

August 25, 2020

Mary D. Nichols, Chair, and Board Members  
California Air Resources Board  
1001 I Street  
Sacramento, CA 95814

*Re: California Air Resources Board Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments*

Dear Chair Nichols and Honorable Board Members:

The Northeast States for Coordinated Air Use Management (NESCAUM) is writing to express its strong support for the California Air Resources Board (CARB) proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments. NESCAUM is the regional association of air pollution control agencies representing Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, and Vermont. As part of a coordinated effort to reduce air pollution in the Northeast, seven of our eight member states have adopted California's Advanced Clean Car standards in lieu of the federal emission standards and several NESCAUM states have previously adopted California's heavy-duty vehicle standards. Thus, our states are following the Heavy-Duty Omnibus Regulation with great interest.

Heavy-duty vehicles are a major source of emissions of nitrogen oxides (NO<sub>x</sub>) that contribute to unhealthy levels of ground-level ozone and secondary fine particulate matter in our region. Areas in the Northeast continue to exceed federal health-based air quality standards for ground-level ozone, and it affects the health and welfare of tens of millions of people living in the NESCAUM region. Thus, reducing heavy-duty vehicle-related NO<sub>x</sub> emissions is a high priority for our states.

The COVID-19 pandemic makes the case stronger for approving the Heavy-Duty Omnibus Regulation and Associated Amendments. While light-duty vehicle traffic counts in the Northeast dropped significantly, on-road heavy-duty truck traffic remained at or near historical baseline levels throughout this period.<sup>1</sup> Even with drastically reduced vehicle miles traveled by light-duty vehicles during the COVID-19 restrictions, monitors in the Northeast continued to record ozone levels exceeding the National Ambient Air Quality Standards (NAAQS), and large populated metropolitan areas like New York City will remain in non-attainment.

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<sup>1</sup> Maryland Department of the Environment, "Analyzing Air Quality and Climate Change Data During the COVID-19 Pandemic: What Are We Learning?" Update #2 (May 29, 2020). Available at <https://otcair.org/upload/Documents/Miscellaneous/AnalyzingAir%20QualityClimateChangeUpdate2.pdf>.

Furthermore, while we have known for some time that air pollution causes and exacerbates respiratory and pulmonary illnesses,<sup>2</sup> researchers are now finding that long-term exposure to poor air quality leads to increased risk of death from COVID-19.<sup>3</sup> Thus, the Omnibus regulation can provide additional, important public health benefits in the future.

NOx emissions also play a role in producing secondary PM<sub>2.5</sub> through the formation of nitrates. Nitrates are an increasingly important contributor to poor visibility at Northeast scenic vistas, and an area of keen interest for state regional haze planners.

Our states are undertaking significant efforts to reduce heavy-duty vehicle emissions. States are enforcing anti-tampering regulations, introducing anti-idling regulations and public awareness campaigns, conducting vehicle inspection and maintenance programs, and allocating Volkswagen settlement funds toward medium- and heavy-duty vehicle electrification. Most recently in conjunction with California, governors of most of the NESCAUM states signed a Memorandum of Understanding (MOU) to implement market enabling programs for zero emission medium- and heavy-duty vehicles. The MOU also established targets to transition medium- and heavy-duty vehicles to zero emissions.<sup>4</sup> Since this transition will take time and diesel vehicles will be in the fleet for many years, ensuring new diesel engines emit substantially less NOx is a priority for states.

In January 2020, the U.S. Environmental Protection Agency (EPA) issued an Advance Notice of Proposed Rulemaking (ANPR) to update the heavy-duty engine NOx emissions standards.<sup>5</sup> Establishing stringent, nationwide new engine NOx standards would provide a critical tool for states to meet air quality requirements and public health goals. States are eager to assist EPA in developing a robust federal program for heavy-duty engines and vehicles. However, issuance of proposed standards by EPA has been delayed significantly. This delay makes CARB's approval of the Omnibus regulation even more important.

For the reasons offered below, we urge the Board to approve the Heavy-Duty Omnibus regulation. A strong program in California will spur introduction of NOx reducing technologies in the U.S. market. It will also provide substantial NOx reductions for states that choose to adopt California's standards through Section 177 of the Clean Air Act, and will provide states with additional low NOx heavy-duty vehicle options as they replace ageing diesels using Diesel Emission Reduction Act and other incentive funds.

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<sup>2</sup> EPA, "Health Effects of Ozone Pollution." Available at <https://www.epa.gov/ground-level-ozone-pollution/health-effects-ozone-pollution>, last updated July 30, 2019.

<sup>3</sup> Wu, X., Nethery, R., Sabath, M., Braun, D., and Dominici, F. (2020), Exposure to air pollution and COVID-19 mortality in the United States: A nationwide cross-sectional study. Available at [https://projects.iq.harvard.edu/files/covid-pm/files/pm\\_and\\_covid\\_mortality\\_med.pdf](https://projects.iq.harvard.edu/files/covid-pm/files/pm_and_covid_mortality_med.pdf).

<sup>4</sup> Multi-State Medium- and Heavy-Duty Zero Emission Vehicle Memorandum of Understanding (July 14, 2020). Available at <http://www.nescaum.org/documents/multistate-truck-zev-governors-mou-20200714.pdf>.

<sup>5</sup> EPA, "Control of Air Pollution from New Motor Vehicles: Heavy-Duty Engine Standards," [(85 Fed. Reg. 3306-3330 (January 21, 2020)]. Available at <https://www.govinfo.gov/content/pkg/FR-2020-01-21/pdf/2020-00542.pdf>.

### **Emissions Standards over the Federal Test Procedure (FTP) and Ramped Mode Cycle-Supplemental Emissions Test (RMC-SET)**

It has been nearly 20 years since the heavy-duty engine standards were last updated. Strategies such as improved catalyst substrates, improvements in thermal management of SCR systems, close coupled catalysts, and other options can be used to substantially reduce NO<sub>x</sub> emissions, as has been shown in a recent Southwest Research Institute study.<sup>6</sup> Accordingly, NESCAUM encourages the Board to finalize the following FTP and RMC-SET NO<sub>x</sub> standards set out in the Initial Statement of Reasons (ISOR):

- An FTP and SET NO<sub>x</sub> standard of 0.05 grams per brake horsepower hour (g/bhp-hr) for model year (MY) 2024-2026 heavy-duty diesel engines;
- An FTP standard of 0.05 g/bhp-hr for MY 2024-2026 for heavy-duty Otto cycle engines;
- An FTP standard of 0.02 g/bhp-hr for MY 2027 and subsequent heavy-duty Otto cycle engines;
- An FTP and RMC-SET NO<sub>x</sub> standard of 0.02 g/bhp-hr for MY 2027 and subsequent heavy-duty diesel engines;
- An anti-backsliding PM<sub>2.5</sub> standard of 0.005 for MY 2024 and later heavy-duty diesel and Otto cycle engines;
- An optional 50-state NO<sub>x</sub> standard for MYs 2024-2026 as outlined in the ISOR.

### **Idle and Low Load NO<sub>x</sub> Emissions**

Selective catalytic reduction (SCR) systems are highly effective at controlling NO<sub>x</sub> emissions at high engine exhaust temperatures but do not function well at low temperature, low load conditions. These low load conditions dominate real world operation of heavy-duty vehicles in urban stop-and-go operation. Even some tractor trailer duty cycles have a high percentage of low load operation.

NESCAUM has initiated a heavy-duty vehicle in-use data gathering project to collect combination tractor engine and vehicle activity information and NO<sub>x</sub> emissions data. Initial results for four tractors indicate the vehicles operate between 10 and 35 percent of the time at idle and low loads (combined). Furthermore, a preliminary estimation of NO<sub>x</sub> emissions over the truck duty cycle shows that NO<sub>x</sub> emitted during idling and low loads combined contributes between 15 and 60 percent of NO<sub>x</sub> emissions over the duty cycles. These preliminary results underscore the need to establish a certification test cycle and NO<sub>x</sub> emissions standards for both idle and low load operation. An ICCT study published in 2019 reached a similar conclusion based on analysis of Not-to-Exceed (NTE) data released by manufacturers.<sup>7</sup>

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<sup>6</sup> Sharp, C., "Low NO<sub>x</sub> Program Stage 3 Update," Southwest Research Institute, June 3, 2020.

<sup>7</sup> Badshah, H., Posada, F., and Muncrief, R., "Current State of NO<sub>x</sub> Emissions from In-Use Heavy-Duty Diesel Vehicles in the United States," 2019. Available at <https://theicct.org/publications/nox-emissions-us-hdv-diesel-vehicles>.

Technologies exist to greatly reduce heavy-duty vehicle idle and low load NOx emissions.<sup>8</sup> NESCAUM strongly supports the provisions outlined in the ISOR to significantly reduce idle and low load NOx emissions, namely:

- An idling NOx emissions standard of 10 grams per hour for MY 2024-2026 heavy-duty diesel engines, and 5 grams per hour NOx for 2027 and subsequent MYs;
- A low load cycle (LLC) NOx emissions standard of 0.20 g/bhp-hr for MY 2024-2026 heavy-duty diesel engines, and 0.05 g/bhp-hr for MY 2027 and subsequent heavy-duty diesel engines.

### **In-Use Heavy-Duty Vehicle Test**

The current NTE-based heavy-duty in-use test program exempts nearly all heavy-duty vehicle operating conditions, and therefore does not accurately assess the NOx emissions performance of heavy-duty vehicles. An analysis of manufacturer-submitted heavy-duty in-use test data showed the average percent of data and percent of NOx emissions represented in NTE events was less than six percent in the data set.<sup>9</sup>

The European Union has developed a Moving Average Window (MAW) approach that more accurately assesses emissions from heavy-duty vehicles. This approach could be used to develop an in-use heavy-duty vehicle test program. CARB staff have proposed replacing the current NTE-based methodology with a new MAW-based methodology for 2024 and subsequent MY engines. For diesel engines, three bins related to the applicable standards would be used to determine compliance. The three diesel-cycle MAW-based bins represent idle, low load, and medium to high load operations.

NESCAUM strongly supports the CARB staff proposal to establish a MAW in-use test requirement. NESCAUM is ready to provide data from its in-use heavy-duty vehicles activity and emissions data gathering project once it is available.

### **Regulatory Useful Life**

As described in the CARB ISOR, current regulatory useful life mileages for heavy-duty engines are significantly lower than the mileages at which modern heavy-duty engines are rebuilt or replaced.<sup>10</sup> This highlights the need for longer useful life periods to reduce emissions by: (1) better representing the longer modern service lives of heavy-duty engines, and (2) encouraging manufacturers to make parts more durable in order to avoid non-compliance with in-use testing requirements and inconvenient, costly recalls. Given this, NESCAUM encourages CARB to finalize the regulatory useful life provisions outlined in the ISOR, namely:

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<sup>8</sup> CARB, “Public Hearing to Consider the Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments, Staff Report: Initial Statement of Reasons,” June 23, 2020. Appendix I “Current and Advanced Emission Control Strategies and Key Findings of CARB/SwRI Demonstration Work.” Available at <https://ww3.arb.ca.gov/regact/2020/hdomnibuslownox/appi.pdf>.

<sup>9</sup> Badshah, Posada, and Muncrief, *supra* note 7.

<sup>10</sup> CARB “Public Hearing to Consider the Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Associated Amendments, Staff Report: Initial Statement of Reasons,” June 23, 2020. Available at <https://ww3.arb.ca.gov/regact/2020/hdomnibuslownox/isor.pdf>.

- For light heavy-duty diesel engines, a useful life of 110,000 miles/10 years for current MYs through 2026; 190,000 miles/12 years between 2027-2030; and 270,000 miles/15 years for 2031 and later MYs;
- For medium heavy-duty diesel engines, a 185,000 mile/10 year useful life for current MYs through 2026; 270,000 miles/11 year useful life between 2027 and 2030; and 350,000 miles/12 year useful life for MY 2031 and subsequent engines;
- For heavy heavy-duty diesel engines, a 435,000 mile/10 year useful life for current to 2026 MYs; a 600,000 mile/11 year useful life for 2027-2030 MY engines; and an 800,000 miles/12 year useful life for 2031 and subsequent MY engines;
- For heavy-duty Otto cycle engines, a 110,000 mile/10 year useful life for current to 2026 MY engines; a 155,000 mile/12 year useful life for 2027-2030 MY engines; and a 200,000 mile/15 year useful life for 2031 and subsequent MY engines.

### Warranty

Longer warranty periods for heavy-duty vehicles and engines are needed for three main reasons: (1) to better represent their longer modern service lives and ensure that the emission control systems remain operational throughout a greater portion of a vehicle's service life, (2) to reduce incidences of tampering and mal-maintenance, and (3) to encourage manufacturers to make parts more durable. Class 8 vehicles operate approximately 850,000 miles before the first engine rebuild, however, engines in these vehicles are only required to be warrantied to 100,000 miles.<sup>11</sup> Thus, the engines operate for 750,000 miles after the warranty has expired.

To help ensure that emission controls are sufficiently durable to control emissions over applicable useful life periods, and well-maintained and repaired when needed, NESCAUM supports CARB staff's proposal to lengthen the criteria pollutant emissions warranty requirements. Specifically:

- For light heavy-duty diesel engines, a 110,000 mile/5 year warranty through MY 2026; a 150,000/7 year warranty for MYs 2027-2030; and a 210,000 mile/10 year warranty for 2031 and later MYs;
- For medium heavy-duty diesel engines, a 150,000/5 year warranty through MY 2026; a 220,000/7 year warranty for MYs 2027-2030; and a 280,000/10 year warranty for MY 2031 and later engines;
- For heavy heavy-duty diesel engines, a 350,000/5 year warranty through 2026, a 450,000/7 year warranty for MYs 2027 to 2030; and a 600,000/10 year warranty for 2031 and subsequent MYs;
- For heavy-duty Otto cycle engines, a 50,000/5 year warranty through 2026 MY; a 110,000/7 year warranty for MYs 2027 to 2030 MYs; and a 160,000/10 year warranty for 2031 and subsequent MYs.

### Flexibilities

CARB has proposed an Averaging Banking and Trading provision that would allow manufacturers of heavy-duty zero emission vehicles to generate NOx credits as part of the

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<sup>11</sup> CARB, *supra* note 10.

Omnibus regulation. We support the establishment of NOx credits for heavy-duty zero emission vehicles in the early years of the Omnibus to incentivize production of these vehicles, but request that CARB set a sunset date for those credits, so as not to dilute the stringency of the regulation.

We recognize the CARB may receive requests for exemptions for certain engines that are manufactured in small volumes. We request that, should CARB establish compliance flexibilities for certain categories of engines, these flexibilities be tailored to have limited applicability and duration.

Thank you for the opportunity to comment on the Proposed Heavy-Duty Engine and Vehicle Omnibus Regulation and Amendments. We appreciate California's ongoing leadership in protecting the environment and public health from motor vehicle pollution. NESCAUM and its members states look forward to working with California as it implements this important regulation.

Sincerely,

A handwritten signature in black ink, appearing to read "Paul J. Miller". The signature is fluid and cursive, with the first name "Paul" and last name "Miller" clearly distinguishable.

Paul J. Miller  
Executive Director

cc: NESCAUM Directors