Steve Douglas

Attached are the Alliance for Automotive Innovation comments on the OBD regulations in the On-Road Heavy-Duty Engine and Vehicle Omnibus rulemaking.

ALLIANCE
FOR AUTOMOTIVE
INNOVATION

November 10, 2025

DELIVERED ELECTRONICALLY

Clerk of the Board
Air Resources Board
1001 I Street
Sacramento, CA 95814

Subject: On Board Diagnostic (OBD) – Heavy-Duty Engine and Vehicle Omnibus Rulemaking

Dear Board Members,

The Alliance for Automotive Innovation (Auto Innovators)[1] appreciates the opportunity to provide comments on the California Air Resources Board (CARB) On-Board Diagnostic (OBD) regulatory proposals[2] in the On-Road Heavy-Duty Engine and Vehicle Omnibus Regulation.[3] Our association and members are committed to working cooperatively and constructively with CARB staff to ensure vehicles developed and produced are efficient, clean, and affordable for all. Subject to the recommendations in this letter, we support the proposed changes to the OBD II regulations, which are necessary to allow compliance with CARB's OBD requirements beyond the 2026 model year (MY).

Before providing our recommendations, we want to recognize the work of CARB OBD staff over the past couple of years to understand and address our concerns. While we don't always agree, we always have an open and honest exchange of ideas, data, and analysis between CARB and industry engineers. This is critical to develop the regulations and OBD systems that ensure near-zero emission vehicles remain near zero throughout the vehicle life – a goal we jointly share.

The OBD regulations are the most technically complex regulations that CARB adopts. Technology forcing in every way, the cost of developing, validating, and certifying vehicles to meet these regulations is far from trivial. As we've previously noted, the OBD system consumes about half of

[1] Auto Innovators represents the full auto industry, including the manufacturers producing most vehicles sold in the U.S., equipment suppliers, battery producers, semiconductor makers, technology companies, and autonomous vehicle developers. Our mission is to work with policymakers to realize a cleaner, safer, and smarter transportation future and to maintain U.S. competitiveness in cutting-edge automotive technology. Representing approximately 5 percent of the country's GDP, responsible for supporting nearly 10 million jobs, and driving $1 trillion in annual economic activity, the automotive industry is the nation's largest manufacturing sector. (www.autosinnovate.org).
[2] The "OBD II Regulatory proposals" include those changes to 13 CCR 1968.2 (OBD regulations) and 1968.5 (OBD Enforcement regulation).
[3] California Air Resources Board. (2025, September 23). *On-Road Heavy-Duty Engine and Vehicle Omnibus, Low Carbon Fuel Standard, and Emergency Vehicle Emissions Regulations*. https://ww2.arb.ca.gov/rulemaking/2025/orhdomnibus

the vehicle's powertrain computing power. That is, the OBD system requires as much computing power as controlling the engine, transmission, fuel, and emission control systems.

There are, of course, tradeoffs for CARB developing the regulations and for automakers developing OBD systems. Turning on the Check Engine light prematurely or when no malfunction is present will quickly result in consumers ignoring the light. Moreover, just detecting a malfunction and turning on the Check Engine light is only half of the problem and in many cases even less. If the malfunction cannot be repaired or the repair is cost-prohibitive, consumers will lose confidence in the system, ignore the Check Engine light, and/or seek political changes to the emissions inspection programs. These are real concerns that could ruin an otherwise highly effective program.

Automakers and CARB staff have worked closely over the last couple of years on the OBD II changes in this rulemaking. Most changes provide relief from OBD requirements that have proven infeasible in the time required. Thus, the changes generally adjust the phase-in or thresholds and/or streamline implementation of and compliance with the regulations. We support these changes.

The remainder of this letter proposes additional changes to the OBD II regulations. These changes, which have been reviewed with CARB OBD staff, further streamline the regulations while maintaining a robust diagnostic system and improving the service and repair of these vehicles.

Freeze Frame Data Storage

13 CCR 1968.2(g)(4.3.2)(D) specifies the freeze frame data storage requirements for diagnostic emission critical electronic control unit (DEC-ECU).

> *(D) Freeze frame conditions shall be stored on two data frames per fault code (as described in section (d)(2.2.7)(B)). The OBD II system shall have the ability to store freeze frame conditions for a minimum of five fault codes per diagnostic or emission critical powertrain control unit on the vehicle.*

The OBD system stores not only the fault detected but also the vehicle operating parameters (e.g., engine speed, throttle position, load, engine coolant temperature, vehicle speed) at the time the fault is detected. These freeze frame conditions are stored in two data frames (one when the pending fault code (PFC) is stored and the other when the confirmed fault code is stored). By storing this information, the service technician can more quickly and accurately diagnose and repair emission system faults.

We support storing freeze frame conditions, but a requirement to store five fault codes with two data frames each for every DEC-ECU would require storing hundreds of freeze frame data elements necessitating a substantial redesign of the OBD system. Moreover, storing hundreds of data frames would be of little or no value to repair technicians. Many DEC-ECUs do not have the capability to store PFCs and instead simply report data to another DEC-ECU. Finally, DEC-ECUs do not necessarily directly communicate with a generic scan tool (GST), which technicians use to retrieve the fault codes and freeze frame data.

We do not believe that either CARB staff or industry intended to require the storage of such a large amount of data that will not help repair technicians. Instead, we understand the regulations intended to require the vehicle OBD system as a whole to store at least five fault codes with two data frames each (ten data frames), recognizing that multiple DEC-ECUs both store and communicate PFCs to GSTs. In practice, the majority of OBD systems contain multiple DEC-ECUs that both store PFCs and communicate with a GST, so the minimum requirement to store five fault codes system-wide will be exceeded. The changes we recommend below result in storing a large amount of freeze frame data – far more data than the OBD systems have historically stored and should help repair technicians swiftly and accurately repair malfunctions.

We recommend revising 13 CCR 1968.2(g)(4.3.2)(D) as follows:

> *(D) Freeze frame conditions shall be stored on two data frames per fault code (as described in section (d)(2.2.7)(B)). Except as provided below in sections (g)(4.3.2)(D)(i) and (ii), ~~T~~the OBD II system shall have the ability to store freeze frame conditions for a minimum of five fault codes ~~per diagnostic or emission critical powertrain control unit on the vehicle~~.*
>
> *(i) Each diagnostic or emission critical electronic control unit capable of storing and directly communicating five or more pending fault codes to a generic scan tool shall have the ability to store freeze frame conditions for a minimum of five fault codes from the population of fault codes that is communicated by that control unit to a generic scan tool.*
>
> *(ii) Each diagnostic or emission critical electronic control unit capable of storing and directly communicating one to four pending fault codes to a generic scan tool shall have the ability to store freeze frame conditions for all fault codes that are communicated by that control unit to a generic scan tool.*

The following table shows the number of fault codes required to be stored for different DEC-ECU configurations with our recommended changes. Note the OBD system, as a whole, must store a minimum of 5 fault codes. For example, if an OBD system had only 2 DEC-ECUs that stored and communicated 2 PFCs each, this would not meet the OBD system requirement of 5. Also, each fault code stored would contain two data frames.

DEC-ECU communication to GST*	Number of PFCs communicated to GST	Number of fault codes stored*
Communicates PFCs to GSTs	1 to 4	The maximum (1 to 4)
Communicates PFCs to GSTs	5 or more	Minimum of 5
Does not communicate PFCs to GST	0	0

NOx Emissions Tracking Requirements for 2-Bin Moving Average Window

For NOx emissions tracking, CARB staff proposed changes to include the 2-bin moving average window (2B-MAW) for 2031 and subsequent medium-duty (MD) diesel engines certified to an engine dynamometer standard but did not include MD diesel vehicles. We recommend adding these vehicles in 13 CCR 1968.2(g)(6)(J) if their gross combined weight rating is over 14,000 pounds as follows:

> *(J) 2-bin moving average window (2B-MAW) bins. For 2031 and subsequent model year medium-duty diesel engines certified to an engine dynamometer tailpipe emission standard and medium-duty diesel vehicles with a Gross Combination Weight Rating greater than 14,000 pounds, "Bin A" and "Bin B," described below, shall store data from overlapping 300-second windows of engine operation. Storage of data shall begin after engine start when 300 seconds of engine operation have elapsed for which none of the conditions described in (g)(6.12.3)(J)(iv) are met. Each second thereafter, the OBD system shall store the last 300 seconds of valid data in the appropriate bin. The OBD system shall discard any partial window of valid data (i.e., a window that contains less than 300 seconds of valid data) at the end of the driving cycle.*

Negative Response Code (NRC) $13

13 CCR 1968.2(g)(3.4.2)(A) prohibits the OBD II system from responding with an NRC $13 in response to a scan tool request that contains an invalid request message format. However, the NRC $13 response is the most appropriate feedback to a scan tool request message with an invalid format. SAE J1969-2 and the ISO14229-1 standards specify that the ECU send an NRC 0x13 (IncorrectMessageLengthOrFormat) in response to an invalid request message format. To avoid the ambiguity between these regulations and SAE and ISO standards, we recommend deleting 13 CCR 1968.2(g)(3.4.2)(A).

> *For vehicles using SAE J1979-2, except as provided in sections (g)(3.4.2)(A) through (g)(3.4.2)(F) and (g)(4.7.4)(A), **the OBD II system may respond with a negative response code (NRC) in response to a request message from a scan tool** in accordance with the specifications in SAE J1979-2.*
>
> ~~*(A) The OBD II system may not respond with **NRC $13** in response to a functional or physical request message from a scan tool with an invalid request message format.*~~

NOx Gap Testing

CARB staff made modifications to 1968.2 (f)(5.2.2)(D) and 1971.1 (e)(9.2.2)(D) regarding the requirements for NOx sensor monitoring capability ("NOx Gap"). The modifications reflect the provision that industry requested for manual adjustment of the test points based on potential overlap with other failure modes and for allowing bi-directional failure characteristics.

The proposed modification also achieves the industry request to allow other monitors to provide coverage when there is overlap of diagnostic coverage and an additional requirement not requested. Industry requested failures of alternate sensor monitors failing in the passing region to satisfy the requirement, but CARB is requiring that the SCR monitor fails at least one time.

This modification also satisfies the industry request for a provision of unintended system interactions when combining degraded catalysts with degraded sensors, but with two new requirements. CARB requires indication of system interactions in the service procedures, which is not an objectionable requirement, industry made no mention of Executive Officer (EO) request for approval for additional data submission to satisfy the lack of SCR detection with the original test points. This flexibility would be beneficial to manufacturers.

Industry requested additional provisions to correct discrepancies in the regulation that are not reflected in CARB's proposed draft regulation. Specifically,

1. CARB did not include any provisions for removing the testing burden for test points that were redundant to other testing requirements in the regulation (i.e., best performing unacceptable (BPU) catalyst with full useful life (FUL) sensors, as required in 1968.2 (h)(4.2))

2. CARB did not provide language to clarify and limit the required failure modes to sensor gain and sensor offset. Undefined requirements leave manufacturers left interpreting the regulation and allow future regulation expansion based on interpretation.

3. Industry had proposed alternate ways to determine the standard deviation required in the regulation that were not adopted. Lack of allowed methods to calculate standard deviation can overly burden the testing demands on the manufacturer to determine the standard deviation of the different monitors in many different conditions.

4. Industry had proposed the allowance to manually control the spacing of the test points to cover the desired spacing between FUL and BPU, but this was not adopted. Without this allowance, the requirements in the regulation could drive manufacturers testing the same functional point multiple times due to a small standard deviation, which is overly burdening to manufacturer testing resources for no functional benefit.

To incorporate these, we recommend the following changes to the regulations.

(i) For the NOx sensor on 2025 and subsequent model year vehicles, the manufacturer shall test sensor offset and sensor gain failure modes ~~each applicable failure mode of the NOx sensor (e.g., sensor offset high failure mode, sensor gain low failure mode)~~ with the component/system for the dependent monitor set at the best performing unacceptable level (e.g., with a best performing unacceptable catalyst). For each applicable NOx sensor failure mode, the manufacturer shall collect one data point with the sensor performance set at the sensor monitor malfunction threshold, ~~at least three~~ one data points with the sensor performance set above the sensor malfunction threshold, and at least three data points with the sensor performance set below the sensor malfunction threshold.

Sigma values shall be calculated using one of the following methods:
(a) the variance of the applicable NOx sensor monitor output (i.e., the variance calculated from the NOx sensor monitor result distribution for the malfunction threshold sensor for the sensor failure mode under consideration)
(b) calculated using NOx sensor component variance data (e.g., the variance calculated from the NOx sensor component distribution data from the NOx sensor supplier)
(c) mathematically to cover the functional space between the performance of the nominal NOx sensor and beyond BPU NOx sensor

(v) The manufacturer can satisfy a required test point from (f)(5.2.2)(D)(i)(b) with the demonstration testing requirements of (h)(4.5) when the demonstration test point matches the point required for (f)(5.2.2)(D)(i)(b).

Diesel Particulate Filter (DPF) NMHC

CARB staff modified 1968.2 (f)(9.2.4)(A)(ii) and 1971.1 (e)(8.2.4)(A)(iii) regarding the requirements for DPF NMHC monitoring. The modification reflects the request from industry to align the test out threshold with the modern emissions standards and the measurement accuracy of the emissions equipment.

Industry believes there is still no viable monitoring technology for stand-alone DPF NMHC, and this requirement is redundant to DPF filtration efficiency requirements based on real-world failure mechanisms for DPFs. Thus, the DPF NMHC stand-alone requirement is not necessary, drives burdensome and unnecessary testing, and drives architecture and emissions control decisions that are counter to CARBs objective of lowering tailpipe emissions.

We recommended the following revisions to the draft OBD language:

(9.2.4)(A)

(iv) For OBDII systems that have a DPF filtration efficiency monitor that fulfills the requirements of section (f)(9.2.1), the manufacturer may use the DPF filtration efficiency monitor to fulfill the NMHC conversion performance monitoring requirements of section (f)(9.2.4)(A)(i) and (f)(9.2.4)(A)(ii).

(9.2.4) Catalyzed PM Filter:
(B) Feedgas generation:
(ii) For 2025 and subsequent model year vehicles, for catalyzed PM filters used to generate a feedgas constituency to assist SCR systems (e.g., to increase NO2 concentration upstream of an SCR system), the OBD II system shall detect a malfunction when the catalyzed PM filter is unable to generate the necessary feedgas constituents to the point when emissions exceed:
a. For Low Emission Vehicle III applications, any of the applicable NMOG+NOx emission thresholds set forth in Table 2 in the beginning of section (f).
b. For medium-duty vehicles (including MDPVs) certified to an engine dynamometer tailpipe emission standard, 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.
(iii) For OBD II systems that have a catalyzed PM filter NMHC conversion monitor, ~~or~~ are exempt from the catalyzed PM filter NMHC conversion monitoring requirements in accordance with section (f)(9.2.4)(A) or are using alternate coverage in accordance with section (f)(9.2.4)(A)(iv), the manufacturer is not required to meet the feedgas generation performance monitoring requirements of sections (f)(9.2.4)(B)(i) and (f)(9.2.4)(B)(ii).

Multiple Catalyst Monitoring

CARB staff made modifications to 1968.2 (d)(4.3.2)(P) and 1971.1 (d)(4.3.2)(O) regarding the IUMPR denominator requirements for SCR systems with multiple catalysts in series. The modifications allow for EO approval for special denominators for dual SCR architectures, which resolved the concern for low monitoring opportunities due to the functional behavior of multiple SCR architectures.

The language does not have an automatic allowance for a special denominator (i.e., tied to minimum NOx levels for monitoring), and requires manufacturers to seek CARB EO approval for each situation. We request CARB allow the special denominator in this situation without EO approval for every occurrence. Additionally, industry requests clarification that the aging levels of the adjoining SCR would be at FUL, consistent with other component diagnostic demonstration method. These provisions, which were mutually agreed upon by industry and CARB staff, are an essential option for aftertreatment systems that incorporate multiple Diesel Oxidation Catalysts (DOCs) arranged in series.

DPF Efficiency IUMPR and OBD thresholds

CARB staff made modifications to 1968.2 (d)(3.2.1)(G)(iv), 1968.2 (h)(2.2), 1968.2 (k)(7.3), 1968.2 (f) Table3 and 1968.2 (f)(9.2.1)(A)(ii) regarding the requirements for DPF efficiency monitoring on the implementation timing for revised requirements. The modifications match the requested 3-year delay to the increased In-Use Monitor Performance Ratio (IUMPR) and the decreased OBD threshold for PM due to the projected commercial availability of the sensing technology needed to comply with the requirement. Current PM sensing technology is not capable of robustly meeting the requirement, thus if the new PM sensing technology proves to be infeasible, additional modifications will be needed to the requirement.

CARB staff's recent "Workshop for Drive Forward Light-duty Vehicle Program Confirmation" reflects a commitment to improving vehicle affordability. With this in mind, industry urges CARB to reconsider mandating costly new PM sensing technologies intended to increase IUMPR while lowering OBD emission thresholds for DPF efficiency monitoring.

The commercialization of these technologies represents a significant financial burden, and their impact on air quality is questionable. Current systems already demonstrate effective in-use monitoring: for healthy vehicles, the DPF efficiency monitor achieves an IUMPR of approximately 0.150, meeting the program's goal of real-world monitoring. Field data further shows that faulted systems yield significantly higher IUMPR values, consistent with the sensor's design to detect PM bridging the electrode gap (higher PM to the sensor equates to quicker detection).

The proposed regulations would require increased monitoring frequency of healthy systems, which does not correlate with improved air quality. In contrast, today's technology effectively identifies faulted systems, triggers the MIL, and prompts necessary repairs, actions that directly benefit air quality. Therefore, the cost of implementing new technology is misaligned with the intended actual air quality outcomes.

OBD Enforcement Regulation Relief for J1979-2 CCM readiness

CARB staff made modifications to 1968.5(c)(3)(A)(vii) and 1971.5 (d)(3)(A)(vii) regarding the enforcement requirements for nonconformance of I&M readiness. This modification provides short-term relief for implementation errors for the SAE J1979-2 readiness group for CCM. However, this short-term relief is insufficient, as there are many components that fall into the category of CCM, and the size of the CCM group can be very large. Because of the group size, and the high dynamics of the components that can fall into this category, the risk of implementation errors remains high after the short-term relief period expires. Industry recommends that this relief for CCM inspection and maintenance (I&M) readiness be made permanent in the enforcement regulations.

We recommend the following revisions to the draft OBD Enforcement regulatory language:

> (vii) The motor vehicle class cannot be tested so as to obtain valid test results in accordance with the criteria identified in section (b)(6)(C)(ii) due to the nonconforming OBD II system., except for the following:
>
> a. Gasoline comprehensive component readiness bit (title 13, CCR section 1968.2 (g)(4.1.2)(B)(xiv)) for ~~2030 and earlier model year~~ vehicles that use SAE J1979-2.
>
> b. Diesel comprehensive component readiness bits (title 13, CCR section 1968.2 (g)(4.1.2)(B)(xxix)) for ~~2030 and earlier model year~~ vehicles that use SAE J1979-2.

I&M Readiness "Automatic Readiness" Setting Provision

Auto Innovators generally supports the proposed amendments to the readiness status provisions in 13 CCR 1971.1 (h)(4.1.1)(J) and (h)(4.1.2)(G) and 13 CCR 1968.2 (h)(4.1.2)(G) and (g)(4.1.2)(G), which introduce alternate criteria for monitor completion in evaluating readiness status. These changes aim to address challenges associated with monitors that do not run frequently in-use by allowing readiness status to be set to "complete" if the vehicle has accumulated at least 15 warm-up cycles and either 200 miles (1968.2) or 400 minutes of engine run time (1971.1) since the fault memory was last cleared, provided no permanent diagnostic trouble code (PDTC) is stored for the monitor in question.

We support the inclusion of minimum vehicle usage criteria (i.e., warm-up cycles and mileage or engine run time) as a practical solution to improve readiness status completion. However, requiring the readiness status to be "incomplete" if a PDTC is stored defeats the purpose of this minimum vehicle usage criteria to set readiness as "complete."

Industry previously raised concerns to CARB staff that certain monitors – especially those dependent on specific ambient conditions or driving behaviors – may not run frequently enough for readiness status to complete under typical vehicle usage patterns. This issue is particularly pronounced in regions with seasonal climate variations or for vehicles with limited or specialized usage.

Because I&M programs use readiness status as a criterion for passing emissions tests, an incomplete readiness status can prevent vehicle registration – even after repairs have been made and the vehicle's emissions systems are functioning properly. We appreciate CARB's efforts to address this issue, but the proposed inclusion of PDTC status in the alternate readiness criteria introduces unnecessary complexity and does not fully resolve the problem.

PDTCs serve a distinct purpose from readiness status. They are used by I&M programs to prevent clearing fault codes prior to an I&M test without having fixed an emissions-related fault. While PDTCs can be a valid basis for failing a vehicle in an I&M test, they should not be used to block readiness status completion. Doing so conflates two separate diagnostic functions and limits the flexibility of I&M program administrators to tailor pass/fail criteria to their jurisdiction's needs.

For example, consider a scenario where a heater performance monitor fails during cold winter months, triggering a MIL and prompting a repair. If the repair is completed in spring, and the vehicle no longer encounters cold ambient conditions, the monitor may not rerun for six months or more, leaving both a PDTC and the readiness group incomplete. Under the revised provisions, readiness status could be set complete based on vehicle usage – but only if no PDTC is present. This undermines the intent of the alternate criteria and may unfairly penalize vehicle owners and confuse state I&M program administrators that may have to exempt that specific monitor for both readiness and PDTC fail criteria.

Auto Innovators recommends CARB remove the PDTC condition from the alternate readiness status criteria and allow I&M programs to independently determine how PDTCs factor into their inspection protocols. This approach preserves the integrity of both readiness status and PDTC functions while supporting practical implementation across diverse operating environments.

> *(G) For condition (1) described in section (g)(4.1.2)(B), for a monitor that increments the denominator using any of the criteria in sections (d)(4.3.2)(C) through (J) and (L) through (P), the monitor may be considered to have "fully executed and determined that the component or system is not malfunctioning" if the following criteria are met:*
>
> *(i) at least 15 warm-up cycles have occurred since the fault memory was last cleared,*
>
> *(ii) at least 200 miles have accumulated since the fault memory was last cleared~~, and~~*
>
> ~~*(iii) no permanent fault code is stored for that monitor*~~

Permanent Diagnostic Trouble Code (PDTC) for Automatic Readiness Setting

As outlined in the I&M Readiness "Automatic Readiness" Setting Provision section above, monitors that run infrequently may result in PDTCs being "stuck" in permanent memory after a repair has already been completed and the emissions system operating properly. The recommendation provided in that section provides appropriate relief to prevent customers from failing I&M because the *readiness is not complete*.

However, even if the readiness is automatically set to "complete" , the vehicle will still fail I&M because a *PDTC* cannot be cleared. The California Bureau of Automotive Repair (BAR) website indicates that they have (presumably) faced a large volume of these cases and have had to implement a temporary measure to pass vehicles which with a PDTC provided the vehicle has completed a specific number of warm up cycles and mileage. Rather than each state I&M program administrator setting different requirements, we recommend CARB address this problem in the OBD regulations to prevent unnecessary issues for customers.

We recommend an additional method of clearing PDTC's outlined in 13 CCR 1968.2 (2.5.4) and 13 CCR 1971.1 (2.3.1)(D) and (2.3.2)(E):

This proposal uses similar criteria to what BAR has been using as a temporary solution but limits the scope to only DTCs that use the listed special denominators.

1968.2(d)(2.5.4)

For a monitor that increments the denominator using any of the criteria in sections (d)(4.3.2)(C) through (J) and (L) through (P), the OBD II system shall erase a permanent fault code if the following criteria are met:

(i) at least 15 warm-up cycles have occurred since the fault memory was last cleared, and
(ii) at least 200 miles have accumulated since the fault memory was last cleared.

1971.1 (d)(2.3.1)(D)

For a monitor that increments the denominator using any of the criteria in sections (d)(4.3.2)(C) through (I) and (K) through (O), the OBD system shall erase a permanent fault code if the following criteria are met:

(i) at least 15 warm-up cycles have occurred since the fault memory was last cleared, and
(ii) at least 400 minutes of engine run time have accumulated since the fault memory was last cleared

1971.1 (d)(2.3.2)(E)

For a monitor that increments the denominator using any of the criteria in sections (d)(4.3.2)(C) through (I) and (K) through (O), the OBD system shall erase a permanent fault code if the following criteria are met:

(i) at least 15 warm-up cycles have occurred since the fault memory was last cleared, and
(ii) at least 400 minutes of engine run time have accumulated since the fault memory was last cleared

PVET(j)(3) and PEVE(l)(3) Templates

Originally, CARB staff proposed specific and resource intensive templates for 1968.2 (j) Production Vehicle Evaluation Testing (3) Verification and Reporting of In-use Monitoring Performance and 1971.1 (l) Production Engine/Vehicle Evaluation Testing (3) Verification and Reporting of In-use Monitoring Performance. We appreciate that CARB staff has withdrawn the proposed templates for these two post-production programs.

Aging Harmonization

CARB staff proposes amendments to 13 CCR 1968.2 (h)(2.3.2) and 1971.1 (i)(2.3.5) allowing manufacturers the option to align with EPA's durability aging provisions in 40 CFR 1036.245, as they existed on April 8, 2025. We support this amendment, because FUL durability aging for OBD certification should not differ from the same aging for tailpipe emission certification. Harmonizing the aging provisions between EPA and CARB is critical for consistency across agencies and vehicle weight categories (MD and HD engine dynamometer certifications).

However, CARB still requires extensive data collection to validate the accelerated aging process, including parameters that may not be relevant to aging or that simply reflect diverse product use cases. This raises concerns because aging does not result in a single "standard" aged system—rather, it varies widely based on vehicle usage. CARB has stated that this data will not be used as approval criteria for the accelerated aging process yet still insists on collecting it. Manufacturers have not been informed about CARB's expected conclusions or how the data will be used. While CARB may use the data to confirm different vehicle use cases, this does not necessarily relate to aging correlation. Technical literature and manufacturer experience indicate that aging is primarily a function of time at temperature. Therefore, parameters reflecting time and temperature may be useful for aging correlation, whereas other requested data points may provide little value.

Additionally, as noted previously, CARB requires multiple post-production validation programs – including aging correlation for worst performing acceptable (WPA) and BPU systems, manufacturer self-testing, and Clean Truck Check (CTC).

Auto Innovators recommends CARB staff and industry review these programs to eliminate duplicative requirements that unnecessarily increase product costs, that are quickly becoming a barrier to the adoption of new, lower-emission vehicles and engines.

DEC-ECUs PVET Testing

Auto Innovators recommend updates to 13 CCR 1968.2 sections (j)(1) and (j)(2) and 13 CCR 1971.1 sections (l)(1) and (l)(2) concerning Production Vehicle Evaluation Testing and Production Engine/Vehicle Evaluation Testing.

Specifically, we recommend changes to (j)(1.4.2)(E) and (l)(1.4.3)(E) to limit "Verification of Standardized Requirements" testing to each DEC-ECU that can directly communicate any emission-related fault code (permanent, confirmed, pending) to a generic scan tool via the diagnostic connector.

This change addresses the current requirement to perform J1699 testing on every DEC-ECU, which is unnecessary when a DEC-ECU does not communicate fault codes directly to a GST. J1699 testing is designed to verify fault code communication with a single fault implemented in a DEC-ECU. However, some DEC-ECUs rely on another ECU to transmit fault codes, making direct testing redundant and unnecessary. Moreover, accessing certain DEC-ECUs can be extremely difficult, often requiring removal of airbags, seats, or other components. The (j)/(l)(1) testing also has a tight timeline – results are due within three months of production start – so manufacturers typically perform this testing at assembly plants.

Manufacturers propose removing these requirements for DEC-ECUs that do not directly communicate fault codes and instead performing verification during (j)/(l)(2) "Verification of Monitoring Requirements", which has a longer deadline, covers nearly all DTCs, and is usually handled by engineering teams.

Auto Innovators recommends adding new sections (j)(2.3.7) and (l)(2.3.8) requiring manufacturers to confirm that fault codes are communicated to a generic scan tool for DEC-ECUs that rely on another ECU for communication. We also recommend adding (j)(1.4.4) and (l)(1.4.5) to allow manufacturers to omit testing specific DEC-ECUs with Executive Officer approval when testing would risk vehicle damage or personnel safety.

We recommend the following changes and additions to 13 CCR 1968.2.

Section (j)(1.4.2)(E):

(1.4.2) The testing shall further verify that the vehicle can properly communicate to any SAE J1978 scan tool:

***

(E) Any emission-related fault code (permanent, confirmed, and pending) in accordance with SAE J1979 or SAE J1979-2, whichever is applicable, (including correctly indicating the number of stored fault codes and MIL command status (e.g., Mode/Service $01, PID $01, Data A for SAE J1979, Service $22, PID $F501 for SAE J1979-2)) and section (g)(4.4) for each diagnostic and emission critical electronic powertrain control unit that is capable of directly communicating any emission-related fault code (permanent, confirmed, pending) to a generic scan tool communicating to the vehicle via the diagnostic connector.

Add New Section (j)(1.4.4):

Subject to Executive Officer approval, manufacturers may omit demonstration of specific diagnostic and emission critical electronic powertrain control units. The Executive Officer shall approve a manufacturer's request if the demonstration cannot be reasonably performed without causing physical damage to the vehicle (e.g., on-board computer internal circuit faults) or jeopardizing the safety of personnel performing the demonstration.

Add New Section (j)(2.3.7):

The evaluation shall verify the following functions for each DEC-ECU which cannot communicate directly with a generic scan tool:

A. Functions described by (j)(1.4.2), as supported by the DEC-ECU
B. The MIL illuminates and an emissions-related fault code is stored and available to be read by a generic scan tool for communication disruptions between a scan tool facing ECU and the DEC-ECU
C. If a manufacturer cannot reasonably demonstrate specific test cases on a vehicle, the Executive Officer may approve alternative demonstration methods or may omit testing the DEC-ECU

We recommend the following changes and additions to 13 CCR 1971.1:

Section (l)(1.4.3)(E):

(1.4.3) The testing shall further verify that the following information can be properly communicated to any SAE J1978/J1939 scan tool:

***

(E) An emission-related fault code (permanent, confirmed, pending, MIL-on, and previously MIL-on) in accordance with SAE J1979/J1979-2/J1939-73 (including correctly indicating the number of stored fault codes and MIL command status (e.g., Mode/Service $01, PID $01, Data A for SAE J1979, Service $22, PID $F501 for SAE J1979-2, or J1939/73 Diagnostic Message 1)) and section (h)(4.4) for each diagnostic and emission critical electronic powertrain control unit that is capable of directly communicating any emission-related fault code (permanent, confirmed, pending, MIL-on, and previously MIL-on) to a generic scan tool communicating to the vehicle via the diagnostic connector.

Add New Section (l)(1.4.5):

Subject to Executive Officer approval, manufacturers may omit demonstration of specific diagnostic and emission critical electronic powertrain control units. The Executive Officer shall approve a manufacturer's request if the demonstration cannot be reasonably performed without causing physical damage to the vehicle (e.g., on-board computer internal circuit faults) or jeopardizing the safety of personnel performing the demonstration.

Add New Section (l)(2.3.8):

The evaluation shall verify the following functions for each DEC-ECU which cannot communicate directly with a generic scan tool:

A. Functions described by (l)(1.4.3), as supported by the DEC-ECU
B. The MIL illuminates and an emissions-related fault code is stored and available to be read by a generic scan tool for communication disruptions between a scan tool facing ECU and the DEC-ECU
C. If a manufacturer cannot reasonably demonstrate specific test cases on a vehicle, the Executive Officer may approve alternative demonstration methods or may omit testing the DEC-ECU

CARB has stated that (j)/(l)(2) testing is more limited than (j)/(l)(1) testing, and therefore do not support the proposed changes above. However, this position fails to address the key challenges manufacturers face: (1) the difficulty of physically accessing modules to install faults, (2) the extremely short timeline for completing (j)/(l)(1) testing, and (3) the duplicative nature of the process, which makes the overall test program unnecessarily burdensome. It is important to note that (j)/(l) testing was never intended to be comprehensive. Its short deadline and primary objective – to confirm that the vehicle communicates properly with I&M stations – reflect its original purpose as a quick verification process during the transition to on-board data utilization for I&M programs.

Additionally, CARB OBD staff has not addressed the very real safety risks and complexity of removing critical components (e.g., airbags) to access certain DEC-ECUs for communication testing. CARB has suggested that manufacturers should design vehicles to accommodate CARB's post-production test programs. This expectation overlooks the significant design and engineering trade-offs required to develop new vehicles that comply with numerous safety and emission regulatory requirements, not just OBD.

Manufacturer Self-Testing (MST) to Increased FUL Alignment

CARB OBD staff is proposing amendments to Section 13 CCR 1971.5(c)(2) MST regarding engine selection for manufacturer self-testing. These changes are driven by the significant increase in Full Useful Life (FUL) requirements under EPA's 2027 and later model year heavy-duty engine rule (see Table 4 to Paragraph (e) of 40 CFR 1036.104).

Specifically, while the previous requirement was to test at 70-100% of FUL mileage, CARB now proposes:

- Reducing the required percentage of certified FUL mileage for self-test engines to:
    - 60–100% for diesel/compression-ignition heavy heavy-duty engines
    - 55–100% for diesel/compression-ignition medium heavy-duty engines
    - 50–100% for diesel/compression-ignition light heavy-duty engines and
    - 50–100% gasoline/spark-ignited engines
- Extending the self-test program completion deadline from 3 years to 4 years.

Industry appreciates these adjustments, which provide some relief in mileage percentage and timing. However, we remain concerned that locating vehicles in the real world that accumulate the required mileage within 4 years will be extremely challenging, if not impossible. While these mileage and time requirements might be appropriate for line-haul applications (e.g., long-haul trucks traveling hundreds of miles every day), it does not adequately account for other duty cycles, such as local delivery vehicles, which may only accumulate 65 miles per day.

Auto Innovators requests CARB to consider the practical limitations and explore alternative approaches that reflect the diversity of real-world vehicle usage. As shown in the following table, the 2027+ mileage requirements are much higher even if vehicles are allowed an extra year to accumulate that mileage.

Application	CARB Proposed Percent of certified FUL mileage	1036.104 FUL Miles	27MY+ MST Mileage Range	Pre-2027MY MST Mileage Range
Diesel/compression-ignition heavy heavy-duty engines	60 - 100	650,000	390,000 - 650,00	304,500 - 435,000
Diesel/compression-ignition medium heavy-duty engines	55 - 100	350,000	192,500 - 350,000	129,500 - 185,000
Diesel/compression-ignition light heavy-duty engines	50 - 100	270,000	135,000 - 270,000	77,000 - 110,000
Gasoline/spark-ignited engines	50 - 100	200,000	100,000 - 200,000	77,000 - 110,000

Industry requests that CARB retain the pre-2027 model year MST mileage range. This will improve the likelihood of sourcing vehicles with appropriate mileage from those available in the field. This request is based on several considerations:

- MST is only one of multiple post-production test programs, which also include:
  - BPU and WPA aging correlation
  - NOx REAL data collection and submission
  - Production Engine Vehicle Evaluation Testing
- Vehicle owners are already required to comply with quarterly inspections under Clean Truck Check (CTC) or Heavy-Duty Inspection and Maintenance programs for diesel and alternative-fueled engines.

The MST program represents a significant cost burden—estimated at ~$1 million per program for procurement, testing, hosting witnesses, and related activities, assuming no remediation is required. Spending $1 million to confirm expected product performance seems unnecessary given the addition of quarterly inspection testing for vehicles operating in California.

During discussions, CARB offered to extend the MST program deadline from 3 years to 4 years, as reflected in the proposal. However, this extension adds complexity for manufacturers because the engineers and technical experts involved in product development are often no longer in the same roles after 2–3 years.

While industry appreciates the limited relief provided in the proposed changes, we strongly believe this program should be evaluated in the context of other post-production testing requirements and quarterly CTC inspections. A more practical approach would be transitioning MST to an audit-based program rather than maintaining a standing annual requirement for every model year.

OBD Threshold Alternate Malfunction Criteria (HC/CO)

CARB staff proposes to amend the Exceptions to Monitoring Requirements within 1968.2 Gasoline/Spark-Ignited medium-duty vehicles certified to an engine dynamometer tailpipe emission standard in (e)(17.1.4) including: (B) Alternate Malfunction Criteria (iv) and (v), (C) Alternate Malfunction Criteria for engine cooling system thermostat monitor (iii) and (iv), and (D) Alternate test-out criteria (i - iv).

CARB staff also amended 1968.2 (f)(17) Exceptions to Monitoring Requirements for medium-duty diesel vehicles certified to an engine dynamometer tailpipe emission standard in (f)(17.1.4) including (B) Alternate malfunction criteria (iv) and (v), (C) Alternate malfunction criteria for engine cooling system thermostat monitor (iii) and (iv), and (D) Alternate test-out criteria (iv) and (v).

Similarly, CARB is proposing to amend 13 CCR 1971.1 (g)(5) Alternate malfunction criteria and monitoring test-out criteria for diesel/compression-ignition engines in (5.2.1)(F) and (G) and (5.2.2)

Alternate malfunction criteria for gasoline/spark-ignited engines in (E) and (F) and in (5.2.3) Alternate malfunction criteria for engine cooling system thermostat monitor. These exceptions are like the exceptions codified in CARB's OBDII/HDOBD regulations included in 2021 versions (the original HD Low NOx Omnibus) for NOx and PM constituents.

Auto Innovators agrees with CARB's proposal to update its regulation to align with EPA's 40 CFR 1036.110 which provides alternate malfunction and test-out criteria for NMHC and CO corresponding to the lower exhaust emission standards in EPA's 27MY+ HD engine rule. As exhaust emission standards become more stringent, the variability in measured exhaust emissions increases. To effectively detect faults under these conditions, a greater separation between “WPA (good)” and “BPU (faulted)” components or systems is required to account for this increased dispersion. This need for wider OBD emission thresholds is not new and has been codified in many other exhaust emissions programs (e.g., LEV III, LEV IV). This proposal is essential to prevent situations where manufacturers are unable to certify to lower exhaust emission standards due to challenges in meeting OBD malfunction criteria (i.e, a vehicle could meet a lower emission standard, but instead meets a less stringent standard for the sake of complying with OBD requirements). Such barriers undermine the purpose of these standards and the goal of improving air quality. This issue has occurred for some manufacturers in the past, prioritizing OBD robustness, which is paramount for all stakeholders, at the expense of environmental progress through lower exhaust emissions.

Conclusion

Auto Innovators and our members appreciate the work of CARB staff on this proposal, which we support, and recommend the additional changes above. We look forward to continuing to work with CARB staff to streamline and improve the OBD program.

Sincerely,

Dan Bowerson
Vice President, Energy & Environment
dbowerson@autosinnovate.org