## Attachment A

## PROPOSED 15-DAY MODIFIED REGULATION ORDER

Amend section 1971.1, title 13, California Code of Regulations, to read as follows:

**Note**: The amendments proposed with the 45-day notice are shown in single underline to indicate additions and ~~single strikeout~~ to indicate deletions from the existing regulatory text, while amendments proposed with this 15-day notice are shown in double underline to indicate additions and ~~double strikeout~~ to indicate deletions from the existing regulatory text. Various portions of the regulations that are not modified by the proposed amendments are omitted from the text shown and indicated by " * * * * ".

### §1971.1. On-Board Diagnostic System Requirements--2010 and Subsequent Model-Year Heavy-Duty Engines

(c) *Definitions*.

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"Alternate phase-in", as allowed in section (g)(5.8), is a phase-in schedule that achieves equivalent compliance volume by the end of the last year of a scheduled phase-in provided in this regulation. The compliance volume is the number calculated by multiplying the percent of engines (based on the manufacturer's projected sales volume of all engines unless specifically stated otherwise in section (e), (f), or (g)) meeting the new requirements per year by the number of years implemented prior to and including the last year of the scheduled phase-in and then summing these yearly results to determine a cumulative total (e.g., a three year, 20/50/100 percent scheduled phase-in would be calculated as (20*3 years) + (50*2 years) + (100*1 year) = 260; a two-year 20/50 percent scheduled phase-in would be calculated as (20*2 years) + (50*1 year) = 90). Manufacturers are allowed to include engines introduced before the first year of the scheduled phase-in (e.g., in the previous example, 10 percent introduced one year before the scheduled phase-in begins would be calculated as (10*4 years) and added to the cumulative total). However, manufacturers are only allowed to include engines introduced up to one model year before the first year of the scheduled phase-in. The Executive Officer shall consider acceptable any alternate phase-in that results in an equal or larger cumulative total by the end of the last year of the scheduled phase-in and ensures that all engines subject to the phase-in will comply with the respective requirements no later than two model years following the last year of the scheduled phase-in.

For alternate phase-in schedules resulting in all engines complying one model year following the last year of the scheduled phase-in, the compliance volume shall be calculated as described directly above. For example, a 20/50/100 percent scheduled phase-in during the 2016-2018 model years would have a cumulative total of 260. If the manufacturer's planned alternate phase-in schedule is 40/50/80/100 percent during the 2016-2019 model years, the final

compliance volume calculation would be (40*3 years) + (50*2 years) + (80*1 year) = 300, which is greater than 260 and therefore would be acceptable as an alternate phase-in schedule.

For alternate phase-in schedules resulting in all engines complying two model years following the last year of the scheduled phase-in, the compliance volume calculation shall be calculated as described directly above and shall also include a negative calculation for engines not complying until one or two model years following the last year of the scheduled phase-in. The negative calculation shall be calculated by multiplying the percent of engines not meeting the new requirements in the final year of the phase-in by negative one and the percent of engines not meeting the new requirements in the one year after the final year of the phase-in by negative two. For example, if 10 percent of a manufacturer's engines did not comply by the final year of the scheduled phase-in and 5 percent did not comply by the end of the first year after the final year of the scheduled phase-in, the negative calculation result would be (10*(-1 years)) + (5*(-2 years)) = -20. The final compliance volume calculation is the sum of the original compliance volume calculation and the negative calculation. For example, a 20/50/100 percent scheduled phase-in during the 2016-2018 model years would have a cumulative total of 260. If a manufacturer's planned alternate phase-in schedule is 40/70/80/90/100 percent during the ~~2013~~2016-2020 model years, the final compliance volume calculation would be (40*3 years) + (70*2 years) + (80*1 year) + (20*(-1 year)) + (10*(-2 years)) = 300, which is greater than 260 and therefore would be acceptable as an alternate phase-in schedule.

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"Diagnostic or emission critical" electronic control unit refers to the engine control unit and any other on-board electronic powertrain control unit ~~containing software~~ that:

~~(1) determines the commanded value(s) for any of the following:~~

~~(a) Fuel injection quantity~~

~~(b) Fuel injection timing and/or valve timing~~

~~(c) NOx catalyst reductant (e.g., urea) injection quantity; or~~

~~(2) is used to control or determine the measured value of an exhaust gas sensor subject to monitoring in section (e)(9) or (f)(8) (e.g., NOx or PM sensor module); or~~

(~~3~~1) has primary control over any of the monitors required by sections (e)(1) through (f)(9), (g)(1) through (g)(2), and (g)(4), but does not include circuit or out-of-range fault monitors required by sections (e)(9.2.1)(A)(ii), (e)(9.2.1)(B)(ii), (e)(9.2.2)(B), (e)(9.2.4)(B), (f)(8.2.1)(B), (f)(8.2.2)(B), (f)(8.2.2)(D), (f)(8.2.3)(A), (f)(8.2.3)(B), and (g)(1.1.2); or

(~~2~~42) ~~excluding~~ except for anti-lock brake system (ABS) control units or stability/traction control units,:

(a) has primary control over ~~the~~ any rationality fault diagnostic~~s~~ or functional check for more than ~~two~~ four ~~of the~~ input components or more than two output components required to be monitored by section (g)(3)~~.~~; or

(b) for 2016 and subsequent model year engines, is field reprogrammable and has primary control over any rationality fault diagnostic or function check for any input or output component required to be monitored by section (g)(3).

For purposes of criteria (~~3~~1) and (~~4~~2) above, "primary control" over a monitor means the control unit does any of the following: (a) determines if any enable conditions are satisfied; (b) calculates all or part of the diagnostic decision ~~the value or~~ statistic or metric by which pass or fail decisions are made (e.g., the comparison of a component's measured or calculated level of performance to a fault threshold) ~~that represents the component/system's level of performance~~; or (c) makes or processes pass or fail decisions (e.g., debounces diagnostic decision statistics or commands MIL illumination or fault code storage). Further, f~~F~~or purposes of criteri~~a~~on (~~4~~2)(a) above, all glow plugs in an engine shall be considered "one" output component in lieu of each glow plug being considered a separate component. Additionally, for purposes of criterion (2)(b) above, "field reprogrammable" means a control unit that is capable of supporting a manufacturer service procedure intended to be executed in a dealership or other vehicle service environment that results in the downloading of new software and/or calibration data into the control unit.

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"Emission standard," as it applies to OBD compliance and the remedies provided for in the Health and Safety Code for noncompliance, relates to the emission characteristics of a motor vehicle and engine and means:

(1) a numerical limit on the amount of a given pollutant that a motor vehicle or motor vehicle engine may emit into the atmosphere; or

(2) a requirement that a motor vehicle or motor vehicle engine be equipped with a certain type of pollution-control device or some other design feature related to the control of emissions.

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(d) *General Requirements.*

Section (d) sets forth the general requirements of the OBD system. Specific performance requirements for components and systems that shall be monitored are set forth in sections (e) through (g) below. The OBD system is required to detect all malfunctions specified in sections (e) through (g). However, except as specified elsewhere, the OBD system is not required to use a unique monitor to detect each malfunction specified.

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(2) MIL and Fault Code Requirements.

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(2.2) MIL Illumination and Fault Code Storage Protocol.

(2.2.1) For vehicles using the ISO 15765-4 protocol for the standardized functions required in section (h):

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(D) Storage and erasure of freeze frame conditions.

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(ii) ~~The storage and erasure of~~ For 2010 through 2015 model year engines, the OBD system shall store and erase freeze frame conditions ~~shall be done~~ in conjunction with the storage and erasure of either pending or confirmed fault codes as required elsewhere in section (d)(2.2).

(iii) For 2016 and subsequent model year engines, except as provided for in section (d)(2.2.1)(D)(iv), the OBD system shall store freeze frame conditions in conjunction with the storage of a pending fault code.

a. If the pending fault code is erased in the next driving cycle in which monitoring occurs and a malfunction is not detected (as described in section (d)(2.2.1)(B)), the OBD system may erase the corresponding freeze frame conditions.

b. If the pending fault code matures to a confirmed fault code (as described in section (d)(2.2.1)(B)), the OBD system shall either retain the currently stored freeze frame conditions or replace the stored freeze frame conditions with freeze frame conditions regarding the confirmed fault code. The OBD system shall erase the freeze frame information in conjunction with the erasure of the confirmed fault code (as described under section (d)(2.3.1)(B)).

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(2.2.2) For vehicles using the SAE J1939 protocol for the standardized functions required in section (h):

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(D) Storage and erasure of freeze frame conditions.

(i) The OBD system shall store and erase "freeze frame" conditions (as defined in section (h)(4.3)) present at the time a malfunction is detected.

(ii) The OBD system shall store freeze frame conditions in conjunction with the storage of a pending fault code.

(iii) If the pending fault code is erased in the next driving cycle in which monitoring occurs and a malfunction is not detected (as described under section (d)(2.2.2)(B)), the OBD system may erase the corresponding freeze frame conditions.

(iv) If the pending fault code matures to a MIL-on fault code (as described under section (d)(2.2.2)(B)), the OBD system shall either retain the currently stored freeze frame conditions or replace the stored freeze frame conditions with freeze frame conditions regarding the MIL-on fault code. The OBD system shall erase the freeze frame information in conjunction with the erasure of the previously MIL-on fault code (as described under section (d)(2.3.2)(C)).

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(e) *Monitoring Requirements for Diesel/Compression-Ignition Engines.*

(1) Fuel System Monitoring

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(1.4) MIL Illumination and Fault Code Storage:

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(1.4.2) Additionally, for malfunctions identified in section (e)(1.2.1) (i.e., fuel pressure control) on all 2013 and subsequent model year ~~vehicles~~ engines:

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(D) Storage of freeze frame conditions.

(i) For 2013 through 2015 model year engines, a~~A~~ manufacturer shall store and erase freeze frame conditions either in conjunction with storing and erasing a pending fault code or in conjunction with storing and erasing a confirmed/MIL-on fault code. For 2016 and subsequent model year engines, a manufacturer shall store freeze frame conditions in conjunction with storing and erasing a pending fault code in accordance with section (d)(2.2.1)(D)(iii) or (d)(2.2.2)(D).

(ii) If freeze frame conditions are stored for a malfunction other than misfire (see section (e)(2)) or fuel system malfunction when a fault code is stored as specified in section (e)(1.4.2) above, the stored freeze frame information shall be replaced with freeze frame information regarding the fuel system malfunction.

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(2) Misfire Monitoring

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(2.2) Malfunction Criteria:

(2.2.1) The OBD system shall detect a misfire malfunction when one or more cylinders are continuously misfiring.

(2.2.2) Additionally, for 2013 ~~and subsequent~~through 2015 model year engines equipped with sensors that can detect combustion or combustion quality (e.g., for use in homogeneous charge compression ignition (HCCI) control systems) and for 20 percent of 2016 model year diesel engines, 50 percent of 2017 model year diesel engines, and 100 percent of 2018 model year diesel engines (percentage based on the manufacturer's projected California sales volume of all diesel engines subject to this regulation), the OBD system shall detect a misfire malfunction when the percentage of misfire is equal to or exceeds five percent ~~causing the engine's NMHC, CO, or NOx emissions to exceed 2.0 times the applicable standards or the engine's PM emissions to exceed the applicable standard plus 0.02 g/bhp-hr~~.

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(2.2.5) Upon request by the manufacturer and upon determining that the manufacturer has submitted data and/or engineering evaluation that support the request, the Executive Officer shall revise the percentage of misfire malfunction criteria in section (e)(2.2.2) upward to exclude detection of misfire that cannot cause the engine's NMHC, CO, and NOx emissions to exceed 2.0 times the applicable standards and the engine's PM emissions to exceed the applicable standard plus 0.02 g/bhp-hr.

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(2.3) Monitoring Conditions:

(2.3.1) Except as provided in section (e)(2.3.2), ~~T~~the OBD system shall monitor for misfires identified in section (e)(2.2.1) during engine idle conditions at least once per driving cycle in which the monitoring conditions for misfire are met. A manufacturer shall submit monitoring conditions to the Executive Officer for approval. The Executive Officer shall approve manufacturer-defined monitoring conditions that are determined (based on manufacturer-submitted data and/or other engineering documentation) to: (i) be technically necessary to ensure robust detection of malfunctions (e.g., avoid false passes and false detection of malfunctions), (ii) require no more than 1000 cumulative engine revolutions, and (iii) do not require any single continuous idle operation of more than 15 seconds to make a determination that a malfunction is present (e.g., a decision can be made with data gathered during several idle operations of 15 seconds or less); or satisfy the requirements of (d)(3.1) with alternative engine operating conditions.

(2.3.2) Manufacturers may request Executive Officer approval to use alternate monitoring conditions (e.g., off-idle) in lieu of the monitoring conditions specified in section (e)(2.3.1). The Executive Officer shall approve alternate monitoring conditions that are determined (based on manufacturer-submitted data and/or other engineering documentation) to ensure equivalent robust detection of malfunctions and equivalent timeliness in detection of malfunctions.

(2.3.3) ~~Additionally, f~~For misfires identified in section (e)(2.2.2) ~~2013 and subsequent model year engines equipped with sensors that can detect combustion or combustion quality~~:

(A) The OBD system shall continuously monitor for misfire under the following conditions:

(i) For 2013 through 2018 model year engines and 2019 and subsequent model year engines that are not included in the phase-in specified in section (e)(2.3.3)(A)(ii), ~~all~~ under positive torque conditions between 20 percent and 75 percent of peak torque with engine speeds ~~up to 75 percent of the maximum rated~~ engine speed ~~and engine load up to 75 percent maximum rated~~ and ~~load~~ conditions ~~except within the following range.: the engine operating region bound by the positive torque line (i.e., engine load with transmission in neutral) and the two following engine-operating points: engine speed of 50 percent of maximum-rated engine speed with the engine load at the positive torque line, and 75 percent of the maximum-rated engine speed with the engine load 5 percent above the positive torque line.~~

(ii) For 20 percent of 2019 model year diesel engines, 50 percent of 2020 model year diesel engines, and 100 percent of 2021 model year diesel engines (percentage based on the manufacturer's projected California sales volume of all diesel engines subject to this regulation), under all positive torque engine speed ~~and load~~ conditions except within the

following range: the engine operating region bound by the positive torque line (i.e., engine torque with transmission in neutral) and the two following points: engine speed of 50 percent of maximum ~~rated~~ engine speed with the engine torque at the positive torque line, and 100 percent of the maximum ~~rated~~ engine speed with the engine torque at 10 percent of peak torque above the positive torque line.

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(C) A manufacturer may request Executive Officer approval to disable misfire monitoring or employ an alternate malfunction criterion when misfire cannot be distinguished from other effects. Upon determining that the manufacturer has presented documentation that demonstrates the disablement interval or period of use of an alternate malfunction criterion is limited only to that necessary for avoiding false detection, the Executive Officer shall approve the disablement or use of the alternate malfunction criterion. Such disablements may include but are not limited to events involving:

(i) rough road,

(ii) fuel cut,

(iii) gear changes for manual transmission vehicles,

(iv) traction control or other vehicle stability control activation such as anti-lock braking or other engine torque modifications to enhance vehicle stability,

(v) off-board control or intrusive activation of vehicle components or diagnostics during service or assembly plant testing,

(vi) intrusive diagnostics during portions that can significantly affect engine stability, or

(vii) infrequent regeneration events during portions that can significantly affect engine stability.

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(2.4) MIL Illumination and Fault Code Storage:

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(2.4.2) Additionally, for ~~2013 and subsequent model year engines~~ misfires identified in section (e)(2.2.2) ~~equipped with sensors that can detect combustion or combustion quality~~:

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(B) Storage of freeze frame conditions.

(i) For 2013 through 2015 model year engines, t~~T~~he OBD system shall store and erase freeze frame conditions either in conjunction with storing and erasing a pending fault code or in conjunction with storing a confirmed/MIL-on fault code and erasing a confirmed/previously MIL-on fault code. For 2016 and subsequent model year engines, a manufacturer shall store freeze frame conditions in conjunction with storing and erasing a pending fault code in accordance with section (d)(2.2.1)(D)(iii) or (d)(2.2.2)(D).

(ii) If freeze frame conditions are stored for a malfunction other than a misfire malfunction when a fault code is stored as specified in section (e)(2.4.2), the stored freeze frame information shall be replaced with freeze frame information regarding the misfire malfunction.

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(5) Non-Methane Hydrocarbon (NMHC) Converting Catalyst Monitoring

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(5.2) Malfunction Criteria:

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(5.2.3) Other Aftertreatment Assistance Functions:

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(B) For ~~2013~~ 2015 and subsequent model year engines, for catalysts used to generate a feedgas constituency to assist SCR systems (e.g., to increase $NO_2$ concentration upstream of an SCR system), the OBD system shall detect a malfunction when the catalyst is unable to generate the necessary feedgas constituents for proper SCR system operation. Catalysts are exempt from ~~feedgas generation~~ this monitoring if both of the following criteria are satisfied: (1) no malfunction of the catalyst's feedgas generation ability can cause emissions to ~~(1)~~ increase by 15 percent or more of the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle; ~~or~~ and (2) no malfunction of the catalyst's feedgas generation ability can cause emissions to exceed the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle.

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(6) Oxides of Nitrogen (NOx) Converting Catalyst Monitoring

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(6.2) Malfunction Criteria: For purposes of section (e)(6), each catalyst in a series configuration that converts NOx shall be monitored either individually or in combination with others.

(6.2.1) Conversion Efficiency:

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(B) For all 2013 model year engines and 2014 and 2015 model year engines that are not included in the phase-in specified in section (e)(6.2.1)(C):

(i) The OBD system shall detect a catalyst malfunction when the catalyst conversion capability decreases to the point that would cause an engine's emissions to exceed the applicable NOx standard by more than 0.4 g/bhp-hr (e.g., cause emissions to exceed 0.6 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard.

(ii) If no failure or deterioration of the catalyst system NOx conversion capability could result in an engine's NOx or NMHC emissions exceeding the applicable malfunction criteria of section (e)(6.2.1)(B)(i),

the OBD system shall detect a malfunction when the catalyst has no detectable amount of NOx or NMHC conversion capability.

(C) For at least 20 percent of 2014 model year diesel engines and at least 50 percent of 2015 model year diesel engines (percentage based on the manufacturer's projected California sales volume of all diesel engines subject to this regulation):

(i) The OBD system shall detect a catalyst malfunction when the catalyst conversion capability decreases to the point that would cause an engine's emissions to exceed the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause emissions to exceed 0.5 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard.

(ii) If no failure or deterioration of the catalyst system NOx conversion capability could result in an engine's NOx or NMHC emissions exceeding the applicable malfunction criteria of section (e)(6.2.1)(C)(i), the OBD system shall detect a malfunction when the catalyst has no detectable amount of NOx or NMHC conversion capability.

~~(B)~~(D) Except as provided for below in section (e)(6.2.1)(E), ~~F~~for ~~2013~~2016 and subsequent model year engines:

(i) The OBD system shall detect a catalyst malfunction when the catalyst conversion capability decreases to the point that would cause an engine's emissions to exceed the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause emissions to exceed 0.4 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard.

(ii) If no failure or deterioration of the catalyst system NOx conversion capability could result in an engine's NOx or NMHC emissions exceeding the applicable malfunction criteria of section (e)(6.2.1)(~~B~~D)(i), the OBD system shall detect a malfunction when the catalyst has no detectable amount of NOx or NMHC conversion capability.

(E) In lieu of using the malfunction criteria in section (e)(6.2.1)(D), a manufacturer may continue to use the malfunction criteria in section (e)(6.2.1)(C) for any 2016 model year engine that was previously certified in the 2014 or 2015 model year to the malfunction criteria in section (e)(6.2.1)(C) and carried over to the 2016 model year.

(6.2.2) Selective Catalytic Reduction (SCR) or Other Active/Intrusive Reductant Injection System Performance:

(A) Reductant Delivery Performance:

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(ii) For all 2013 model year engines and 2014 and 2015 model year engines that are not included in the phase-in specified in section (e)(6.2.2)(A)(iii):

a. The OBD system shall detect a malfunction prior to any failure or deterioration of the system to properly regulate reductant delivery (e.g., urea injection, separate injector fuel injection, post injection of fuel, air assisted injection/mixing) that would cause an engine's emissions to exceed the applicable NOx standard by more than 0.4 g/bhp-hr (e.g., cause emissions to exceed 0.6 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard.

b. If no failure or deterioration of the SCR system could result in an engine's NOx or NMHC emissions exceeding the applicable malfunction criteria of section (e)(6.2.2)(A)(ii)a., the OBD system shall detect a malfunction when the system has reached its control limits such that it is no longer able to deliver the desired quantity of reductant.

(iii) For at least 20 percent of all 2014 model year diesel engines and at least 50 percent of all 2015 model year diesel engines (percentage based on the manufacturer's projected California sales volume of all diesel engines subject to this regulation):

a. The OBD system shall detect a malfunction prior to any failure or deterioration of the system to properly regulate reductant delivery (e.g., urea injection, separate injector fuel injection, post injection of fuel, air assisted injection/mixing) that would cause an engine's emissions to exceed the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause emissions to exceed 0.5 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard.

b. If no failure or deterioration of the SCR system could result in an engine's NOx or NMHC emissions exceeding the applicable malfunction criteria of section (e)(6.2.2)(A)(iii)a., the OBD system shall detect a malfunction when the system has reached its control limits such that it is no longer able to deliver the desired quantity of reductant.

~~(ii)~~(iv) Except as provided for below in section (e)(6.2.2)(A)(v), ~~F~~for ~~2013~~ 2016 and subsequent model year engines, the OBD system shall detect a system malfunction prior to any failure or deterioration of the system to properly regulate reductant delivery (e.g., urea injection, separate injector fuel injection, post injection of fuel, air assisted injection/mixing) that would cause an engine's emissions to exceed the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause emissions to exceed 0.4 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard. If no failure or deterioration of the SCR system could result in an engine's NOx or NMHC

emissions exceeding the applicable malfunction criteria above, the OBD system shall detect a malfunction when the system has reached its control limits such that it is no longer able to deliver the desired quantity of reductant.

(v) In lieu of using the malfunction criteria in section (e)(6.2.2)(A)(iv), a manufacturer may continue to use the malfunction criteria in section (e)(6.2.2)(A)(iii) for any 2016 model year engine that was previously certified in the 2014 or 2015 model year to the malfunction criteria in section (e)(6.2.2)(A)(iii) and carried over to the 2016 model year.

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(8) Particulate Matter (PM) Filter Monitoring

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(8.2) Malfunction Criteria:

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(8.2.4) Catalyzed PM Filter:

(A) NMHC conversion: For ~~2013~~ 2015 and subsequent model year engines~~,~~ ~~for~~ with catalyzed PM filters that convert NMHC emissions~~,~~:

(i) ~~t~~The OBD system shall monitor the catalyst function of the PM filter and detect a malfunction when the NMHC conversion capability decreases to the point that NMHC emissions exceed 2.0 times the applicable standards.

(ii) If no failure or deterioration of the NMHC conversion capability could result in an engine's NMHC emissions exceeding 2.0 times the applicable standards, the OBD system shall detect a malfunction when the system has no detectable amount of NMHC conversion capability.

(iii) Catalyzed PM filters are exempt from ~~NMHC conversion capability~~this monitoring if both of the following criteria are satisfied: (1) no malfunction of the catalyzed PM filter's NMHC conversion capability can cause emissions to ~~(1)~~ increase by 15 percent or more of the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle; ~~or~~ and (2) no malfunction of the catalyzed PM filter's NMHC conversion capability can cause emissions to exceed the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle.

(B) Feedgas generation: For 2016 and subsequent model year engines with catalyzed PM filters used to generate a feedgas constituency to assist SCR systems (e.g., to increase $NO_2$ concentration upstream of an SCR system), the OBD system shall detect a malfunction when the system is unable to generate the necessary feedgas constituents for proper SCR system operation. Catalyzed PM filters are exempt from ~~feedgas generation~~ this monitoring if both of the following criteria are satisfied: (1) no malfunction of the catalyzed PM filter's feedgas generation ability can cause emissions to ~~(1)~~ increase by 15 percent or more of the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle; ~~or~~ and (2) no malfunction of the catalyzed PM filter's feedgas

generation ability can cause emissions to exceed the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle.

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(9) Exhaust Gas Sensor Monitoring

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(9.2) Malfunction Criteria:

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(9.2.2) NOx and PM sensors:

(A) Sensor performance faults:

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(ii) For all 2013 model year engines and 2014 and 2015 model year engines that are not included in the phase-in specified in section (e)(9.2.2)(A)(iii), the OBD system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause an engine's NOx emissions to exceed the applicable NOx standard by more than 0.4 g/bhp-hr (e.g., cause emissions to exceed 0.6 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or cause an engine's PM emissions to exceed (whichever is higher): 0.03 g/bhp-hr as measured from an applicable cycle emission test (i.e., FTP or SET); or any of the applicable standards by more than 0.02 g/bhp-hr (e.g., cause emissions to exceed 0.03 g/bhp-hr if the exhaust emission standard is 0.01 g/bhp-hr).

(iii) For at least 20 percent of 2014 model year diesel engines and at least 50 percent of 2015 model year diesel engines (percentage based on the manufacturer's projected California sales volume of all diesel engines subject to this regulation), the OBD system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause an engine's NOx emissions to exceed the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause emissions to exceed 0.5 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or cause an engine's PM emissions to exceed (whichever is higher): 0.03 g/bhp-hr as measured from an applicable cycle emission test (i.e., FTP or SET); or any of the applicable standards by more than 0.02 g/bhp-hr (e.g., cause emissions to exceed 0.03 g/bhp-hr if the exhaust emission standard is 0.01 g/bhp-hr).

~~(ii)~~(iv) Except as provided for below in section (e)(9.2.2)(A)(v), ~~F~~for ~~2013~~ 2016 and subsequent model year engines, the OBD system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude,

offset, or other characteristic(s) that would cause an engine's NOx emissions to exceed ~~any of~~ the applicable NOx standards by more than 0.2 g/bhp-hr (e.g., cause emissions to exceed 0.4 g/bhp-hr if the exhaust emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test (i.e., FTP or SET), cause an engine's NMHC emissions to exceed 2.0 times the applicable NMHC standard, or cause an engine's PM emissions to exceed (whichever is higher): 0.03 g/bhp-hr as measured from an applicable cycle emission test (i.e., FTP or SET); or any of the applicable standards by more than 0.02 g/bhp-hr (e.g., cause emissions to exceed 0.03 g/bhp-hr if the exhaust emission standard is 0.01 g/bhp-hr).

(v) In lieu of using the malfunction criteria in section (e)(9.2.2)(A)(iv), a manufacturer may continue to use the malfunction criteria in section (e)(9.2.2)(A)(iii) for any 2016 model year engine that was previously certified in the 2014 or 2015 model year to the malfunction criteria in section (e)(9.2.2)(A)(iii) and carried over to the 2016 model year.

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(g) *Monitoring Requirements For All Engines.*

(1) Engine Cooling System Monitoring

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(1.3) Monitoring Conditions:

(1.3.1) Thermostat

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(D) Manufacturers may request Executive Officer approval to suspend or disable thermostat monitoring if the vehicle is subjected to conditions which could lead to false diagnosis (e.g., vehicle operation at idle for more than 50 percent of the warm-up time, ~~hot restart conditions~~ engine block heater operation). ~~In general, the Executive Officer shall not approve disablement of the monitor on engine starts where the ECT at engine start is more than 35 degrees Fahrenheit lower than the thermostat malfunction threshold temperature determined under section (g)(1.2.1)(A). The Executive Officer shall approve the request upon determining that the manufacturer has provided data and/or engineering analysis that demonstrate the need for the request.~~ With respect to disablement on driving cycles solely due to warm ECT at engine start conditions, the manufacturer shall disable the monitor during driving cycles where the ECT at engine start is within 35 degrees Fahrenheit of the thermostat malfunction threshold temperature determined under section (g)(1.2.1)(A) (e.g., if the malfunction threshold temperature is 160 degrees Fahrenheit, the monitor shall be disabled if the ECT at engine start is ~~between~~ above 125 ~~and 160 degrees~~ Fahrenheit).

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(3) Comprehensive Component Monitoring

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(3.2) Malfunction Criteria:

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(3.2.2) Output Components/Systems:

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(F) For ~~2013~~ 2015 and subsequent model year engines that utilize fuel control system components (e.g., injectors, fuel pump) that have tolerance compensation features implemented in hardware or software during production or repair procedures (e.g., individually coded injectors for flow characteristics that are programmed into an electronic control unit to compensate for injector to injector tolerances, fuel pumps that use in-line resistors to correct for differences in fuel pump volume output), the components shall be monitored to ensure the proper compensation is being used.

(i) Except as provided in section (g)(3.2.2)(F)(ii) below, ~~T~~the system shall detect a fault if the compensation being used by the control system does not match the compensation designated for the installed component (e.g., the flow characteristic coding designated on a specific injector does not match the compensation being used by the fuel control system for that injector). If a manufacturer demonstrates that a single component (e.g., injector) using the wrong compensation cannot cause a measurable increase in emissions during any reasonable driving condition, the manufacturer shall detect a malfunction for the minimum number of components using the wrong compensation needed to cause an emission increase. Further, the stored fault code shall identify the specific component that does not match the compensation.

(ii) Monitoring of the fuel control system components under section (g)(3.2.2)(F)(i) is not required if the manufacturer demonstrates that both of the following criteria are satisfied: (1) no fault of the components' tolerance compensation features (e.g., wrong compensation being used) could cause emissions to ~~(1)~~ increase by 15 percent or more of the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle; ~~or~~ and (2) no fault of the components' tolerance compensation features can cause emissions to exceed the applicable ~~full useful life~~ standard as measured from an applicable emission test cycle. For purposes of determining if the emission criteria above are met, the manufacturers shall request Executive Officer approval of the test plan for which the emission impact will be determined. The test plan shall include the combination of failed components and the degree of mismatch (e.g., wrong compensation) used as well as the test procedure and emission test cycles used to demonstrate the emission impact, including the necessary preconditioning cycles used by the system to correct or adapt for any mismatch and mitigate the emission impact. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering analysis that

demonstrate that the conditions necessary for the system to correct or adapt will readily occur in a timely manner during in-use operation and that the test conditions represent worst case emissions from typical in-use service actions when considering the distribution and variance of the compensation values and parts (e.g., replacement of one or more plus-one-sigma injectors with minus-one-sigma injectors without updating of the compensation value).

* * * *

(5) Exceptions to Monitoring Requirements

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(5.7) ~~A manufacturer may request Executive Officer approval to be exempt from monitoring a component if both of~~ The OBD system is not required to monitor an electronic powertrain component/system if the following criteria are met when the ambient temperature is above 20 degrees Fahrenheit: (1) a malfunction of the component does not affect emissions during any reasonable driving condition, ~~and~~ (2) a malfunction of the component does not affect the diagnostic strategy for any other monitored component or system, ~~—~~and (3) t~~T~~he ambient temperature ~~shall be~~ is determined based on a temperature sensor monitored by the OBD system (e.g., IAT sensor). The manufacturer shall determine whether a component/system meets these criteria. If the Executive Officer reasonably believes that a manufacturer has incorrectly determined that a component/system meets these criteria, the Executive Officer shall require the manufacturer to provide emission and/or other diagnostic data showing that the component/system, when malfunctioning and installed in a suitable test vehicle, does not have an effect on emissions or other diagnostic strategies. The Executive Officer may request emission data for any reasonable driving condition at ambient temperatures above 20 degrees Fahrenheit. ~~The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or engineering evaluation that support these criteria.~~

(5.8) Whenever the requirements in section (e), (f), or (~~f~~g) of this regulation require a manufacturer to meet a specific phase-in schedule~~,~~; ~~manufacturers may use an alternate phase-in schedule in lieu of the required phase-in schedule if the alternate phase-in schedule provides for equivalent compliance volume as defined in section (c) except as specifically noted for the phase-in for the PM filter monitor in section (e)(8.2.1)~~

(5.8.1) Except as provided for in section (g)(5.8.3) below for the diesel NOx converting catalyst and NOx and PM sensor phase-ins and in section (e)(8.2.1) for the PM filter monitor phase-in, ~~M~~manufacturers may use an alternate phase-in schedule in lieu of the ~~required~~ phase-in schedule set forth in sections (e), (f), or (g) if the alternate phase-in schedule provides for equivalent compliance volume as defined in section (c) ~~except as specifically noted for the phase-in for the PM filter monitor in section (e)(8.2.1)~~.

(5.8.2) Small volume manufacturers may use an alternate phase-in schedule in accordance with section (g)(5.8.1) in lieu of the required phase-in schedule or may use a different schedule as follows:

(A) For the diesel misfire monitor phase-in schedule in section (e)(2.2.2), the manufacturer may meet the requirement on all engines by the 2018 model year in lieu of meeting the specific phase-in requirements for the 2016 and 2017 model years.

(B) For the diesel misfire monitor phase-in schedule in section (e)(2.3.3), the manufacturer may meet the monitoring conditions requirements of section (e)(2.3.3)(A)(i) on all engines subject to (e)(2.2.2) through the 2020 model year and the monitoring conditions requirements of section (e)(2.3.3)(A)(ii) on all 2021 and subsequent model year engines in lieu of the specific phase-in requirements in section (e)(2.3.3)(A) for the 2019 and 2020 model years.

(C) For the diesel NOx converting catalyst monitor phase-in schedules in section (e)(6), the manufacturer may use the malfunction criteria in sections (e)(6.2.1)(B) and (e)(6.2.2)(A)(ii) for all 2014 and 2015 model year engines in lieu of the malfunction criteria and required phase-in schedule in sections (e)(6.2.1)(C) and (e)(6.2.2)(A)(iii).

(D) For the diesel PM filter monitor phase-in schedule in section (e)(8), the manufacturer may use the malfunction criteria in section (e)(8.2.1)(B) for all 2014 and 2015 model year engines in lieu of the malfunction criteria and required phase-in schedule in section (e)(8.2.1)(C).

(E) For the diesel NOx sensor phase-in schedules in section (e)(9), the manufacturer may use the malfunction criteria in section (e)(9.2.2)(A)(ii) for all 2014 and 2015 model year engines in lieu of the malfunction criteria and required phase-in schedule in section (e)(9.2.2)(A)(iii).

(5.8.3) In lieu of meeting the diesel NOx converting catalyst and NOx and PM sensor phase-ins set forth in sections (e)(6.2.1), (e)(6.2.2), and (e)(9.2.2), a manufacturer may request Executive Officer approval to use a manufacturer-defined phase-in for each requirement. The Executive Officer shall approve the manufacturer-defined phase-in if it meets the following criteria:

(A) For the requirements in sections (e)(6.2.1)(C), (e)(6.2.2)(A)(iii), and (e)(9.2.2)(A)(iii) (i.e., requiring a NOx threshold of +0.3 g/bhp-hr):

(i) The phase-in shall provide for a compliance volume of engines certified to the +0.3 g/bhp-hr NOx threshold that is equivalent to the volume of the required phase-in set forth in each of the above-referenced sections (i.e., the phase-in of 20 percent of 2014 model year diesel engines and 50 percent of 2015 model year diesel engines). The compliance volume shall be calculated in accordance with the calculation methodology in the definition of “alternate phase-in” in section (c) (i.e., (20*2 years) + (50*1 year) = 90 for the required phase-in). The compliance volume shall be considered equivalent if the calculated total is equal to or greater than 90.

(ii) The calculated compliance volume for the manufacturer-defined phase-in may not include engines meeting the +0.3 g/bhp-hr NOx threshold requirement earlier than the 2013 model year.

(iii) For the 2013 through 2017 model years, engines meeting the requirements in sections (e)(6.2.1)(D), (e)(6.2.2)(A)(iv), and (e)(9.2.2)(A)(iv) (i.e., requiring a NOx threshold of +0.2 g/bhp-hr) shall also be considered as meeting the +0.3 g/bhp-hr NOx threshold requirement and included in the calculated compliance volume and shall not be subtracted from the calculated compliance volume.

(iv) For the 2016 model year, if the proposed phase-in results in a combined percentage of engines meeting the +0.3 g/bhp-hr and the +0.2 g/bhp-hr thresholds being less than 50 percent of all diesel engines, the manufacturer shall subtract those engines that do not meet the above thresholds in both the 2015 and 2016 model years from the required percentage of 50 percent when calculating the compliance volume according to the calculation methodology in the definition of “alternate phase-in” section (c).

(v) All engines shall meet either the +0.3 g/bhp-hr NOx threshold or the +0.2 g/bhp-hr NOx threshold no later than the 2017 model year.

(B) For the requirements in sections (e)(6.2.1)(D), (e)(6.2.2)(A)(iv), and (e)(9.2.2)(A)(iv) (i.e., requiring a NOx threshold of +0.2 g/bhp-hr):

(i) The phase-in shall provide for a compliance volume of engines certified to the +0.2 g/bhp-hr NOx threshold that is equivalent to the volume of the required phase-in set forth in each of the above-referenced sections (i.e., 100 percent of 2016 model year diesel engines). The compliance volume shall be calculated in accordance with the calculation methodology in the definition of “alternate phase-in” in section (c) (i.e., (100*1 year) = 100 for the required phase-in). The compliance volume shall be considered equivalent if the calculated total is equal to or greater than 100.

(ii) The calculated compliance volume for the manufacturer-defined phase-in shall not include engines meeting the +0.2 g/bhp-hr NOx threshold requirement earlier than the 2015 model year.

(iii) For the 2016 model year only, engines meeting the NOx threshold of +0.3 g/bhp-hr and carried over from the 2014 or 2015 model year per sections (e)(6.2.1)(E), (e)(6.2.2)(A)(v), and (e)(9.2.2)(A)(v) shall also be considered as meeting the +0.2 g/bhp-hr NOx threshold requirement and included in the calculated compliance volume and shall not be subtracted from the calculated compliance volume.

(iv) If the phase-in includes engines that do not meet the +0.2 g/bhp-hr NOx threshold in the 2017 model year, the manufacturer shall subtract those engines that do not meet the threshold in the 2016 and 2017 model years (except as allowed for the 2016 model year in section (g)(5.8.3)(B)(iii) above) from the required percentage of 100 percent

when calculating the compliance volume according to the calculation methodology in the definition of “alternate phase-in” section (c).

(v) All engines shall meet the +0.2 g/bhp-hr NOx threshold no later than the 2018 model year.

* * * *

(h) *Standardization Requirements.*

* * * *

(4) Required Emission Related Functions:
The following standardized functions shall be implemented in accordance with the specifications in SAE J1979 or SAE J1939 to allow for access to the required information by a scan tool meeting SAE J1978 specifications or designed to communicate with an SAE J1939 network:

(4.1) Readiness Status: In accordance with SAE J1979/J1939-73 specifications, the OBD system shall indicate “complete” or “not complete” since the fault memory was last cleared for each of the installed monitored components and systems identified in sections (e)(1) through (f)(9), and (g)(3) except (e)(11) and (f)(4). ~~The readiness status for all components or systems identified in (f)(2) and (g)(3) shall always indicate “complete”. The readiness status for all other components or systems shall immediately indicate “complete” upon the respective monitor(s) (except those monitors specified under section (h)(4.1.4) below) determining that the component or system is not malfunctioning. The readiness status for a component or system shall also indicate “complete” if after the requisite number of decisions necessary for determining MIL status has been fully executed, the monitor indicates a malfunction for the component or system. The readiness status for each of the monitored components or systems shall indicate “not complete” whenever fault memory has been cleared or erased by a means other than that allowed in section (d)(2). Normal vehicle shut down (i.e., key off, engine off) may not cause the readiness status to indicate “not complete”.~~

(4.1.1) ~~Subject to Executive Officer approval, a manufacturer may request that the readiness status for a monitor be set to indicate “complete” without monitoring having been completed if monitoring is disabled for a multiple number of driving cycles due to the continued presence of extreme operating conditions (e.g., cold ambient temperatures, high altitudes). Executive Officer approval shall be based on the conditions for monitoring system disablement and the number of driving cycles specified without completion of monitoring before readiness is indicated as “complete”.~~ The readiness status for the following component/system readiness bits shall always indicate “complete”:

(A) Diesel misfire (section (e)(2)) for engines without a separate monitor designed to detect misfires identified in section (e)(2.2.1) and subject to the monitoring conditions of sections (e)(2.3.1) and (e)(2.3.2);

(~~A~~B) Gasoline misfire (section (f)(2)); and

(~~B~~C) Diesel and gasoline comprehensive component (section (g)(3)).

* * * *

(4.1.3) For 2016 and subsequent model year engines, for components and systems not listed in section (h)(4.1.1) above, the readiness status for each component/system readiness bit listed below shall immediately indicate "complete" if any of the following conditions occur: (1) all the respective supported monitors listed below for each component/system have fully executed and determined that the component or system is not malfunctioning, or (2) at least one of the monitors listed below for each component/system has determined that the component or system is malfunctioning after the requisite number of decisions necessary for determining the MIL status have been fully executed, regardless of whether or not the other monitors listed have been fully executed:

(A) Diesel Fuel System: sections (e)(1.2.1), (e)(1.2.2), and (e)(1.2.3)

(B) Diesel Misfire: section (e)(2.2.1) for engines with a separate monitor designed to detect misfires identified in section (e)(2.2.1) and subject to the monitoring conditions of sections (e)(2.3.1) and (e)(2.3.2)

* * * *

(4.2) Data Stream: The following signals shall be made available on demand through the standardized data link connector in accordance with SAE J1979/J1939 specifications. The actual signal value shall always be used instead of a default or limp home value.

* * * *

(4.2.2) For all diesel engines:

* * * *

(E) For 2013 and subsequent model year engines, normalized trigger for PM filter regeneration (SPN 54~~5~~66 defined by SAE J1939 for 2016 and subsequent model year engines), PM filter regeneration status (SPN 3700 defined by SAE J1939 for 2016 and subsequent model year engines); and

* * * *

(4.5) Test Results:

* * * *

(4.5.5) If the OBD system fault memory is cleared~~,~~:

(A) For vehicles using the ISO 15765-4 protocol for the standardized functions required in section (h), all test results shall report values of zero for the test result and test limits. The test results shall be updated once the applicable monitor has run and has valid test results and limits to report.

(B) For vehicles using the SAE J1939 protocol for the standardized functions required in section (h):

(i) For 2010 through 2015 model year engines, all test results shall either (a) report values of zero for the test results and test limits, or (b) report values corresponding to 'test not complete' in accordance with SAE J1939-73 specifications. The test results shall be updated once the applicable monitor has run and has valid test results and limits to report.

(ii) For 2016 and subsequent model year engines, all test results shall report values corresponding to 'test not complete' in accordance with

SAE J1939-73 specifications. The test results shall be updated once the applicable monitor has run and has valid test results and limits to report.

* * * *

~~(6) Service Information:~~

~~(6.1) Engine manufacturers shall provide the aftermarket service and repair industry emission-related service information as set forth in sections (h)(6.3) through (6.5).~~

~~(6.2) The Executive Officer shall waive the requirements of sections (h)(6.3) through (6.5) upon determining that ARB or U.S. EPA has adopted a service information regulation or rule that is in effect and operative and requires engine manufacturers to provide emission-related service information:~~
~~(A) of comparable or greater scope than required under these provisions;~~
~~(B) in an easily accessible format and in a timeframe that is equivalent to or exceeds the timeframes set forth below; and~~
~~(C) at fair and reasonable cost.~~

~~(6.3) Manufacturers shall make readily available, at a fair and reasonable price to the automotive repair industry, vehicle repair procedures which allow effective emission-related diagnosis and repairs to be performed using only the SAE J1978/J1939 generic scan tool and commonly available, non-microprocessor based tools.~~

~~(6.4) As an alternative to publishing repair procedures required under section (h)(6.3), a manufacturer may publish repair procedures referencing the use of manufacturer-specific or enhanced equipment provided the manufacturer meets one of the following conditions:~~

~~(6.4.1) makes available to the aftermarket scan tool industry the information needed to manufacture scan tools to perform the same emission-related diagnosis and repair procedures (excluding any reprogramming) in a comparable manner as the manufacturer-specific diagnostic scan tool, or~~

~~(6.4.2) makes available for purchase, at a fair and reasonable price to the automotive repair industry, a manufacturer-specific or enhanced tool to perform the emission-related diagnosis and repair procedures (excluding any reprogramming).~~

~~(6.5) Manufacturers shall make available:~~

~~(6.5.1) Information to utilize the test results reported as required in section (h)(4.5). The information must include a description of the test and test result, typical passing and failing values, associated fault codes with the test result, and scaling, units, and conversion factors necessary to convert the results to engineering units.~~

~~(6.5.2) A generic description of each of the diagnostics used to meet the requirements of this regulation. The generic description must include a text description of how the diagnostic is performed, typical enable conditions, typical malfunction thresholds, typical monitoring time, fault codes associated with the diagnostic, and test results (section (h)(4.5)) associated with the diagnostic. Vehicles that have diagnostics not~~

~~adequately represented by the typical values identified above shall be specifically identified along with the appropriate typical values.~~

~~(6.5.3) Information necessary to execute each of the diagnostics used to meet the requirements of sections (e)(1) through (f)(9). The information must include either a description of sample driving patterns designed to be operated in use or a written description of the conditions the vehicle needs to operate in to execute each of the diagnostics necessary to change the readiness status from "not complete" to "complete" for all monitors. The information shall be able to be used to exercise all necessary monitors in a single driving cycle as well as be able to be used to exercise the monitors to individually change the readiness status for each specific monitor from "not complete" to "complete".~~

* * * *

(i) *Monitoring System Demonstration Requirements for Certification.*

* * * *

(3) Required Testing:
Except as provided below, the manufacturer shall perform single-fault testing based on the applicable test with the following components/systems set at their malfunction criteria limits as determined by the manufacturer for meeting the requirements of sections (e), (f), and (g) or sections (d)(7.1.2) and (d)(7.2.3) for extrapolated OBD systems.

(3.1) Required testing for Diesel/Compression Ignition Engines:

* * * *

(3.1.2) Misfire Monitoring: ~~For 2010 through 2012 model year engines, a~~ For 2013 model year engines subject to section (e)(2.2.5), the manufacturer shall perform a test at the malfunction limit specified in section (e)(2.2.5). A misfire demonstration test is not required for diesel engines not subject to section (e)(2.2.5). ~~For 2013 and subsequent model year engines, the manufacturer shall perform a test at the malfunction criteria limit specified in section (e)(2.2.2).~~

* * * *

(j) *Certification Documentation.*

* * * *

(2) The following information shall be submitted as part of the certification application. Except as provided below for demonstration data, the Executive Officer will not issue an Executive Order certifying the covered engines without the information having been provided. The information must include:

* * * *

(2.19) A list of the test results required to be made available under section (~~g~~h)(4.5) and the corresponding diagnostic(s) noted by fault code for each test result.

* * * *

(k) *Deficiencies.*

* * * *

(4) Manufacturers must re-apply for Executive Officer approval of a deficiency each model year. In considering the request to carry-over a deficiency, the Executive Officer shall consider the factors identified in section (k)(1) including the manufacturer's progress towards correcting the deficiency. Except as provided for in sections (k)(4.1) and (k)(4.2) below, t~~T~~he Executive Officer may not allow manufacturers to carry over monitoring system deficiencies for more than two model years unless it can be demonstrated that substantial engine hardware modifications and additional lead time beyond two years would be necessary to correct the deficiency, in which case the Executive Officer shall allow the deficiency to be carried over for three model years.

(4.1) For deficiencies first granted in the 2010 model year, the Executive Officer may allow manufacturers to carry over the deficiency into the 2013 model year unless it can be demonstrated that substantial engine hardware modifications and additional lead time beyond the 2013 model year would be necessary to correct the deficiency, in which case the Executive Officer shall allow the deficiency to be carried over into the 2014 model year.

(4.2) For deficiencies first granted in the 2011 model year, the Executive Officer may allow manufacturers to carry over the deficiency into the 2014 model year.

* * * *

Amend section 1968.2, title 13, California Code of Regulations, to read as follows:

**Note:** The amendments that were approved by the Board at the January 26-27, 2012 board hearing are shown in single underline to indicate additions and ~~single strikeout~~ to indicate deletions from the existing regulatory text. These amendments were formally approved by the Office of Administrative Law on August 7, 2012, and became operative on August 7, 2012. The amendments proposed with the 45-day notice are shown in double underline to indicate additions and ~~double strikeout~~ to indicate deletions from the existing regulatory text. New amendments proposed with this 15-day notice are shown in ***bold italic double underline*** to indicate additions and ~~***bold italic double strikeout***~~ to indicate deletions from the existing regulatory text. Various portions of the regulations that are not modified by the proposed amendments are omitted from the text shown and indicated by " * * * * ".

**§1968.2. Malfunction and Diagnostic System Requirements -- 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines**

(c) *Definitions.*

* * * *

"*Emission standard*," as it applies to OBD compliance ***and the remedies provided for in the Health and Safety Code for noncompliance***, relates to the emission characteristics of a motor vehicle and engine and means:

(1) a numerical limit on the amount of a given pollutant that a motor vehicle or motor vehicle engine may emit into the atmosphere; or

(2) a requirement that a motor vehicle or motor vehicle engine be equipped with a certain type of pollution-control device or some other design feature related to the control of emissions.

* * * *

(e) *Monitoring Requirements for Gasoline/Spark-Ignited Engines.*

* * * *

(15) *Comprehensive Component Monitoring*

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(15.4) MIL Illumination and Fault Code Storage:

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(15.4.3) For purposes of determining the emission increase in section (e)(15.4.2)(A), the manufacturer shall request Executive Officer approval of the test cycle/vehicle operating conditions for which the emission increase will be determined. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering evaluation that demonstrate that the testing conditions

represent in-use driving conditions where emissions are likely to be most affected by the malfunctioning component. For purposes of determining whether the specified percentages in section (e)(15.4.2)(A) are exceeded, if the approved testing conditions are comprised of an emission test cycle with an ***exhaust*** emission standard, the measured increase shall be compared to a percentage of the ***exhaust*** emission standard (e.g., if the increase is equal to or more than 15 percent of the ***exhaust*** emission standard for that test cycle). If the approved testing conditions are comprised of a test cycle or vehicle operating condition that does not have an ***exhaust*** emission standard, the measured increase shall be calculated as a percentage of the baseline test (e.g., if the increase from a back-to-back test sequence between normal and malfunctioning condition is equal to or more than 15 percent of the baseline test results from the normal condition).

* * * *

(f) *Monitoring Requirements for Diesel/Compression-Ignition Engines.*

(1) *Non-Methane Hydrocarbon (NMHC) Converting Catalyst Monitoring*

* * * *

(1.2) Malfunction Criteria:

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(1.2.2) Conversion Efficiency:

(A) The OBD II system shall detect an NMHC catalyst malfunction when the catalyst conversion capability decreases to the point that emissions exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC standards for 2007 through 2012 model year vehicles; and

b. 2.0 times the applicable NMHC standards or the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) for 2013 and subsequent model year vehicles.

* * * *

(1.2.3) Other Aftertreatment Assistance Functions. Additionally, for 2010 and subsequent model year vehicles, the catalyst(s) shall be monitored for other aftertreatment assistance functions:

* * * *

(B) For 201~~0~~5 and subsequent model year passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard and 201~~3~~5 and subsequent model year medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, for catalysts used to generate a feedgas constituency to assist SCR systems (e.g., to increase $NO_2$ concentration upstream of an SCR system), the OBD II system shall detect a malfunction when the catalyst is

unable to generate the necessary feedgas constituents for proper SCR system operation. Catalysts are exempt from ***~~feedgas generation~~ this*** monitoring if ***both of the following criteria are satisfied: (1)*** no malfunction of the catalyst's feedgas generation ability can cause emissions to ***~~(1)~~*** increase by 15 percent or more of the applicable full useful life standard as measured from an applicable emission test cycle; ***~~or~~ and*** (2) ***no malfunction of the catalyst's feedgas generation ability can cause emissions to*** exceed the applicable full useful life standard as measured from an applicable emission test cycle.

* * * *

(2) *Oxides of Nitrogen (NOx) Converting Catalyst Monitoring*

* * * *

(2.2) Malfunction Criteria:

* * * *

(2.2.2) Conversion Efficiency:

(A) The OBD II system shall detect a NOx catalyst malfunction when the catalyst conversion capability decreases to the point that NOx or NMHC emissions exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. the applicable NOx standard by more than 0.5 g/bhp-hr (e.g., cause NOx emissions to exceed 0.7 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 3.5 times the applicable NMHC standard for 2007 through 2009 model year vehicles;

b. the applicable NOx standard by more than 0.4 g/bhp-hr (e.g., cause NOx emissions to exceed 0.6 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.5 times the applicable NMHC standard for 2010 through 2012 model year vehicles; ~~and~~

c. the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard for 2013 through 2015 model year vehicles; and

~~c~~d. the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard for ~~2013~~ 2016 and subsequent model year vehicles.

* * * *

(2.2.3) Selective Catalytic Reduction (SCR) or Other Active/Intrusive Reductant Injection System Performance:

(A) Reductant Delivery Performance:

(i) For 2007 and subsequent model year vehicles, the OBD II system shall detect a system malfunction prior to any failure or deterioration of the system to properly regulate reductant delivery (e.g., urea injection, separate injector fuel injection, post injection of fuel, air assisted injection/mixing) that would cause a vehicle's NOx or NMHC emissions to exceed the applicable emission levels specified in sections (f)(2.2.2)(A).

(ii) If no failure or deterioration of the reductant delivery system could result in a vehicle's NOx or NMHC emissions exceeding the applicable malfunction criteria specified in section (f)(2.2.3)(A)(i), the OBD II system shall detect a malfunction when the system has reached its control limits such that it is no longer able to deliver the desired quantity of reductant.

* * * *

(2.3) Monitoring Conditions:

(2.3.1) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(2.2.2)***, (f)(2.2.3)(A),*** and (f)(2.2.3)(C) (i.e., catalyst efficiency, ***reductant delivery performance, and*** improper reductant) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in section (f)(2.2.2) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

(2.3.2) Except as provided for in section (f)(2.3.3), the OBD II system shall monitor continuously for malfunctions identified in section**s** (f)(2.2.3)~~***(A),***~~ (B)~~***,***~~ and (D) (~~***e.g.***~~***i.e.***, ~~***SCR performance,***~~ insufficient reductant, feedback control).

(2.3.3) Manufacturers may request Executive Officer approval to temporarily disable continuous monitoring under conditions technically necessary to ensure robust detection of malfunctions and to avoid false passes and false indications of malfunctions. The Executive Officer shall approve the request upon determining that the manufacturer has submitted data and/or an engineering evaluation which demonstrate that a properly operating system cannot be distinguished from a malfunctioning system and that the disablement interval is limited only to that which is technically necessary.

* * * *

(3) *Misfire Monitoring*

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(3.2) Malfunction Criteria:

(3.2.1) The OBD II system shall detect a misfire malfunction when one or more cylinders are continuously misfiring.

(3.2.2) Additionally, for ***all combustion sensor or combustion quality sensor-equipped (e.g., for use in homogeneous charge compression ignition control systems)*** 2010 and subsequent model year ~~vehicles~~ passenger

cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard, ***for all combustion sensor or combustion quality sensor-equipped*** ~~***and***~~ 2010 through 2015 model year medium-duty vehicles ~~***equipped with sensors that can detect combustion or combustion quality (e.g., for use in homogeneous charge compression ignition (HCCI) control systems)***~~, and for 20 percent of 2016 model year, 50 percent of 2017 model year, and 100 percent of 2018 model year medium-duty vehicles (percentage based on the manufacturer's projected California sales volume for all medium-duty diesel vehicles):

(A) The OBD II system shall detect a misfire malfunction ~~that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed~~ as follows:

(i) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard, the OBD II system shall detect a misfire malfunction that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed 1.5 times any of the applicable FTP standards.

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, the OBD II system shall detect a misfire malfunction when the percentage of misfire is equal to or exceeds five percent ~~2.0 times any of the applicable NMHC, CO, and NOx standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test~~.

* * * *

(3.2.5) Upon request by the manufacturer and upon determining that the manufacturer has submitted data and/or engineering evaluation which support the request, the Executive Officer shall revise the percentage of misfire malfunction criteria in section (f)(3.2.2)(A)(ii) upward to exclude detection of misfire that cannot cause the vehicle's NMHC, CO, and NOx emissions to exceed 2.0 times the applicable standards and the vehicle's PM emissions to exceed 0.03 g/bhp-hr as measured from an applicable cycle emission test.

* * * *

(3.3) Monitoring Conditions:

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(3.3.3) ~~Additionally, f~~For misfires identified in section (f)(3.2.2) ~~2010 and subsequent model year vehicles subject to (f)(3.2.2)~~, the OBD II system shall monitor for misfire as follows:

(A) For passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard, ~~T~~the OBD II system shall continuously monitor for misfire under all positive torque engine speeds and load conditions.

(B) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, the OBD II system shall continuously monitor for misfire under the following conditions:

(i) For 2010 through 2018 model year vehicles and 2019 and subsequent model year vehicles that are not included in the phase-in specified in section (f)(3.3.3)(B)(ii), under positive torque conditions ***up to75 percent of peak torque*** with engine speed up to 75 percent of the maximum-~~***rated***~~ engine speed ~~***and engine load up to 75 percent maximum-rated load***~~ except within the following range: the engine operating region bound by the positive torque line (i.e., engine ~~***load***~~ ***torque*** with transmission in neutral) and the two following ~~***engine-operating***~~ points: engine speed of 50 percent of maximum-~~***rated***~~ engine speed with the engine ~~***load***~~ ***torque*** at the positive torque line, and 75 percent of the maximum-~~***rated***~~ engine speed with the engine ~~***load***~~ ***torque at*** 5 percent ***of peak torque*** above the positive torque line.

(ii) For 20 percent of 2019 model year, 50 percent of 2020 model year, and 100 percent of 2021 model year medium-duty vehicles (percentage based on the manufacturer's projected California sales volume for all medium-duty diesel vehicles), under all positive torque engine speed ~~***and load***~~ conditions ***except within the following range: the engine operating region bound by the positive torque line (i.e., engine load with transmission in neutral) and the two following points: engine speed of 50 percent of maximum engine speed with the engine torque at the positive torque line, and 100 percent of the maximum engine speed with the engine torque at 10 percent of peak torque above the positive torque line***.

* * * *

***(D) A manufacturer may request Executive Officer approval to disable misfire monitoring or employ an alternate malfunction criterion when misfire cannot be distinguished from other effects. Upon determining that the manufacturer has presented documentation that demonstrates the disablement interval or period of use of an alternate malfunction criterion is limited only to that necessary for avoiding false detection, the Executive Officer shall approve the disablement or use of the alternate malfunction criterion. Such disablements may include but are not limited to events involving:***

***(i) rough road,***

***(ii) fuel cut,***

***(iii)gear changes for manual transmission vehicles,***

***(iv)traction control or other vehicle stability control activation such as anti-lock braking or other engine torque modifications to enhance vehicle stability,***

***(v) off-board control or intrusive activation of vehicle components or diagnostics during service or assembly plant testing,***

***(vi)intrusive diagnostics during portions that can significantly affect engine stability, or***

***(vii)infrequent regeneration events during portions that can significantly affect engine stability.***

* * * *

(4) *Fuel System Monitoring*

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(4.2) Malfunction Criteria:

(4.2.1) Fuel system pressure control:

(A) The OBD II system shall detect a malfunction of the fuel system pressure control system (e.g., fuel, hydraulic fluid) prior to any failure or deterioration that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 1.5 times any of the applicable NMHC, CO, and NOx standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of greater than 0.50 g/bhp-hr NOx;

b. 2.5 times any of the applicable NMHC or CO standards, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx; and

c. 2.0 times any of the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx;

* * * *

(5) *Exhaust Gas Sensor Monitoring*

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(5.2) Malfunction Criteria:

(5.2.1) Air-Fuel Ratio Sensors:

(A) For sensors located upstream of the exhaust aftertreatment:

(i) Sensor performance faults: The OBD II system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or

other characteristic(s) that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

b. For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:
   1. 1.5 times the applicable NMHC, CO, and NOx standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of greater than 0.50 g/bhp-hr NOx;
   2. 2.5 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx; and
   3. 2.0 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx.

* * * *

(B) For sensors located downstream of the exhaust aftertreatment:

(i) Sensor performance faults: The OBD II system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

b. For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:
   1. 2.5 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.5 g/bhp-hr (e.g., cause NOx emissions to exceed 0.7 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2009 model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of greater than 0.50 g/bhp-hr NOx;

2. 2.5 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx; and
3. 2.0 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx.

* * * *

(5.2.2) NOx and PM sensors:

(A) Sensor performance faults: The OBD II system shall detect a malfunction prior to any failure or deterioration of the sensor voltage, resistance, impedance, current, response rate, amplitude, offset, or other characteristic(s) that would cause a vehicle's emissions to exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC standards, the applicable NOx standard by more than 0.5 g/bhp-hr (e.g., cause NOx emissions to exceed 0.7 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2009 model year vehicles;
b. 2.5 times the applicable NMHC standards, the applicable NOx standard by more than 0.4 g/bhp-hr (e.g., cause NOx emissions to exceed 0.6 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 0.05 g/bhp-hr PM as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; ~~and~~
c. 2.0 times the applicable NMHC standard, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 through 2015 model year vehicles; and

~~c~~d. 2.0 times the applicable NMHC standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for ~~2013~~ 2016 and subsequent model year vehicles.

* * * *

(5.3) Monitoring Conditions:

(5.3.1) Exhaust Gas Sensors

(A) Manufacturers shall define the monitoring conditions for malfunctions identified in sections (f)(5.2.1)(A)(i), (5.2.1)(B)(i), ~~and~~ (5.2.2)(A), and (5.2.2)(D) (e.g., sensor performance faults) in accordance with sections (d)(3.1) and (d)(3.2) (i.e., minimum ratio requirements). For all 2010 and subsequent model year vehicles, for purposes of tracking and reporting as required in section (d)(3.2.2), all monitors used to detect malfunctions identified in sections (f)(5.2.1)(A)(i), (5.2.1)(B)(i), ~~and~~ (5.2.2)(A), and for 2016 and subsequent model year medium-duty vehicles ~~***certified to an engine dynamometer tailpipe emission standard***~~, section (f)(5.2.2)(D) shall be tracked separately but reported as a single set of values as specified in section (d)(5.2.2).

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(6) *Exhaust Gas Recirculation (EGR) System Monitoring*

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(6.2) Malfunction Criteria:

(6.2.1) Low Flow:

(A) The OBD II system shall detect a malfunction of the EGR system at or prior to a decrease from the manufacturer's specified EGR flow rate that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 1.5 times the applicable FTP standards for 2004 through 2006 model year vehicles;

b. 1.5 times the applicable NMHC, CO, and NOx standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of greater than 0.50 g/bhp-hr NOx;

c. 2.5 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2007 through 2012 model year vehicles certified to

an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx; and

d. 2.0 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx.

* * * *

(6.2.6) EGR Catalyst Performance: For catalysts located in the EGR system ~~***on 2013 and subsequent model year vehicles***~~ and used to convert constituents to reduce emissions or protect or extend the durability of other emission-related components (e.g., to reduce fouling of an EGR cooler or valve)~~.~~:

***(A) For 2004 through 2012 model year vehicles, the catalyst shall be monitored in accordance with the other emission control or source system monitoring requirements under section (f)(16).***

***(B) For 2013 and subsequent model year vehicles, except as provided for in section (f)(6.2.6)(C) below,*** the OBD II system shall detect a malfunction when the catalyst has no detectable amount of constituent (e.g., hydrocarbons, soluble organic fractions) oxidation. ~~***For 2004 through 2012 model year vehicles, the catalyst shall be monitored in accordance with the other emission control or source system monitoring requirements under section (f)(16).***~~

***(C) Monitoring of the catalyst is not required if there is no measurable emission impact on the criteria pollutants (i.e., NMHC, CO, NOx, and PM) during any reasonable driving condition in which the catalyst is most likely to affect criteria pollutants.***

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(7) *Boost Pressure Control System Monitoring*

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(7.2) Malfunction Criteria:

(7.2.1) Underboost:

(A) The OBD II system shall detect a malfunction of the boost pressure control system at or prior to a decrease from the manufacturer's commanded or expected boost pressure that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard

is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; and

b. 2.0 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

* * * *

(8) *NOx Adsorber Monitoring*

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(8.2) Malfunction Criteria:

(8.2.1) NOx adsorber capability:

(A) The OBD II system shall detect a NOx adsorber system malfunction when the NOx adsorber system capability decreases to the point that would cause a vehicle's NOx or NMHC emissions to exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. the applicable NOx standard by more than 0.5 g/bhp-hr (e.g., cause NOx emissions to exceed 0.7 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 3.5 times the applicable NMHC standard for 2007 through 2009 model year vehicles;

b. the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.5 times the applicable NMHC standard for 2010 through 2012 model year vehicles; and

c. the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test or 2.0 times the applicable NMHC standard for 2013 and subsequent model year vehicles.

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(9) *Particulate Matter (PM) Filter Monitoring*

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(9.2) Malfunction Criteria:

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(9.2.2) Frequent Regeneration:

(A) For 2010 and subsequent model year vehicles, the OBD II system shall detect a malfunction when PM filter regeneration occurs more frequently than (i.e., occurs more often than) the manufacturer's specified

regeneration frequency such that it would cause a vehicle's emissions to exceed:

* * * *

(ii) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

a. 2.5 times the applicable NMHC standards or the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test for 2010 through 2012 model year vehicles; and

b. 2.0 times the applicable NMHC standards or the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

* * * *

(9.2.4) ***Catalyzed PM Filter:***

***(A)*** NMHC conversion: For 2010~~5~~ and subsequent model year passenger cars, light-duty trucks, and MDPVs certified to a chassis dynamometer tailpipe emission standard and 2013~~5~~ and subsequent model year medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard with catalyzed PM filters that convert NMHC emissions, the OBD II system shall monitor the catalyst function of the PM filter and detect a malfunction when the NMHC conversion capability decreases to the point that NMHC emissions exceed the applicable emission levels specified in section (f)(9.2.2)(A). If no failure or deterioration of the NMHC conversion capability could result in a vehicle's NMHC emissions exceeding these emission levels, the OBD II system shall detect a malfunction when the system has no detectable amount of NMHC conversion capability. PM filters are exempt from ~~***NMHC conversion capability this***~~ monitoring if ***both of the following criteria are satisfied: (1)*** no malfunction of the PM filter's NMHC conversion capability can cause emissions to ~~***(1)***~~ increase by 15 percent or more of the applicable full useful life standard as measured from an applicable emission test cycle; ~~***or***~~ ***and*** (2) ***no malfunction of the PM filter's NMHC conversion capability can cause emissions to*** exceed the applicable full useful life standard as measured from an applicable emission test cycle.

***(B) Feedgas generation: For 2016 and subsequent model year medium-duty vehicles with catalyzed PM filters used to generate a feedgas constituency to assist SCR systems (e.g., to increase $NO_2$ concentration upstream of an SCR system), the OBD II system shall detect a malfunction when the system is unable to generate the necessary feedgas constituents for proper SCR system operation. Catalyzed PM filters are exempt from this monitoring if both of the***

***following criteria are satisfied: (1) no malfunction of the catalyzed PM filter's feedgas generation ability can cause emissions to increase by 15 percent or more of the applicable full useful life standard as measured from an applicable emission test cycle; and (2) no malfunction of the catalyzed PM filter's feedgas generation ability can cause emissions to exceed the applicable full useful life standard as measured from an applicable emission test cycle.***

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(12) *Cold Start Emission Reduction Strategy Monitoring*

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(12.2) Malfunction Criteria: The OBD II system shall, to the extent feasible, detect a malfunction if either of the following occurs:

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(12.2.2) Any failure or deterioration of the cold start emission reduction control strategy that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

(B) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

(i) 2.0 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles.

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(13) *Variable Valve Timing And/Or Control (VVT) System Monitoring*

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(13.2) Malfunction Criteria:

(13.2.1) Target Error: The OBD II system shall detect a malfunction prior to any failure or deterioration in the capability of the VVT system to achieve the commanded valve timing and/or control within a crank angle or lift tolerance that would cause a vehicle's NMHC, CO, NOx, or PM emissions to exceed:

* * * *

(B) For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard:

(i) 1.5 times the applicable NMHC, CO, and NOx standards or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2006 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of greater than 0.50 g/bhp-hr NOx;

(ii) 2.5 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.3 g/bhp-hr (e.g., cause NOx emissions to

exceed 0.5 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2006 through 2012 model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx; and

(iii) 2.0 times the applicable NMHC or CO standards, the applicable NOx standard by more than 0.2 g/bhp-hr (e.g., cause NOx emissions to exceed 0.4 g/bhp-hr if the ***exhaust*** emission standard is 0.2 g/bhp-hr) as measured from an applicable cycle emission test, or 0.03 g/bhp-hr PM as measured from an applicable cycle emission test for 2013 and subsequent model year vehicles certified to an engine dynamometer tailpipe NOx emission standard of less than or equal to 0.50 g/bhp-hr NOx.

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(15) *Comprehensive Component Monitoring*

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(15.2) Malfunction Criteria:

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(15.2.2) Output Components/Systems:

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(F) For ~~2013~~2015 and subsequent model year vehicles that utilize fuel control system components (e.g., injectors, fuel pump) that have tolerance compensation features implemented in hardware or software during production or repair procedures (e.g., individually coded injectors for flow characteristics that are programmed into an electronic control unit to compensate for injector to injector tolerances, fuel pumps that use in-line resistors to correct for differences in fuel pump volume output), the components shall be monitored to ensure the proper compensation is being used.

(i) The system shall detect a fault if the compensation being used by the control system does not match the compensation designated for the installed component (e.g., the flow characteristic coding designated on a specific injector does not match the compensation being used by the fuel control system for that injector). If a manufacturer demonstrates that a single component (e.g., injector) using the wrong compensation cannot cause a measurable increase in emissions during any reasonable driving condition, the manufacturer shall detect a malfunction for the minimum number of components using the wrong compensation needed to cause an emission increase. Further, the stored fault code shall identify the specific component that does not match the compensation.

(ii) Monitoring of the fuel control system components under section (f)(15.2.2)(F)(i) is not required if the manufacturer demonstrates that ***both of the following criteria are satisfied: (1)*** no fault of the

components' tolerance compensation features (e.g., wrong compensation being used) could cause emissions to ~~*(1)*~~ increase by 15 percent or more of the applicable full useful life standard as measured from an applicable emission test cycle; ~~*or*~~ ***and*** (2) ***no fault of the components' tolerance compensation features could cause emissions to*** exceed the applicable full useful life standard as measured from an applicable emission test cycle. For purposes of determining if the emission criteria above are met, the manufacturers shall request Executive Officer approval of the test plan for which the emission impact will be determined. The test plan shall include the combination of failed components and the degree of mismatch (e.g., wrong compensation) used as well as the test procedure and emission test cycles used to demonstrate the emission impact, including the necessary preconditioning cycles used by the system to correct or adapt for any mismatch and mitigate the emission impact. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering analysis that demonstrate that the conditions necessary for the system to correct or adapt will readily occur in a timely manner during in-use operation and that the test conditions represent worst case emissions from typical in-use service actions when considering the distribution and variance of the compensation values and parts (e.g., replacement of one or more plus-one-sigma injectors with minus-one-sigma injectors without updating of the compensation value).

* * * *

(15.4) MIL Illumination and Fault Code Storage:

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(15.4.3) For purposes of determining the emission increase in section (f)(15.4.2)(A), the manufacturer shall request Executive Officer approval of the test cycle/vehicle operating conditions for which the emission increase will be determined. Executive Officer approval shall be granted upon determining that the manufacturer has submitted data and/or engineering evaluation that demonstrate that the testing conditions represent in-use driving conditions where emissions are likely to be most affected by the malfunctioning component. For purposes of determining whether the specified percentages in section (f)(15.4.2)(A) are exceeded, if the approved testing conditions are comprised of an emission test cycle with an ***exhaust*** emission standard, the measured increase shall be compared to a percentage of the ***exhaust*** emission standard (e.g., if the increase is equal to or more than 15 percent of the ***exhaust*** emission standard for that test cycle). If the approved testing conditions are comprised of a test cycle or vehicle operating condition that does not have an ***exhaust*** emission standard, the measured increase shall be calculated as a percentage of the baseline test (e.g., if the increase from a back-to-back test sequence between normal and malfunctioning condition is equal to or

more than 15 percent of the baseline test results from the normal condition).

* * * *

(17) *Exceptions to Monitoring Requirements*

(17.1) Except as provided in sections (f)(17.1.1) through (17.1.4) below, upon request of a manufacturer or upon the best engineering judgment of ARB, the Executive Officer may revise the emission threshold for a malfunction on any diagnostic required in section (f) for medium-duty vehicles if the most reliable monitoring method developed requires a higher threshold to prevent ~~significant errors of commission in detecting~~ false indications of a malfunction. Additionally, except as specified in section (f)(9.2.1)(A)(iii), for 2007 through ~~2009~~2013 model year light-duty vehicles and 2007 through ~~2012~~ ~~2013~~ 2015 model year medium-duty vehicles, the Executive Officer may revise the PM filter malfunction criteria of section (f)(9.2.1) to exclude detection of specific failure modes (e.g., combined failure of partially melted and partially cracked substrates) if the most reliable monitoring method developed requires the exclusion of specific failure modes to prevent ~~significant errors of commission in detecting~~ false indications of a malfunction.

* * * *

(17.1.3) For medium-duty diesel vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, the Executive Officer shall approve a malfunction criteria of "the applicable PM standard plus 0.02 g/bhp-hr PM (e.g., unable to maintain PM emissions at or below 0.03 g/bhp-hr if the ***exhaust*** emission standard is 0.01 g/bhp-hr) as measured from an applicable cycle emission test" in lieu of "0.03 g/bhp-hr PM as measured from an applicable cycle emission test" wherever required in section (f). The Executive Officer shall also approve a malfunction criteria of "the applicable PM standard plus 0.04 g/bhp-hr PM (e.g., unable to maintain PM emissions at or below 0.05 g/bhp-hr if the ***exhaust*** emission standard is 0.01 g/bhp-hr) as measured from an applicable cycle emission test" in lieu of "0.05 g/bhp-hr PM as measured from an applicable cycle emission test" wherever required in section (f).

* * * *

(h) *Monitoring System Demonstration Requirements For Certification*

* * * *

(4) *Required Testing for Diesel/Compression-ignition vehicles:*

Except as provided below, the manufacturer shall perform single-fault testing based on the applicable test with the following components/systems set at their malfunction criteria limits as determined by the manufacturer for meeting the requirements of section (f).

* * * *

(4.3) Misfire Monitoring: For 2010 and subsequent model year vehicles subject to section (f)(3.2.2)(A)(i) ***or (f)(3.2.5)***, the manufacturer shall perform a test at the malfunction criteria limit specified in section (f)(3.2.2)***(A)(i) or (f)(3.2.5)***. A misfire monitor demonstration test is not required for vehicles not subject to

section (f)(3.2.2)(A)(i) ***and not subject to section (f)(3.2.5)***.

* * * *

Amend section 1971.5, title 13, California Code of Regulations, to read as follows:

**Note**: The amendments proposed with the 45-day notice are shown in single underline to indicate additions and ~~single strikeout~~ to indicate deletions from the existing regulatory text, while amendments proposed with this 15-day notice are shown in double underline to indicate additions and ~~double strikeout~~ to indicate deletions from the existing regulatory text. Various portions of the regulations that are not modified by the proposed amendments are omitted from the text shown and indicated by " * * * * ".

**§1971.5. Enforcement of Malfunction and Diagnostic System Requirements for 2010 and Subsequent Model-Year Heavy-Duty Engines.**

(a) *General.*

* * * *

(3) *Definitions.*

The definitions applicable to these rules include those set forth in Health and Safety Code section 39010 et seq. and in Cal. Code Regs., title 13, section 1900(b) and section 1971.1(c), which are incorporated by reference herein. The following definitions are specifically applicable to section 1971.5 and take precedence over any contrary definitions.

* * * *

"*Nonconforming OBD System*" means an OBD system on a production engine that has been determined not to comply with the emission standards as defined in ~~requirements of~~ Cal. Code Regs., title 13, section 1971.1(c), ~~. For purposes of section 1971.5, an engine class shall be considered nonconforming~~ irrespective of whether engines in the engine class, on average, meet other applicable ~~tailpipe or evaporative~~ emission standards (e.g., exhaust emission standards defined in Cal. Code Regs., title 13, section 1956.8, evaporative emission standards defined in Cal. Code Regs., title 13, section 1976).

* * * *

Amend section 1968.5, title 13, California Code of Regulations, to read as follows:

**Note**: The amendments proposed with the 45-day notice are shown in single underline to indicate additions and ~~single strikeout~~ to indicate deletions from the existing regulatory text, while amendments proposed with this 15-day notice are shown in double underline to indicate additions and ~~double strikeout~~ to indicate deletions from the existing regulatory text. Various portions of the regulations that are not modified by the proposed amendments are omitted from the text shown and indicated by " * * * * ".

**§1968.5. Enforcement of Malfunction and Diagnostic System Requirements for 2004 and Subsequent Model-Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles and Engines.**

(a) *General*

* * * *

(3) *Definitions.*

The definitions applicable to these rules include those set forth in Health and Safety Code section 39010 et seq. and in title 13, CCR sections 1900(b) and 1968.2(c), which are incorporated by reference herein. The following definitions are specifically applicable to section 1968.5 and take precedence over any contrary definitions.

* * * *

*"Nonconforming OBD II System"* means an OBD II system on a production vehicle that has been determined not to comply with the emission standards as defined in ~~requirements of~~ title 13, CCR section 1968.2(c). ~~For purposes of section 1968.5, a motor vehicle class shall be considered nonconforming~~ irrespective of whether vehicles in the motor vehicle class, on average, meet other applicable ~~tailpipe or evaporative~~ emission standards (e.g., exhaust emission standards defined in title 13, CCR section 1960.1, evaporative emission standards defined in title 13, CCR section 1976).

* * * *