Updated Informative Digest

Proposed Revisions to the On-Board Diagnostic System Requirements and Associated Enforcement Provisions for Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles and Engines, and Heavy-Duty Engines

Sections Affected:

Proposed amendments to California Code of Regulations, title 13, section(s) 1968.2, 1968.5, 1971.1, and 1971.5

Documents Incorporated by Reference (Cal. Code Regs., tit. 1, § 20, subd. (c)(3)):

In the interest of completeness and in accordance with Government Code section 11347.1, subdivision (a), staff added the following documents to the rulemaking record:

- SAE International (SAE) J1979-DA, "Digital Annex of E/E Diagnostic Test Modes," April 2021, sections 1968.2(g)(1.4.1) and 1971.1(h)(1.4.1)
- SAE J1979-2 – "E/E Diagnostic Test Modes: OBDonUDS," April 2021, sections 1968.2(g)(1.4.2) and 1971.1(h)(1.4.2)
- Data Record Reporting Procedures for Over-the-Air Reprogrammed Vehicles and Engines Using SAE J1979-2, December 15, 2021; sections 1968.2(g)(8.1.1) and 1971.1(h)(6.1.1)
- 40 Code of Federal Regulations (CFR) 86.082-2, as it existed on January 25, 2018; section 1968.2(c)
- 40 CFR 86.094-2, as it existed on January 25, 2018; section 1968.2(c)
- 40 CFR 86, Appendix I, section (a), as it existed on July 8, 2019; section 1968.2(c)
- 40 CFR 86, Appendix I, section (f)(1), as it existed on January 25, 2018; section 1968.2(c)
- 40 CFR 86, Appendix I, section (f)(2), as it existed on January 25, 2018; section 1968.2(c)

Background and Effect of the Proposed Regulatory Action:

On-Board Diagnostic (OBD) systems serve an important role in helping to ensure that on-road vehicles and engines maintain low emissions throughout their full lives. OBD systems monitor virtually all emission controls on engines and vehicles, including catalysts, particulate matter (PM) filters, exhaust gas recirculation systems, oxygen sensors, evaporative systems, fuel systems, electronic powertrain components, and other components and systems that can affect emissions when malfunctioning. The systems also provide specific diagnostic information in a standardized format through a serial data link on-board each vehicle. The

use and operation of OBD systems also ensure reductions of in-use motor vehicle and motor vehicle engine emissions through the incentive they create for manufacturers to improve emission system durability and performance.

The Board originally adopted comprehensive OBD regulations in 1990, requiring all 1996 and newer model year passenger cars, light-duty trucks, and medium-duty vehicles and engines to have OBD II systems. The Board subsequently updated the OBD requirements in 2002 with the adoption of California Code or Regulations, title 13, sections 1968.2 and 1968.5, which established OBD II requirements (Cal. Code Regs., tit. 13, § 1968.2) and enforcement requirements (Cal. Code Regs., tit. 13, § 1968.5) for 2004 and subsequent model year vehicles. The Board has modified the OBD II regulation in several updates since initial adoption to address manufacturers' implementation concerns and, where needed, to strengthen specific monitoring requirements. In 2005, CARB adopted California Code or Regulations, title 13, section 1971.1, which established comprehensive OBD requirements for 2010 and subsequent model year heavy-duty engines and vehicles (i.e., vehicles with a gross vehicle weight rating greater than 14,000 pounds), referred to as Heavy Duty OBD (HD OBD). The Board subsequently updated the HD OBD regulation in 2009 and adopted HD OBD-specific enforcement requirements (Cal. Code Regs., tit. 13, § 1971.5). The Board last adopted comprehensive updates to the OBD II and HD OBD regulations in 2018.

Since then, CARB staff identified a number of new proposed amendments to the OBD II and HD OBD regulations that it believes are warranted. The majority of the proposed amendments are related to the new proposed requirement for manufacturers to implement Unified Diagnostic Services (UDS) features on vehicles and engines using the International Organization for Standardization (ISO) 15765-4 communication protocol. The use of UDS for OBD communications would significantly increase the number of available fault codes for manufacturers to use, provide more information related to emissions-related malfunctions that are detected by OBD systems, improve the usefulness of the generic scan tool to repair vehicles, and provide needed information on in-use monitoring performance. UDS implementation would be required for all 2027 and subsequent model year light- and medium-duty vehicles and engines, as well as heavy-duty vehicles and engines that use the ISO 15765-4 protocol. Notwithstanding, manufacturers would be permitted to implement UDS as early as the 2023 model year. The proposed amendments related to the use of UDS include:

- Increasing the amount of information required to be provided by each supported fault code;
- Increasing the number of freeze frames, readiness status, and in-use monitor performance ratio (IUMPR) data required to be supported;
- Adding new data parameters that are required to be tracked and reported for the purposes of evaluating in-use monitoring activity; and
- Adding necessary SAE International document references to complement these new UDS requirements.

Staff also identified other proposed amendments to the OBD II regulation that it believes are warranted and necessary. The proposed amendments would address manufacturers' implementation concerns, enhance some existing requirements, and provide clarification on other requirements. The proposed amendments to the OBD II regulation include:

- Revising the monitoring requirements for cold start emission reduction strategies (CSERS) to include more details on which features of the emission control system need to be monitored and under which conditions, and requiring new data to be tracked and reported related to CSERS activity;
- Adding new monitoring requirements to detect engine stalls on gasoline vehicles/engines to ensure the idle speed system monitor covers stall malfunctions on virtually all engine starts;
- Requiring more stringent emission malfunction thresholds for the PM filter monitor in conjunction with relaxing the IUMPR requirements;
- Revising the non-methane hydrocarbon (NMHC) catalyst and catalyzed PM filter monitoring requirements for feedgas generation performance to provide clarifications and to make compliance easier to achieve;
- Updating the supporting data requirements for the diesel oxides of nitrogen (NOx) sensor diagnostic to better ensure the robustness of monitoring strategies that rely on sensor readings;
- Specifying the data manufacturers are required to submit to support the diesel catalyst/adsorber laboratory aging protocols and catalyst/adsorber monitor malfunction criteria and the associated acceptance criteria;
- Requiring the ability of vehicles to seal the evaporative system when commanded by a generic scan tool to aid service technicians in finding and fixing detected evaporative system leaks;
- Revising the durability demonstration testing requirements to allow for alternate methods to conduct retesting; and
- Revising the production vehicle evaluation testing requirements to decrease the number of tests required for verification of monitoring requirements and to collect more data from in-use vehicles.

Staff also proposed similar amendments to the HD OBD regulation, section 1971.1, where necessary to harmonize the requirements with regard to the UDS-related amendments, the CSERS monitor and tracking data amendments, the engine stall monitor amendments, the NOx sensor monitoring amendments, and the diesel catalyst/adsorber monitor malfunction criteria amendments. Lastly, staff proposed amendments to correct regulatory language regarding diesel misfire monitoring.

A number of minor amendments were also proposed as part of this rulemaking. Staff proposed amendments to the OBD II enforcement regulation (section 1968.5) to align with the proposed changes to the OBD II regulation, specifically to account for the proposed amendments related to the UDS features and to add nonconformance criteria for the proposed IUMPRs applicable to the PM filter monitor. Staff also proposed amendments to the HD OBD enforcement regulation (section 1971.5) to align with the proposed amendments related to the UDS features in the HD OBD regulation. Lastly, additional amendments were proposed to correct section reference errors, typographical errors, and other minor errors in the regulations.

Objectives and Benefits of the Proposed Regulatory Action:

The objectives and benefits of the proposed amendments remain largely unchanged from the 45-Day Notice as released to the public on June 1, 2021 and available here: *https://ww2.arb.ca.gov/rulemaking/2021/obd2021*.

The proposed amendments to the OBD II and HD OBD regulations will provide manufacturers with greater compliance flexibility, and will strengthen and clarify the requirements they are expected to meet in designing and developing robust OBD systems. These amendments will further ensure that OBD systems will be effective in detecting emission-related malfunctions during in-use driving and providing more timely identification and repair of malfunctions, therefore minimizing excess in-use emissions. Manufacturers will also be further encouraged to design and build more durable engines and emission-related components, all of which will help ensure that forecasted emission reduction benefits from adopted light-, medium-, and heavy-duty vehicle and engine emission control programs are achieved in-use. Ultimately, the proposed action will further the goal of CARB, which is to promote and protect public health, welfare and ecological resources through the effective and efficient reduction of air pollutants, and provide safe, clean air to Californians. No quantifiable benefit to worker safety is expected.

CARB carried out an extensive public process. CARB began the OBD regulatory update process at the end of 2016, when CARB staff had meetings with industry to discuss UDS-related amendments to the OBD regulation. CARB staff then began meetings with SAE committee members in 2017 to help develop the specifications related to the proposed UDS-related requirements in the SAE standards. CARB held a public workshop in El Monte on February 27, 2020, to discuss the proposal and to seek comments. Interested stakeholders participated in the workshop in person or via webinar. The workshop notice and workshop presentation were posted on the OBD Program website prior to the workshop. CARB staff also presented and sought comments regarding elements of the upcoming proposed amendments to the OBD regulations during SAE OBD symposiums held in September 2019 (Garden Grove, California), September 2020 (virtual symposium) and March 2021 (virtual symposium). These symposiums were attended by vehicle and engine manufacturers, scan tool manufacturers, and individuals involved in various other aspects of the automotive industry. CARB also presented and sought comments about the proposal during a Truck and Engine Manufacturers Association (EMA) compliance workshop in April 2020. Additionally, CARB staff held numerous teleconferences with the Alliance for Automotive Innovation and EMA, which represent the vast majority of stakeholders affected by the proposed rulemaking, as well as numerous meetings and correspondences (comprising of teleconferences, in-person meetings, and e-mail correspondences) with individual manufacturers. The proposal was developed in close collaboration with these stakeholders. As a result of the comments received throughout the regulatory process, staff made significant changes to the proposed amendments to the OBD II and HD OBD regulations, which are reflected in the final proposal.

Description of Regulatory Action

On June 1, 2021, CARB released the Notice of Public Hearing (45-Day Notice) and Staff Report: Initial Statement of Reasons for Rulemaking (Staff Report), titled "Public Hearing to

Consider the Proposed Revisions to the On-Board Diagnostic System Requirements and Associated Enforcement Provisions for Passenger Cars, Light-Duty Trucks, Medium-Duty Vehicles and Engines, and Heavy-Duty Engines," for public review. The Staff Report contains a description of the rationale for the proposed amendments. On June 1, 2021, all references relied upon and identified in the Staff Report were made available to the public.

On July 22, 2021, CARB conducted a public hearing. CARB staff informed the Board of the proposed amendments to the OBD II and HD OBD regulations and the Board received written and oral comments from the public. At the conclusion of the hearing, the Board approved Resolution 21-15 for adoption of the proposed regulations.

In accordance with Government Code section 11346.8, the Board directed the Executive Officer to adopt the proposed amendments after making any appropriate conforming modifications, as well as any additional supporting documents and information, available to the public for a period of at least 15 days. The Board further provided that the Executive Officer shall consider such written comments as may be submitted during this period, including comments raising significant environmental issues, and make such modifications as may be appropriate in light of the comments received, and present the regulations to the Board for further consideration if warranted, and if not prepare written responses to such comments as required by CARB's certified regulations at California Code of Regulations, title 17, sections 60000-60007 and Government Code section 11346.9, subdivision (a).

Subsequent to the hearing, staff identified additional conforming modifications in response to comments received during the hearing and the 45-day comment period prior to it and other modifications needed to correct errors and to enhance the original proposal. These post-hearing modifications were made available for two 15-day public comment periods in the staff's Notice of Public Availability of Modified Text and Availability of Additional Documents and Information (First 15-Day Notice), released on February 15, 2022, and the Notice of Public Availability of Modified Text (Second 15-Day Notice), released on April 22, 2022.

The First and Second 15-Day Notice amendments include the following changes for both the OBD II and HD OBD regulations:

- Modifying the proposals regarding the CSERS IUMPR, monitoring, and tracking requirements to clarify and enhance the requirements and address manufacturers' issues;
- Modifying the allowance to waive the proposed data submittal requirements for the diesel catalyst/adsorber aging protocols and monitor malfunction criteria to restrict the waiver criteria to changes that do not affect the aging mechanism;
- Expanding the allowable negative response codes for vehicles/engines meeting the new UDS requirements; and
- Requiring more information to be submitted in the testing results for production vehicle/engine evaluation testing and manufacturer self-testing to assist CARB staff in reviewing and addressing OBD system issues.
- Revising the OBD II and HD OBD enforcement provisions to exempt vehicles with OBD-related recalls that involve only software changes from the recall labeling requirements and to correct the mailing address where manufacturers are required to send their remedial action information.

The First and Second 15-Day Notice amendments also include the following changes for either OBD II or HD OBD:

- Revising the deficiency provisions in the OBD II regulation to require manufacturers to pay deficiency fines according to a specific schedule and to extend the deadline to issue retroactive deficiencies;
- Revising the NMHC catalyst and catalyzed PM filter monitoring requirements for feedgas generation performance in the HD OBD regulation to align with those proposed for the OBD II regulation;
- Including provisions in the HD OBD regulation to allow for certain 2025 and 2026 model year "legacy engines" to meet the 2023 model year OBD requirements to align with recent amendments adopted for the Heavy-Duty Omnibus rulemaking; and

The text of the proposed regulatory and staff report modifications was posted on CARB's website at *https://ww2.arb.ca.gov/rulemaking/2021/obd2021*, accessible to all stakeholders and interested parties.

Comparable Federal Regulations:

In February 1993, the United States Environmental Protection Agency (U.S. EPA) promulgated OBD requirements for federally certified light-duty vehicles and trucks. (40 CFR Part 86, §§ 86.094-2, 86.094-17, 86.094-18(a), 86.094-21(h), 86.094-25(d), 86.094-30(f), 86.094-35(l), 86.095-30(f), 86.095-35(l); see 58 Fed.Reg. 9468-9488 (February 19, 1993).) These requirements were later amended to require OBD systems on medium-duty vehicles by the 2008 model year. The final rule with the latest modifications of the requirements was published on February 24, 2009. A central part of the federal regulation is that, for federal certification of vehicles, U.S. EPA will deem California-certified OBD II systems to comply with the federal regulations.

In Health and Safety Code sections 43013, 43018, and 43101, the Legislature directed CARB to adopt emission standards for new motor vehicles that are necessary and technologically feasible and to endeavor to achieve the maximum emission reduction possible from vehicular and other mobile sources to accomplish the attainment of the State standards at the earliest practicable date. CARB initially adopted the OBD II regulations to meet those legislative directives. The OBD II regulation was first adopted in 1990. On October 11, 1996, the U.S. EPA granted California's request for a waiver regarding the OBD II regulation, as last amended in December 1994, recognizing that the OBD II regulation is at least as stringent in protecting public health and welfare as the federal regulation, and that unique circumstances exist in California necessitating the need for the State's own motor vehicle regulations program.

In 2014, the U.S. EPA adopted Tier 3 regulations that include provisions (40 CFR 86.1806-17) that generally align federal OBD requirements for 2017 and subsequent model year light duty vehicles, light-duty trucks, medium-duty passenger vehicles, and complete heavy-duty vehicles between 8,501 and 14,000 pounds gross vehicle weight rating with CARB's California OBD II regulation, as last amended in 2013. The federal requirements differ from the corresponding California OBD requirements in several aspects. For example, the malfunction thresholds for the emission threshold monitors may differ based on the emission standard the vehicle is certified to, especially in cases involving vehicles certified to federal

Tier 3 standards that have no corresponding California Low Emission Vehicle standard. Additionally, the federal OBD requirements do not incorporate the anti-tampering provisions of the OBD II regulation (that prevent unauthorized modifications of the computer-coded engine operating parameters of the on-board computer). Further, while the federal regulation does not incorporate the specific deficiency provisions of the California OBD II regulation, it contains its own deficiency provisions that contain differences from the deficiency provisions in the OBD II regulation. Specifically, the federal requirements do not assign fines for deficiencies while California's OBD II regulation would require manufacturers to pay fines if their OBD system is certified with three or more deficiencies. Additionally, the California OBD II regulation allows for deficiencies that are applied after certification of the OBD system (i.e., retroactive deficiencies), while the federal OBD regulation does not contain such provisions. The federal requirements specifically do not allow deficiencies for complete lack of major monitors. Further, considering California updated the OBD II regulation with more stringent requirements after 2013, including the requirement for the vehicle to track and report certain data parameters to characterize the vehicle's NOx control performance as well as the greenhouse gas emissions in the real world, California's OBD II regulation establishes more comprehensive and stringent requirements than the federal regulation.

CARB initially adopted the HD OBD regulation in 2005. A waiver for the regulation was granted by U.S. EPA in 2008.[1] CARB amended the regulation in 2010, and was granted another waiver action by U.S. EPA in 2012.[2] On November 7, 2016, the U.S. EPA formally granted California's request for a waiver regarding the HD OBD regulation, as last amended on June 26, 2013,[3] recognizing that the HD OBD regulation is at least as stringent in protecting public health and welfare as the federal regulation, and that unique circumstances exist in California necessitating the need for the State's own motor vehicle regulations program. The U.S. EPA has also adopted OBD requirements for vehicles and engines above 14,000 pounds, which is the weight range for California's "heavy-duty" class. The federal regulation (40 CFR 86.010-18) was published on February 24, 2009, and subsequently amended on September 15, 2011, and June 17, 2013.

The federal regulation is consistent with CARB's California regulation in the most important aspects. However, the California HD OBD regulation in general still establishes more comprehensive and stringent requirements than the federal OBD regulation. For example, the HD OBD regulation generally requires California OBD systems on diesel engines to detect malfunctions before emissions exceed more stringent thresholds than those required by the federal HD OBD regulation. Further, the federal regulation does not require the OBD system to detect diesel oxidation catalyst malfunctions before a specific emission threshold is

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[1] *California State Motor Vehicle Pollution Control Standards; Notice of Waiver of Clean Air Act Preemption; California's 2010 Model Year Heavy-Duty Vehicle and Engine On-Board Diagnostic Standards*, 73 Fed. Reg. 52042 (September 8, 2008).

[2] *California State Motor Vehicle Pollution Control Standards; Notice of Waiver of Clean Air Act Preemption; California's 2010 Model Year Heavy-Duty Vehicle and Engine On-Board Diagnostic Standards*, 77 Fed. Reg. 73459 (December 10, 2012).

[3] *California State Motor Vehicle Pollution Control Standards; Malfunction and Diagnostic System Requirements for 2010 and Subsequent Model Year Heavy-Duty Engines; Notice of Decision*, 81 Fed. Reg. 78149 (November 7, 2016).

exceeded like the California OBD regulations—it is only required to detect a failure if the catalyst completely lacks NMHC conversion capability. As another example, under the federal HD OBD regulation, the malfunction thresholds for the emission threshold monitors are not required to be adjusted to account for emissions due to infrequent regeneration events.

The proposed 2021 amendments would continue California's efforts to require more comprehensive and robust monitoring of emission related systems and components than required by federal OBD regulations. Historically, virtually every light- and medium-duty vehicle sold in the U.S. is designed and certified to California's OBD II requirements in lieu of the federal OBD requirements, and virtually all heavy-duty engine manufacturers have also certified to California's HD OBD regulation, since U.S. EPA's regulation directly allows acceptance of systems that have been certified to California's regulations. While this process is expected to continue, this may not be the case for some future heavy-duty engines that will be certified to the lower emission standards recently adopted as part of CARB's Heavy-Duty Omnibus rulemaking update. This rulemaking, which will result in California regulations having different emission standards than the federal regulation, may result in heavy-duty engine manufacturers producing federal-only engines that do not meet California's regulations. Therefore, it is expected that heavy-duty engine manufacturers will need to design different OBD systems, one meeting the California OBD regulation and the other meeting the federal OBD regulation, for a portion of their future product lines. However, if U.S. EPA adopts emission standards in the future that align with CARB's lower emission standards, it is expected that heavy-duty manufacturers will continue to design one OBD system to meet both the California and federal OBD requirements.

An Evaluation of Inconsistency or Incompatibility with Existing State Regulations (Gov. Code, § 11346.5, subd. (a)(3)(D)):

During the process of developing the proposed regulatory action, CARB conducted a search of any similar regulations on this topic and concluded these regulations are neither inconsistent nor incompatible with existing state regulations.