manufacturers have requested that they be allowed to report the raw CO<sub>2</sub> emission values instead of the corrected values (e.g., fuel-corrected), since collecting corrected values would require lots of fuel samplings (which may involve manufacturers sending fuel samples to outside labs for analysis) several times during testing. Staff understands manufacturers’ concerns about the additional workload, costs, and impacts on timing this may cause. Therefore, staff is proposing language to allow manufacturers to request Executive Officer approval to submit the raw measured CO<sub>2</sub> values instead of the fuel-corrected CO<sub>2</sub> values provided the data are sufficient for CARB to assess the CO<sub>2</sub> impacts of each malfunction tested.
38. Sections 1971.1(i)(5.1.2) and (i)(5.1.3)(A): As part of the 45-day notice, staff proposed language in section 1971.1(i)(5.1.2) adding reference to the five percent misfire malfunction criterion in section (e)(2.2.2) to correct an error, since the current language only referenced the “one percent” misfire malfunction criterion in section (f)(2.2.2)(A). Staff is proposing to add the word “respectively” to make clear that the “five percent” malfunction criterion is referenced in section (e)(2.2.2) while the “one percent” malfunction criterion is referenced in section (f)(2.2.2)(A).

Also as part of the 45-day notice, staff proposed that for any demonstration test in which a default fuel or emission control strategy is used when a malfunction is detected and the MIL illuminates prior to emissions exceeding the applicable emission threshold malfunction criteria, manufacturers would be required to test and collect emission data with a worst acceptable limit component or system

(section 1971.1(i)(5.1.2)(A)). The purpose was to address default fuel or emission control strategies that improve the emission control system (which may result in emission levels below the OBD emission threshold) and to ensure that emissions do not exceed the OBD emission threshold when the component/system is performing better than a best performing unacceptable part, when such a default strategy is not triggered and the MIL is not illuminated. Manufacturers have requested that they be allowed to use alternate methods to demonstrate that emissions do not exceed the thresholds at the worst acceptable limit level, including using a best performing unacceptable component/system and modifying the onboard computer to prevent the default fuel or emission control strategy from activating. CARB staff agrees and is proposing to include this allowance, which would require manufacturers that want to use computer modifications to provide data to CARB demonstrating that (1) emissions do not exceed the applicable malfunction criteria with the system or component adjusted to the best performing unacceptable level of performance, and (2) the computer modifications used to disable the default fuel or emission control strategy produce emissions results equivalent to the production-level calibration. Staff is also proposing to include this allowance in section 1971.1(i)(5.1.3)(A) for default strategies that cause emissions to increase.

39. Section 1971.1(j)(2.31): As part of the 45-day notice, staff proposed that for monitors that are designed to run during the SET cycle, manufacturers would be required to include information required under section 1971.1(d)(3.1.3), "including the supporting in-use monitor performance ratio data." However, this language improperly implies that the data would always be required for such monitors prior to certification of the OBD system, which may be an issue for new engines. Further, the newly proposed language in section 1971.1(d)(3.1.3)(A), described above, would allow manufacturers to submit such data "after" certification. Additionally, the language "information required under section (d)(3.1.3)" would already allow CARB staff to ask for the data if the manufacturer has them for the engine of concern. Therefore, staff is proposing to delete the phrase "including the supporting in-use monitor performance ratio data."
40. Section 1971.1(k)(3.2): As part of the 45-day notice, staff proposed increases to the fines associated with certifying OBD systems with deficiencies. These included increasing the current \$50 and \$25 fine amounts for major and "non-major" deficiencies, respectively, and the maximum \$500 fine amount per engine. Manufacturers have argued that the proposed increased fines were unreasonably high and would result in high costs for manufacturers certifying their OBD systems with deficiencies. CARB staff expresses that such fines would only be imposed if the manufacturer does not comply with the requirements of the OBD regulation and that the increase in fines is necessary since manufacturers have been misusing the deficiency provisions and have been requesting deficiencies instead of putting in the effort to design compliant systems. Nevertheless, CARB staff agrees to relax some of the fine amounts and allow for more free deficiencies. First, staff is proposing that the maximum

total fines per engine be \$600 for 2024 model year engines, \$800 for 2025 model year engines, \$1000 for 2026 model year engines, and \$1250 for 2027 and subsequent model year engines. Second, staff is proposing the following fines for deficiencies related to emission threshold (ET) monitors:

Deficiency Type	Threshold Exceedance (% of malfunction criteria)	Applicable Model Year (MY) for Deficiency			
		1 <sup>st</sup> MY	2 <sup>nd</sup> MY (1 MY carryover)	3 <sup>rd</sup> MY (2 MY carrover)	4 <sup>th</sup> MY (3 MY carryover)
<b>ET1</b>	100 - 120	Free for 2 ET1, \$100 for all other ET1	Free for 1 ET1, \$100 for all other ET1	\$150	\$200
<b>ET2</b>	121-150	\$200	\$200	\$250	\$300
<b>ET3</b>	151-200	\$300	\$300	\$350	\$400

41. Section 1971.1(k)(9): As part of the 45-day notice, staff proposed to allow two of the deficiencies related to the newly proposed tracking requirements in sections 1971.1(h)(5.3) and (h)(5.4) to be “free” deficiencies (i.e., not subject to fines) for the 2022 and 2023 model years. Staff, however, intended for this section to apply to the tracking requirements in sections 1971.1(h)(5.3) through (h)(5.7), not just sections 1971.1(h)(5.3) and (h)(5.4). Therefore, staff is proposing amendments to correct this.
42. Section 1971.1(l)(3.4): This section currently requires manufacturers to report the “odometer reading” with the in-use performance tracking data collected under section 1971.1(l)(3). Staff is proposing to change the phrase “odometer reading” to “chassis odometer reading” to harmonize with the same proposed change in section 1971.1(h)(4.2.3)(G).
43. Section 1971.1(m)(1.1.7): As part of the 45-day notice, staff proposed that manufacturers include “copies of all service manuals, technical service bulletins and instructions regarding the use, repair, adjustment, maintenance, or testing of such vehicles relevant to the emission control system, OBD system, as applicable,” in written or electronic form, in their running change/field fix documents. Manufacturers have argued that including such information in every running change/field fix document is cumbersome, especially service manuals, and that running changes/field fixes normally do not result in changes to most of these documents. While CARB staff believes it is important that manufacturers properly report all relevant documents to CARB, with regards to service manuals, CARB only intended that manufacturers submit the portions of the manuals that included any changes that were made as a result of the running change/field fix. Therefore, staff is proposing amendments that would make clear that the running change/field fix documents would only need to include portions of the service

manual that were changed due to the running change/field fix and that the changes would need to be highlighted.

#### Additional Modifications to OBD II Regulation (section 1968.2)

44. Section 1968.2(d)(10): Staff is proposing to renumber section 1968.2(d)(9) to (d)(10), since staff is proposing new language in section 1968.2(d)(9), described above in the description for sections 1971.1(d)(7.3.2) and 1968.2(d)(9).
45. Sections 1968.2(f)(5.2.2)(E), 1968.2(i)(2.30), 1968.2(i)(2.32), 1968.2(g)(4.2.2)(B)(iv), and 1968.2(g)(4.2.3)(I): As part of the 45-day notice, staff proposed that new NOx emission tracking requirements under section 1968.2(g)(6.12) apply to all medium-duty diesel vehicles instead of just medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard. As explained in the Staff Report, the application of the new requirement to all medium-duty diesel vehicles is due to the importance of understanding these real-world, in-use emissions across the diesel fleet. However, staff had also proposed, as part of the 45-day notice, new requirements for NOx sensor activity monitoring, NOx-related certification documentation, and related data stream parameters (e.g., “NOx mass emission rate-engine out,” “NOx mass emission rate – tailpipe”) that applied to medium-duty vehicles certified to an engine dynamometer tailpipe emission standard. These other requirements were proposed specifically to accompany the NOx emission tracking requirements – manufacturers cannot implement the NOx emission tracking requirements without these other requirements. For example, the data stream parameters “engine rated power,” “NOx mass emission rate-engine out,” and “NOx mass emission rate – tailpipe” are directly referenced as necessary data under section 1968.2(g)(6.12). As another example, section 1968.2(g)(6.12.4) specifically states that compliance with the NOx mass accuracy requirement would be determined under the certification documentation requirement in section 1968.2(i)(2.32). Therefore, staff is proposing to change applicability of these requirements from medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard to all medium-duty diesel vehicles (i.e., medium-duty vehicles equipped with diesel engines).
46. Section 1968.2(f)(15.2.2)(D): As part of the 45-day notice, staff proposed language in section 1971.1(g)(3.2.2)(D) allowing manufacturers of heavy-duty diesel engines to be exempt from monitoring the wait-to-start lamp if: (1) the lamp is located on the instrument cluster on a liquid crystal display (LCD) screen and a fault causes the lamp, vehicle speed, engine speed, and fuel level displays to black out, or (2) the engine is prohibited from cranking until a manufacturer-determined time necessary for optimum cold start performance and emission control has been met. Staff did not include this change in the OBD II regulation for medium-duty diesels; it is now proposing the same change to the OBD II regulation.

47. Section 1968.2(g)(4.1.3)(P): As part of the 45-day notice, staff proposed that manufacturers remove the PM filter frequent regeneration and active/intrusive injection monitors from the PM filter readiness status in the HD OBD regulation (section 1971.1(h)(4.1.3)(H)). As mentioned in the Staff Report, when proposing amendments to the HD OBD regulation, staff also proposed similar amendments to the OBD II regulation, where necessary, for medium-duty diesel engines and vehicles to harmonize the requirements of the two regulation. However, staff did not include these proposed changes in the OBD II regulation for medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard. Therefore, staff is proposing the same amendments to the OBD II regulation to apply to medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard starting in the 2024 model year.
48. Sections 1968.2(g)(4.2.3)(I) and (J): As part of the 45-day notice, staff proposed amendments in section 1971.1(h)(4.2) requiring heavy-duty diesel engines to report the “engine rated power” and “engine rated speed” parameters. As mentioned in the Staff Report, when proposing amendments to the HD OBD regulation, staff also proposed similar amendments to the OBD II regulation, where necessary, for medium-duty diesel engines and vehicles to harmonize the requirements of the two regulations. However, staff did not include these proposed parameters in the OBD II regulation for medium-duty diesel vehicles. Therefore, staff is now proposing the same parameters to the OBD II regulation.
49. Section 1968.2(g)(6.6.1)(D): As part of the 45-day notice, staff proposed amendments to section 1968.2(g)(6.6.1) to include the numerical value specifications for the newly proposed counters in section 1968.2(g)(6.12). Staff, however, incorrectly indicated the specifications in section 1968.2(g)(6.6.1)(D) (previously section 1968.2(g)(6.6.1)(C)) applied to the counters in section 1968.2(g)(6.12). Therefore, staff is proposing amendments to correct this error and indicate that the requirements of section 1968.2(g)(6.6.1)(D) apply to the counters in sections 1968.2(g)(6.1) and (6.2).
50. Section 1968.2(g)(6.12.6): As part of the 45-day notice, staff proposed language in the HD OBD regulation (section 1971.1(h)(5.3.6), now (h)(5.3.7)) that indicated that the NOx emission tracking data (section 1971.1(h)(5.3)) would reflect vehicle operation that may not correspond to regulated test procedures, so the data cannot be used to determine compliance with other requirements such as the applicable NOx standards. The language was added to address manufacturers’ concerns about CARB using only the data to determine emission standard compliance or seek enforcement action. CARB staff, however, inadvertently did not propose similar language to the OBD II regulation. Therefore, staff is proposing to add this language to newly proposed section 1968.2(g)(6.12.6).

#### Modifications to HD OBD Enforcement Regulation (section 1971.5)



51. Sections 1971.5(b)(6)(A)(iii) through (v): As part of the 45-day notice, staff proposed changes to the nonconformance criteria for deficient emission threshold monitors to correct an oversight, since the nonconformance criteria in the current regulation may overlap with the emission levels at which the monitor detected a fault and for which CARB granted a deficiency. The proposal deemed an emission threshold monitor to be nonconforming if the emission levels for the test sample group exceeded “20 percent of the emission standard above the emission level at which a malfunction was detected when the OBD system was approved by the Executive Officer.” Manufacturers have argued that while the 20-percent criterion may be appropriate for NMHC, CO, and NO<sub>x</sub> emissions, it is not appropriate for PM emissions, since 20 percent of the PM emission standard would only be 0.0020 g/bhp-hr if the PM standard is 0.01 g/bhp-hr. Manufacturers have suggested that 20 percent of the OBD threshold be used instead for PM (which would be 0.0060 g/bhp-hr if the PM OBD threshold is 0.03 g/bhp-hr). Staff agrees and is proposing to increase the PM nonconformance criteria to “20 percent of the PM malfunction criterion above the emission level at which a malfunction was detected when the OBD system was approved by the Executive Officer.” Further, staff is proposing minor changes to the proposed language that indicated that the engines would be considered nonconforming if the deficient emission threshold monitor did not illuminate the MIL and emissions exceeded “either of the following thresholds, whichever is smaller.” Specifically, staff is proposing to change the phrase “either of the following thresholds, whichever is smaller” to “any of the applicable following thresholds” for simplicity and to make clear that a specific threshold would not apply if the monitor does not have a malfunction criterion for the emission constituent of that specific threshold (e.g., the CO and PM thresholds would not apply for the NO<sub>x</sub> catalyst conversion efficiency monitor since the monitor only has NMHC and NO<sub>x</sub> malfunction criteria).
52. Section 1971.5(b)(6)(B): As part of the 45-day notice, staff proposed nonconformance criteria for engines with monitors certified to the newly proposed in-use monitor performance ratio of 0.300 in the HD OBD regulation (section 1971.1(d)(3.2.2)). To harmonize with the proposed delay for the implementation of the 0.300 ratio in section 1971.1, staff is proposing to delay the implementation of the nonconformance criteria for section 1971.5(b)(6)(B)(iii) from the 2022-2025 model years to the 2024-2027 model years and the nonconformance criteria for section 1971.5(b)(6)(B)(iv) from the 2026 and subsequent model years to the 2028 and subsequent model years.
53. Section 1971.5(c)(1): Manufacturers that consider themselves small volume manufacturers (i.e., certify very few engine families and/or sell low numbers of engines for a given model year) have indicated issues with procuring engines for manufacturer self-testing. Specifically, manufacturers have been having difficulty finding appropriate test engines since very few engines have been sold and/or vehicle owners have been unwilling to sell back their vehicles to the manufacturers. Therefore, these manufacturers have requested additional relief

from testing. CARB staff understands their concerns and is therefore proposing additional language to provide some relief. Specifically, manufacturers may be exempt from manufacturer self-testing a specific model year engine if (1) all engines in that model year are direct carry-overs of engines that were tested in previous model years, (2) all monitors were already tested on those previous model year engines, (3) the manufacturer tested an engine one model year before, and (4) the manufacturer did not reduce the number of additional engines to test during testing of the previous model year engines in accordance with section 1971.5(c)(4)(E)(iii) (description of this new proposed section is provided below).

54. Section 1971.5(c)(2)(C)(iii)a.: As part of the 45-day notice, staff proposed language allowing manufacturers to procure, with Executive Officer approval, an engine with mileage less than the required 70 percent of the certified full useful life mileage for manufacturer self-testing. The proposed language requires manufacturers to show the engine will produce equivalent results to an engine with mileage between 70 to 100 percent of the certified full useful life mileage, which may involve the manufacturer “operating the engine to accumulate more mileage” or providing data “showing operating hours-to-mileage equivalency.” Manufacturers have questioned whether this language allows them to age the engine on the dynamometer using accepted practices for aging an engine for certification demonstration testing. However, CARB did not intend the language to allow such dynamometer aging. Therefore, staff is proposing language that would clearly state that the manufacturer’s plan may involve operating the “vehicle,” not “engine,” to accumulate more mileage, and that the manufacturer would not be allowed to operate the engine on a dynamometer to accumulate operating hours for the purposes of showing operating hours-to-mileage equivalency.

55. Section 1971.5(c)(2)(C)(iii)c.: As mentioned above in section 1971.5(c)(1), manufacturers that certify very few engine families and/or sell low numbers of engines have indicated issues with procuring engines for manufacturer self-testing. Therefore, these manufacturers have requested additional relief regarding test engine procurement. CARB staff understands their concerns and is therefore proposing additional language to provide some relief. Specifically, such manufacturers would be allowed to request Executive Officer approval to procure an engine that meets alternate criteria to those required under section 1971.5(c)(2)(C)(i). The manufacturer would be required to submit the following information with their request: details of the method(s) used by the manufacturer when trying to procure the engine (including the number of vehicle owners contacted and the procurement incentives, if any), the total California and federal (if applicable) sales volumes of the engine family and specific rating selected for testing, the total California and federal (if applicable) sales volumes for different model year engines that are direct carryovers of this engine family and rating, and the proposed alternate criteria the manufacturer wants to use. The Executive Officer would approve the request if the manufacturer has shown it has

taken all reasonable steps to try to procure an engine meeting the required criteria under section 1971.5(c)(2)(C)(i) and that testing of an engine meeting the alternate criteria will provide the same results as testing of an engine meeting the criteria under section 1971.5(c)(2)(C)(i).

56. Section 1971.5(c)(4)(A)(i): As part of the 45-day notice, staff proposed changes to the manufacturer self-testing criteria for triggering additional testing to address deficient emission threshold monitors. Similar to the changes proposed and rationale described above for sections 1971.5(b)(6)(A)(iii) through (v), staff is proposing to increase the criteria for triggering additional testing from 20 percent of the PM emission standard to “20 percent of the PM malfunction criterion” above the emission level at which a malfunction was detected when the OBD system was approved by the Executive Officer. Further, staff is proposing minor changes to the proposed 45-day language that indicated that additional testing is not required if a deficient emission threshold monitor illuminated the MIL and emissions did not exceed “either of the following thresholds, whichever is smaller.” Specifically, staff is proposing to change the phrase “either of the following thresholds, whichever is smaller” to “all of the applicable following thresholds” for simplicity and to make clear that a specific threshold would not apply if the monitor does not have a malfunction criterion for the emission constituent of that specific threshold (e.g., the CO and PM thresholds would not apply for the NO<sub>x</sub> catalyst conversion efficiency monitor since the monitor only has NMHC and NO<sub>x</sub> malfunction criteria).

57. Sections 1971.5(c)(4)(B) and (c)(4)(D): Staff is proposing minor changes indicating that additional testing is required if during testing of the original engine, a monitor did not illuminate the MIL before emissions exceeded “any of” the applicable emission levels specified in section 1971.5(c)(4)(A)(i) and (ii). Staff is proposing the addition of “any of” for clarity, since manufacturers may mistakenly believe that the lack of “any of” means that emissions would have to exceed “all” the applicable emission levels to trigger additional testing, whereas the requirement is that emissions would have to exceed “any” of the described emission levels to trigger additional testing.

Additionally, staff is proposing additional language to address manufacturers’ concerns about the required deadline for additional testing. Specifically, as described above, manufacturers have had difficulties procuring engines for testing, and thus may spend a long time trying to procure the engines. Therefore, manufacturers have requested the ability to extend the required 6-month deadline to perform additional testing. CARB understands the manufacturers’ concerns and therefore is proposing language in sections 1971.5(c)(4)(B)(i) and (c)(4)(D)(i) allowing manufacturers to request an extension for additional testing if the manufacturer has shown good cause for the delay.

58. Section 1971.5(c)(4)(C): Staff is proposing minor changes indicating that additional testing is not required if during testing of the original engine, a monitor

illuminates the MIL before emissions exceeded “all” the applicable emission levels specified in section 1971.5(c)(4)(A)(i) or (ii). Staff proposed the addition of “all of” to make clear that emissions would need to be below all the applicable emissions levels for manufacturers to be exempt from additional testing.

59. Section 1971.5(c)(4)(E)(i): As part of the 45-day notice, staff proposed language allowing manufacturers to procure a “direct carry-over” engine in lieu of the identical model year of the initial engine for manufacturer self-testing additional testing. The Executive Officer would approve the use of such engine if the manufacturer provides information showing that the engine “has OBD system calibrations and emission-related hardware that are substantially similar to the engine of concern such that testing of the “direct carry-over” engine under section (c)(4) will provide the same results as testing of the engine of concern.” Staff is proposing to modify “emission-related hardware” to “emission-related software and hardware” to account for the fact that manufacturers may change the emission-related software such that the engine behaves differently than the previous model year engine, even if the hardware is the same.
60. Section 1971.5(c)(4)(E)(iii): As described above, manufacturers that certify very few engine families and/or sell low numbers of engines have been having difficulty procuring engines for manufacturer self-testing. Therefore, these manufacturers have requested to be allowed to reduce the number of additional engines to test from the required four additional engines under section 1971.5(c)(4)(B)(i) and the required five additional engines under 1971.5(c)(4)(D)(i). CARB staff understand manufacturers’ concerns and is therefore proposing additional language to allow manufacturers to request a reduction in additional engines to test. The manufacturer would be required to submit the following information with their request: details of the method(s) used by the manufacturer when trying to procure the engine (including the number of vehicle owners contacted and the procurement incentives, if any), the total California and federal (if applicable) sales volumes of the engine family and specific rating selected for testing, the total California and federal (if applicable) sales volumes for different model year engines that are direct carryovers of this engine family and rating, and the proposed number of additional engines the manufacturer wants to test. The Executive Officer would approve the request if the manufacturer has shown it has taken all reasonable steps to try to procure the required number of engines, and if the proposed number of test engines provides for a sufficient finding of conformance/nonconformance by the Executive Officer based on the degree of compliance/noncompliance on the tested engines (e.g., how much the emissions exceeded the required malfunction criteria for noncompliant monitors, the number of test engines that passed or failed the tests). For example, if the manufacturer has requested to test an additional two engines, and one of the engines passed the test (i.e., illuminates the MIL with emissions below the required malfunction criteria) while the other engine failed the test (i.e., does not illuminate the MIL when emissions are above the required malfunction criteria), and both tests had emissions very close to the

required malfunction criteria, the Executive Officer may require the manufacturer to test one more engine in order to make a better determination of conformance/nonconformance.

61. Section 1971.5(d)(3)(A)(i): As part of the 45-day notice, staff proposed changes to the mandatory recall criteria to account for monitors subject to the nonconformance criteria of sections 1971.5(b)(6)(B)(iii) and (iv) (i.e., monitors certified to an IUMPR of 0.300). In the Staff Report, staff indicated that for monitors covered under section 1971.5(b)(6)(B)(iii), staff is proposing that the mandatory recall would be applied if the average IUMPR or the IUMPR for at least 66 percent of the vehicles in the test sample group is less than or equal to 0.066, which is 33.0 percent of 0.200. This was intended to provide manufacturers some leeway in terms of mandatory recall for the first few years of the proposed 0.300 IUMPR requirement in order to allow manufacturers to gain more experience with their monitors and the new IUMPR in the field. However, in the proposed 45-day regulation language attached to the Staff Report, staff inadvertently amended the regulation language to indicate that for these monitors, mandatory recall would be applied if the average IUMPR or the IUMPR for at least 66 percent of the vehicles in the test sample group is less than or equal to 33.0 percent of the minimum acceptable ratio, which in this case would be 0.099 (33.0 percent of 0.300). Therefore, staff is proposing corrections to the regulation language to reflect the intention stated in the Staff Report, and is proposing that mandatory recall would apply if the IUMPR for these monitors is less than or equal to 0.066.

Further, in the Staff Report, staff indicated that it was “proposing to divide the section into sections 1971.5(b)(6)(B)(i)a. and b.,” and that this division is needed for better readability. First, staff incorrectly listed the sections as “1971.5(b)(6)(B)(i)a. and b”. instead of “1971.5(d)(3)(A)(i)a. and b.” in the Staff Report. Second, the proposed 45-day regulation language attached to the Staff Report did not include this division of section 1971.5(d)(3)(A)(i). Therefore, staff is proposing to divide this section into sections 1971.5(d)(3)(A)(i)a. and b.

62. Section 1971.5(d)(4)(B)(xiv): As part of the 45-day notice, staff proposed new language in sections 1971.1(h)(4.2) and (h)(5.3) requiring manufacturers to report NOx mass values, and proposed minimum accuracy requirements for these values in section 1971.1(h)(5.3.4). As mentioned in the Staff Report and above, the implementation of REAL is an important and necessary step in addressing issues with high-emitting in-use vehicles and ensuring the emissions reductions projected from the standards programs are realized in the real world. The data associated with REAL would also provide valuable information to help assist CARB staff in improving and developing OBD and other CARB programs. The NOx mass values calculated by the system need to be as accurate as possible to ensure useful data. Therefore, staff is proposing to include language indicating that calibration errors or other calibration features that adversely

impact the accuracy of the calculated NOx mass values may be subject to other ordered remedial action depending on the degree of the inaccuracies.

#### Modifications to the Staff Report: Initial Statement of Reasons

63. Chapter VI, Section E: Impact Analysis on Businesses, Vehicle Operators, and Employment: Staff has prepared this addendum to supplement the information provided in the Economic Impacts Assessment. This addendum is intended to provide additional clarity and does not alter the requirements, rights, responsibilities, conditions, or prescriptions contained in staff's proposal. Furthermore, this addendum refers to the language as originally released for comment on September 25, 2018, and does not cover any modifications being proposed as part of this 15-day change package. The updated language helps explain how additional California businesses could be affected as a result of this regulation pursuant to Gov. Code section 11346.3(b)(1)(C). This updated language also adds three documents to the rulemaking record listed below in "Additional Documents Added to the Record."

#### Other Minor Modifications to HD OBD and OBD II Regulations (sections 1971.1, 1971.5, and 1968.2) and Staff Report

64. In addition to the modifications described above, additional modifications correcting grammar, punctuation and spelling have been made throughout the proposed changes. These changes are nonsubstantive.

#### Additional Documents Added to the Record

In the interest of completeness, staff has also added to the rulemaking record and invites comments on the following:

- "California's New Car Dealers Are Driving the California Economy," California New Car Dealers Association, accessed on August 24, 2018
- "ATD Data 2018: Annual Financial Profile of America's Franchised New-Truck Dealerships," American Truck Dealers, 2018
- Bureau of Automotive Repair History and Overview, Bureau of Automotive Repair, accessed on May 14, 2019

#### Additional Documents Incorporated in the Regulation by Reference

ISO 15765-4 "Road Vehicles-Diagnostic communication over Controller Area Network (DoCAN) - Part 4: Requirements for emission-related systems," April 2016, Section 1971.1(h)(1)

SAE J1979-DA "Digital Annex of E/E Diagnostic Test Modes," May 2019, Sections 1971.1(h)(1) and 1968.2(g)(1)

SAE J1939-DA "Digital Annex of Serial Control and Communication Heavy Duty Vehicle

Network Data,” April 2019, sections 1971.1(h)(1) and 1968.2(g)(1)

SAE J3162 “Heavy Duty OBD IUMPR Data Collection Tool Process,” September 2018, Section 1971.1(h)(1)

As is common practice with technical standards, industry periodically updates the standards to add specification or clarity and the references in the regulation have been updated to refer to the newer versions.

These documents are available for inspection by contacting Chris Hopkins, Regulations Coordinator, at (916) 445-9564.

### **Agency Contacts**

Inquiries concerning the substance of the proposed regulation may be directed to Thomas Montes, Manager, Diesel On-Board Diagnostics Section, at (626) 575-6777 or (designated back-up contact) Adriane Chiu, Air Resources Engineer, On-Board Diagnostics Program Development Section, at (626) 350-6453.

### **Public Comments**

Written comments will only be accepted on the modifications identified in this Notice. Comments may be submitted by postal mail or by electronic submittal no later than the due date to the following:

Postal mail: Clerk of the Board, California Air Resources Board  
1001 I Street, Sacramento, California 95814

Electronic submittal: <http://www.arb.ca.gov/lispub/comm/bclist.php>

Please note that under the California Public Records Act (Gov. Code § 6250 et seq.), your written and verbal comments, attachments, and associated contact information (e.g., your address, phone, email, etc.) become part of the public record and can be released to the public upon request.

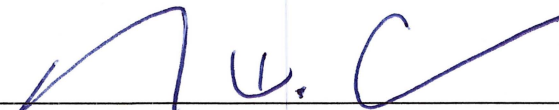
In order to be considered by the Executive Officer, comments must be directed to CARB in one of the two forms described above and received by CARB by the deadline date for public comment listed at the beginning of this notice. Only comments relating to the above-described modifications to the text of the regulations shall be considered by the Executive Officer.

If you need this document in an alternate format or another language, please contact the Clerk of the Board at (916) 322-5594 or by facsimile at (916) 322-3928 no later than five (5) business days from the release date of this notice. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

Si necesita este documento en un formato alternativo u otro idioma, por favor llame a la

oficina del Secretario del Consejo de Recursos Atmosféricos al (916) 322-5594 o envíe un fax al (916) 322-3928 no menos de cinco (5) días laborales a partir de la fecha del lanzamiento de este aviso. Para el Servicio Telefónico de California para Personas con Problemas Auditivos, ó de teléfonos TDD pueden marcar al 711.

CALIFORNIA AIR RESOURCES BOARD



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Richard W. Corey  
Executive Officer

Date: June 4, 2019

Attachments

*The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see CARB's website at [www.ARB.ca.gov](http://www.ARB.ca.gov).*