



Air Resources Board



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Secretary for
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Edmund G. Brown Jr.
Governor

September 23, 2016

Mail-Out #MSC 16-10

TO: All Interested Parties

SUBJECT: PUBLIC WORKSHOP TO DISCUSS POTENTIAL CHANGES TO THE HEAVY-DUTY ENGINE AND VEHICLE EMISSION STANDARDS, TEST PROCEDURES, WARRANTY, AND OTHER RELATED HEAVY-DUTY PROGRAMS

The Air Resources Board (ARB or Board) invites you to participate in a public workshop to learn more about potential regulatory measures to reduce oxides of nitrogen (NO_x) emissions from new on-road heavy-duty vehicles. Staff will discuss various potential measures including revisions to the heavy-duty emission standards, supplemental regulatory amendments to improve certification and warranty requirements, and potential revisions to the Not-to-Exceed (NTE) in-use compliance program. ARB will also provide an update on ARB sponsored heavy-duty research projects.

The workshop will be held at the following location and time:

Date: Thursday, November 3, 2016
Time: 1:00 p.m. to 5:00 p.m.
Location: South Coast Air Quality Management District, Auditorium
21865 Copley Drive
Diamond Bar, California 91765

The workshop will be available via webcast for those unable to attend in person. The broadcast can be accessed on the day of the workshop at <http://www.aqmd.gov/home/library/webcasts>. Information on submitting questions and comments will be provided during the webcast for remote participants. Staff's presentation and any associated documents will be posted prior to the workshop on ARB's website at: <https://www.arb.ca.gov/msprog/hdlownox/hdlownox.htm>.

Background

Since 1990, NO_x emission standards for heavy-duty on-road engines have become significantly more stringent, decreasing from 6.0 grams per brake horsepower hour (g/bhp-hr) in 1990 to the current 0.20 g/bhp-hr standard in 2010. In addition to the increasingly tighter new engine standards, California has also adopted programs that

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.

California Environmental Protection Agency

provide substantial in-use emission reductions such as vehicle idling restrictions and in-use fleet rules including the Drayage Truck Regulation and the Truck and Bus Regulation. These fleet rules require the upgrade of older trucks and buses to newer, cleaner engines meeting the 2010 standards by 2023. To comply with these regulations, fleets have made substantial investments to purchase lower-emitting vehicles. However, despite all of these efforts, on-road heavy-duty vehicles are still a significant source of NOx emissions in the state and are responsible for about 33 percent of total statewide NOx emissions, a precursor to ambient ozone and secondary particulate matter formation. In order to meet our air quality goals, further reductions of heavy-duty NOx emissions are necessary.

In 2013, California established optional low-NOx standards with the most aggressive standard being 0.02 g/bhp-hr, which is 90 percent below the current standard. The optional low-NOx standards were developed to pave the way for mandatory standards by encouraging manufacturers to develop and certify low-NOx engines and incentivizing potential customers to purchase these low-NOx engines. Currently, Cummins has certified two natural gas engine families to the optional low-NOx standards. An 8.9 liter engine has been certified to the optional 0.02 g/bhp-hr standard, and a 6.7 liter engine has been certified to the optional 0.10 g/bhp-hr NOx standard. Both engines are currently commercially available.

A key measure described in ARB's Mobile Source Strategy document¹ is the establishment of national low-NOx emission standards that reflect up to a 90 percent reduction in NOx emissions compared to the current emission standards. This measure is critical for attaining federal health-based air quality standards for ozone in 2023 and 2031 in the South Coast and San Joaquin Valley air basins, as well as fine particulate matter standards in the next decade. About 60 percent of total heavy-duty vehicle miles traveled in the South Coast on any given day is accrued by trucks purchased outside of California, and therefore exempt from California new engine emission standards. Thus, U.S. Environmental Protection Agency (U.S. EPA) action to establish a new national low-NOx standard for heavy-duty trucks is critical. In the preamble to the Heavy-Duty Greenhouse Gas Phase 2 Final Rule, U.S. EPA affirmed their commitment to work with ARB to develop low-NOx emission standards for heavy-duty engines. A national heavy-duty vehicle standard will benefit air quality not only in California but also in many areas across the nation that currently fail to meet air quality standards. ARB plans on coordinating its regulatory development efforts with U.S. EPA. A proposal for new low-NOx emission standards, associated revisions to the certification test cycle to account for low load urban driving conditions, and other potential revisions to account for real-world emissions, is tentatively scheduled for Board consideration in 2019.

¹ 2016 Mobile Source Strategy, May 2016. (<http://www.arb.ca.gov/planning/sip/2016sip/2016mobsrsrc.pdf>)

In addition to lower NOx standards, other elements are being considered in an effort to improve the in-use performance of heavy-duty vehicles. Specifically, these elements are listed below followed by a more detailed discussion of each:

- Amendments to warranty provisions.
- Amendments to the NTE supplemental test procedures.
- Amendments to the certification durability demonstration and useful life provisions.

In addition to the elements listed above, staff plans to consider creative ways to encourage and credit emission reductions within the context of the new standards. For example, staff may consider ways to incentivize emerging technologies such as intelligent transportation systems and autonomous and connected vehicles, advanced zero emission technologies such as battery electric vehicles and fuel cell electric vehicles, as well as technologies such as transmission and aerodynamic improvements that may reduce vehicle emissions but not be reflected by traditional engine dynamometer testing. With the rapid development of advanced technologies in the heavy-duty sector, staff is open to considering concepts that could result in real-world quantifiable emission benefits for this sector even if they do not fit within conventional regulatory standard structures.

Warranty

ARB is considering lengthening the required warranty period for heavy-duty vehicle emission control systems primarily because the warranty period does not reflect the real world longevity of heavy-duty vehicles. Class 8 vehicles frequently operate upwards of a million miles before major overhaul is needed, but they are required to be warranted for only 100,000 miles under ARB and U.S. EPA regulations. Classes 4 through 7 vehicles also have relatively short warranty periods. With longer required warranty periods, manufacturers would need to design more durable emission control systems and components. More durable components would improve the emissions performance of these vehicles, and it would also mean less vehicle down time for operators and owners.

Also, longer warranty periods would give owners greater incentive to fix nonperformance-related malfunctions that otherwise might not get repaired if the owner had to bear the cost for the fix.

As a companion to lengthening the warranty period, ARB also intends to strengthen and enhance the current Emission Warranty and Information Reporting requirements to more readily enact corrective action on the part of the manufacturer, based upon

warranty rates. Current regulations require manufacturers to report warranty rates for all emission related parts throughout the engine's warranty period. When warranty rates are high for a particular component, manufacturers are often reluctant to initiate corrective action, despite the obvious failure of that component and its likely associated adverse emissions impact. Thus, the burden of proof is often placed on ARB to demonstrate an emissions exceedance which, for heavy-duty vehicles, is a time consuming, costly, and inefficient process (i.e., since the engine must be removed from the vehicle in order to be tested on an engine dynamometer). Staff is considering measures that would correct this inefficient process such as requiring corrective action when an emission related component exceeds an established trigger level. A proposal to revise both the warranty period and the warranty rates/corrective action requirements for heavy-duty vehicles is scheduled to be heard by the Board in December 2017.

Not-To-Exceed

The NTE in-use compliance program is currently the primary method used for ensuring in-use compliance with the heavy-duty engine emission standards. The NTE testing requirements were first introduced as part of the 1998 Consent Decrees with U.S. EPA, ARB, and heavy-duty engine manufacturers. Manufacturers have to demonstrate compliance within the NTE control area of the engine map by measuring emissions using Portable Emissions Measurement Systems. However, the NTE control area was only designed to account for emissions from regions of engine activity representing on-highway cruising operations. As such, the NTE control area includes a number of conditions that exclude regions in the engine map associated with low load operation, including the region below 30 percent maximum torque and/or 30 percent maximum power. Engine operations within the NTE control area for fewer than 30 consecutive seconds and engine operations that result in exhaust aftertreatment temperatures below 250 degrees Celsius are also excluded from the NTE analysis. Because of these current limitations, the current in-use compliance program is not adequate for ensuring that emissions are controlled during the majority of in-use operations, including low load conditions. ARB is currently considering modifying the testing protocol in order to effectively assess in-use compliance under essentially all driving conditions.

Durability and Useful Life

ARB is also considering revising the durability demonstration provisions within the certification requirements for heavy-duty engines. The durability demonstration program requires manufacturers to demonstrate compliance with emission standards over the useful life of the engine. ARB staff are concerned that the current durability demonstration program does not accurately represent the in-use deterioration of aftertreatment emission control systems. Furthermore, the useful life over which

compliance with the durability provisions is demonstrated is significantly lower than the full life or mileage before first rebuild, resulting in excess emissions due to deteriorated engines and components. Therefore, ARB is considering revising the useful life period as well, resulting in the need to revise the durability demonstration process to account for a longer useful life. Revisions to the NTE in-use compliance program, durability demonstration provisions, and the useful life period are all scheduled to be heard by the Board at the same time as the proposal for new low-NOx emission standards (i.e., 2019).

Contact

If you have questions regarding potential regulatory changes to NOx emission standards, test cycle revisions, NTE revisions, or useful life revisions for heavy-duty vehicles to be discussed at the workshop, please contact Mr. Daniel Hawelti, Air Resources Engineer, at (626) 450-6149 or via email at daniel.hawelti@arb.ca.gov. For questions regarding the proposed revisions to the heavy-duty engine warranty period requirements, please contact Mr. Jeff Lowry, Staff Air Pollution Specialist, at (626) 575-6841 or via email at jeffrey.lowry@arb.ca.gov. For questions on proposed amendments to the emission warranty information reporting regulations, please contact Dr. Jerry Ho, Staff Air Pollution Specialist, at (626) 575-6829 or via email jerry.ho@arb.ca.gov.

Special Accommodations

If you require a special accommodation or need this document in an alternate format (i.e., braille, large print) or another language, please contact Mr. Henry Cheung, Air Resources Engineer, at (626) 575-6673 or via email at henry.cheung@arb.ca.gov, as soon as possible, but no later than 10 business days before the scheduled meeting. TTY/TDD/Speech to Speech users may dial 711 for the California Relay Service.

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

Consecuente con la sección 7296.2 del Código de Gobierno de California, una acomodación especial o necesidades lingüísticas pueden ser suministradas para cualquiera de los siguientes:

- Un intérprete que esté disponible en la audiencia.
- Documentos disponibles en un formato alterno u otro idioma.
- Una acomodación razonable relacionados con una incapacidad.

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Para solicitar estas comodidades especiales o necesidades de otro idioma, por favor llame a la oficina del Consejo al (916) 324-0342 o envíe un fax a (916) 327-8524 lo más pronto posible, pero no menos de 10 días de trabajo antes del día programado para la audiencia del Consejo. TTY/TDD/Personas que necesiten este servicio pueden marcar el 711 para el Servicio de Retransmisión de Mensajes de California.

Sincerely,

/s/

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Assistant Chief
Mobile Source Control Division

cc: See next page

cc: Dr. Jerry Ho
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