State of California
Air Resources Board

UPDATED INFORMATIVE DIGEST

ADOPTION OF ONBOARD DIAGNOSTIC SYSTEM REQUIREMENTS FOR 2010 AND SUBSEQUENT MODEL YEAR HEAVY-DUTY ENGINES

Sections Affected: Adoption of title 13, California Code of Regulations (CCR) section 1971.1 for 2010 and subsequent model year on-road heavy-duty engines.

Background: The Air Resources Board (the Board or ARB) originally adopted title 13, CCR section 1968.1 in 1989, which required manufacturers to implement second generation on-board diagnostic (OBD II) systems on all 1996 and later model year passenger cars, light-duty trucks, and medium-duty vehicles and engines sold in California. The regulation specifically required monitoring of engine misfire, catalysts, oxygen sensors, evaporative systems, fuel systems, and electronic powertrain components, among other component and systems that can affect emissions when malfunctioning. The regulations also required OBD II systems to provide specific diagnostic information in a standardized format through a standardized serial data link on-board the vehicles. Subsequently, the Board adopted section 1968.2 in 2002, which established OBD II requirements, for 2004 and subsequent model year passenger cars, light-duty trucks, and medium-duty vehicles and engines.

In 2004, the Board recently adopted diagnostic system requirements to apply to heavy-duty vehicles (i.e., vehicles with a gross vehicle weight rating (GVWR) greater than 14,000 pounds). Oxides of nitrogen (NOx) and particulate matter (PM) emissions emitted from heavy-duty trucks, especially diesel trucks, are of great concern, with those from diesel trucks accounting for about 28 percent and 16 percent of the total statewide mobile source NOx and PM emissions, respectively. NOx is a precursor to ozone as well as a lung irritant, while diesel PM is carcinogenic and has been identified as a toxic air contaminant by ARB. While emissions from heavy-duty diesels are of particular concern, emissions from heavy-duty gasoline vehicles are also of concern, given the state's ongoing problem in meeting state and federal ambient air quality standards. Additionally, more stringent emission standards for heavy-duty vehicles will be phased in starting in the 2007-2008 timeframe. There must be some assurance that these standards continue to be met in-use, since emission-related malfunctions can cause vehicle emissions to increase well beyond the standards that they are intended to meet. Thus, the Board adopted section 1971 in 2004, requiring engine manufacturer diagnostic (EMD) systems to be installed on all 2007 and subsequent model year heavy-duty engines. However, the EMD regulation is much less comprehensive than the OBD II regulation applicable to light- and medium-duty vehicles, requiring the monitoring of just a few major emission control technologies and containing no standardized requirements. Essentially, the EMD regulation was developed to ensure that all heavy-duty engine manufacturers implement a basic diagnostic system for major emission controls. Accordingly, as the

staff indicated during the EMD rulemaking, it was the intention of ARB to come back in 2005 and adopt more comprehensive diagnostic, testing, and standardization requirements for future heavy-duty engines.

California's problems with ozone pollution continue to be the worst in the nation. In an effort to meet federal and state ambient air quality standards and comply with the federally mandated State Implementation Plan (SIP) to meet those standards, California has continued to be in the forefront in adopting the most stringent motor vehicle emissions control program in the nation. To complement the new emission standards for heavy-duty diesel engines, On-Road Heavy-Duty strategy #5 (previously called measure 17) was included as part of the California SIP. This strategy targeted NOx emission reductions from the on-road heavy-duty fleet through improved inspection programs. The proposed OBD regulation is an essential part of this strategy because it can be used in an inspection to easily identify vehicles in need of emission-related repair. Adopting enhanced diagnostic requirements for heavy-duty vehicles is an essential first step towards meeting the goals of On-Road Heavy-Duty strategy #5 to reduce emissions from on-road heavy-duty diesels.

Thus, ARB adopted section 1971.1, title 13 CCR, which requires OBD systems to be phased-in starting with 2010 and subsequent model year on-road gasoline- and diesel-fueled heavy-duty engines and vehicles produced for sale in California with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. ARB's Initial Statement of Reasons for the rulemaking was released on June 3, 2005. On July 21, 2005, the regulation was approved by the Board with modifications. These modifications, in addition to other changes initiated due to comments received during the hearing and the 45-day period prior to it, were made available for public comment in the staff's Notice of Public Availability of Modified Text, released September 9, 2005.

The Adopted Regulation: As stated above, considering the amount of pollution emitted from heavy-duty vehicles (particularly NOx and PM emissions from diesel vehicles) and the increasingly stringent emission standards being phased in, there must be some assurance that low emissions are maintained in-use.

As stated above, the heavy-duty OBD regulation (section 1971.1) is much more comprehensive than the EMD regulation. Sufficient lead-time exists to implement the OBD system by the 2010 model year when emission standards become more stringent. The OBD system will help ensure that the engines are able to meet the stringent emission standards and maintain low emissions for the life of the engine. It will accomplish this by monitoring the performance of the emission control components and systems, and by providing technicians with information that would help in diagnosing and fixing malfunctions.

The heavy-duty OBD regulation requires manufacturers to monitor virtually every emission-related component and system on the engine. These include the fuel system, catalyst systems (e.g., oxidation catalysts, selective catalytic reduction

systems), exhaust gas recirculation system, particulate matter filter, variable valve timing and/or control system, and electronic engine components (e.g., sensors). Engine manufacturers are required to indicate a malfunction of these components or systems before emissions exceed a specific threshold (e.g., 1.5 times the standards). For other systems and components, manufacturers are required to design functional monitors that are capable of detecting malfunctions when the emission system or component is not operating properly. When a malfunction is detected, the regulation requires the OBD system to illuminate a warning light to alert the driver of the problem. Additionally, the regulation establishes standardized requirements defining the content and format of specific diagnostic information required to be output for use by repair technicians.

In addition to monitoring requirements, other provisions in the regulation include:

- A standardized methodology for determining the frequency of monitor operation during in-use driving and a minimum of operating frequency for most non-continuous monitors (sections 1971.1(d)(3.2) and (d)(4)).
- Standardization requirements for the availability of diagnostic information to assist repair technicians in effectively diagnosing and repairing vehicles and to assist in roadside inspections (section 1971.1(h)).
- Requirements for demonstration testing of engines to verify compliance with the emission threshold-based monitoring requirements (section (1971.1(i)).
- Requirements that manufacturers submit specified documentation that an application for certifying OBD systems (section 1971.1(j)).
- Deficiency provisions that will provide manufacturers with flexibility to have OBD systems certified even though they are not fully compliant with the requirements of section 1971.1 (section 1971.1(k)).
- Requirements for post-assembly line testing of production engines and vehicles to verify compliance with the requirements of section 1971.1 (section 1971.1(l)).
- Intermediate in-use compliance standards (section 1971.1(m)).

To alleviate engine manufacturers' concerns about workload, the regulation phases in the incorporation of OBD systems into heavy-duty engines during the first few years of implementation. Specifically, the regulation requires manufacturers to implement an OBD system on only a single engine family for the 2010 through 2012 model years. During this time, other engine families will continue to follow the EMD requirements of title 13, CCR, section 1971, with one exception. In addition to the other requirements of section 1971, manufacturers will be required to monitor NOx aftertreatment (e.g., NOx adsorber monitoring). (See section 1971.1(d)(7)). Manufacturers will not be required to fully implement the requirements on all engine models until the 2013 model year. This phase-in will allow manufacturers to more effectively use their personnel and testing resources (which are already being stretched to ensure compliance with the 2010 emission standards) and allow them to gain experience on a smaller number of engines prior to wide-scale implementation.

COMPARABLE FEDERAL REGULATIONS

Currently, the United States Environmental Protection Agency (U.S. EPA) has OBD requirements only for light-duty vehicles and trucks and federally defined “heavy-duty” vehicles and engines with a GVWR between 8,500 to 14,000 pounds. These are the same categories of vehicles covered by ARB's OBD II regulation, which apply to light- and medium-duty vehicles (where medium-duty is defined in California as the 8,500 to 14,000 pound GVWR range). U.S. EPA currently does not have OBD requirements for vehicles and engines above 14,000 pounds, which is the weight range for California’s “heavy-duty” class. The U.S. EPA staff has indicated its intent to propose and adopt an OBD regulation for heavy-duty vehicles and engines over 14,000 pounds in the near future, and indicated a strong interest in developing harmonized ARB and federal OBD programs.