WRITTEN STATEMENT
OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE U.S. ENVIRONMENTAL PROTECTION AGENCY'S PROPOSAL TO REVISE THE NATIONAL AMBIENT AIR QUALITY STANDARDS FOR OZONE
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The Manufacturers of Emission Controls Association (MECA) is pleased to provide testimony in response to the U.S. EPA's request for public comment on the Proposal to Revise the National Ambient Air Quality Standards for Ozone (Docket ID No. EPA-HQ-OAR-2005-0172). MECA firmly believes that the emission control technologies for mobile sources that will be needed to help meet the most stringent standards under discussion for ozone are currently available. These nitrogen oxides (NOx) emission control technologies for mobile sources are being used today on on-road and non-road applications in the U.S. and other major marketplaces in the world.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for motor vehicles. Our members have decades of experience and a proven track record in developing and manufacturing emission control technology for a wide variety of on-road and non-road vehicles and equipment. A number of our members have extensive experience in the development, manufacture, and application of PM and NOx emission control technologies for both new and existing engines. These companies have developed control technologies for gasoline, diesel, and alternative-fueled engines.

MECA will defer to the health experts to determine the appropriate ozone levels for the ambient standards given that they are not within our area of expertise. The Clean Air Act requires that these standards be set to protect the public health with an adequate safety margin. However, MECA offers comments here regarding the technological feasibility of emission control technologies for mobile source engines that are available to meet the EPA proposed standards for ozone and the even more stringent recommendations that have been published by EPA's Clean Air Scientific Advisory Committee (CASAC).

A number of strategies employing advanced emission control technologies exist to significantly reduce NOx emissions from mobile sources to achieve the most stringent ozone standards recommended by CASAC.

The U.S. EPA has already put in place important regulatory programs for reducing PM and NOx emissions from new on-road and non-road diesel engines beginning with the 2007-2010 heavy-duty highway engine emission program, followed by the Tier 4 non-road diesel emission regulations that will be phased in over the 2008-2015 timeframe. Both of these regulatory programs will rely on a systems approach that combines advanced diesel engine technology, the use of ultra-low sulfur diesel fuel, and advanced diesel exhaust emission control technologies to achieve 90+% reductions in both PM and NOx emissions compared to the new on-road and non-road diesel engines available today. Diesel exhaust emission control

technologies that are expected to play a major role in complying with both EPA's future emission standards for new engines include diesel oxidation catalysts (DOCs), diesel particulate filters (DPFs), closed crankcase filters (CCFs), selective catalytic reduction catalysts (SCR), and NOx adsorber catalysts. MECA believes that further reductions in NOx emissions from new heavy-duty on-road and off-road diesel engines beyond the 2010 on-road and Tier 4 off-road requirements will be possible through the combinations of more advanced diesel engines with advanced diesel exhaust emission control technologies including SCR and/or NOx adsorber catalysts. Additional tightening of NOx standards for both on-road heavy-duty and off-road new diesel engines should be considered by EPA as an additional strategy that could further reduce ozone levels across the country.

Selective Catalytic Reduction (SCR) technology is a proven NOx control strategy. SCR has been used to control NOx emissions from stationary sources for over 15 years. More recently, it has been applied to select mobile sources including trucks, marine vessels, and locomotives. In 2005, SCR using a urea-based reductant was introduced on a large number of on-road diesel heavy-duty engines to help meet the Euro 4 heavy-duty NOx emission standards. More than 100,000 new heavy-duty truck engines are now operating in Europe equipped with SCR systems that use urea as the reductant for reducing NOx emissions. SCR systems are also being used on some new heavy-duty trucks to comply with Japan's 2005 heavy-duty diesel engine emissions standards. SCR is also being given serious consideration by engine manufacturers for complying with future on-road heavy-duty diesel engine emission standards in both the U.S. and Japan (in the 2009-2010 timeframe). Several heavy-duty diesel engine manufacturers have already announced their intentions to commercialize 2010-compliant heavy-duty that will use SCR catalyst technology. Applying SCR to diesel-powered engines provides simultaneous reductions of NOx, PM, and HC emissions.

Since the mid-1990s, SCR technology using a urea-based reductant has also been installed on a variety of marine applications in Europe including ferries, cargo vessels, and tugboats with over 100 systems installed on engines ranging from approximately 450 to 10,400 kW. These marine SCR applications include the design and integration of systems on a vessel's main propulsion engines and auxiliary engines. Most recently an SCR system has been successfully installed on one of New York City's Staten Island ferries. A smaller number of SCR systems have or will be installed on diesel locomotives in Europe and the U.S. to validate the performance of SCR catalysts in another off-road application area. EPA has cited SCR catalysts as the most feasible technical approach for complying with its proposed Tier 4 locomotive and marine diesel engine emission standards that would begin in the next decade once they are finalized.

NOx adsorber technology is another available NOx control strategy that can reduce NOx emissions from new diesel engines. NOx adsorber catalysts are currently being used commercially in light-duty gasoline direct injection (GDI) engines sold in Europe and Japan and on several light-duty and heavy-duty diesel vehicles currently sold in the U.S. Additional light-duty diesel introductions have been announced by several vehicle manufacturers for the U.S. market that will employ NOx adsorber catalysts for complying with either the ARB LEV II or the EPA Tier 2 light-duty vehicle emission limits.

The emergence of "clean diesel" light-duty vehicles in the U.S. that employ DPFs, SCR catalysts, and/or NOx adsorber catalysts, and the significant number of near-zero tailpipe and evaporative emission light-duty gasoline vehicle models that have been certified to date by ARB as partial-zero emission vehicles (PZEVs, more than 30 current models) or super ultra-low emission vehicles (SULEV) provides strong evidence that new light-duty vehicles sold in the U.S. are capable of achieving NOx exhaust emissions below EPA's fully phased-in Tier 2 fleet average NOx limit of 0.07 g/mile. As a strategy to comply with a more stringent ozone standard, EPA should develop a Tier 3 light-duty vehicle program that uses available advanced emission control technologies for both exhaust and evaporative emissions to achieve further reductions in hydrocarbon and NOx emissions in new passenger cars and light-duty trucks. MECA recommends a Tier 3 fleet average NOx emission standard of 30 mg/mile, equivalent to the current Tier 2, Bin 3 NO emission limit.

Due to the long operating lives of diesel engines, it will take decades for older, "dirtier" on-road and non-road diesel engines to be replaced with the mandated newer "cleaner" engines. Given the health and environmental concerns associated with diesel engines and because existing on-road and non-road diesel engines make up a significant percentage of diesel pollution emitted, there is an increasing interest in retrofitting the existing legacy fleet of on-road and non-road diesel engines as a means of complying with federal or state ambient air quality standards for ozone. MECA believes that proven retrofit technologies including combinations of DOCs or DPFs with SCR catalysts, lean NOx catalysts, or low pressure EGR, are available to deliver significant reductions in PM and NOx emissions from existing on-road and non-road diesel engines. MECA member companies are already investing considerable resources in expanding the number and scope of verified retrofit technologies that can provide significant reductions of PM and NOx emissions to existing diesel vehicles and equipment. MECA believes that additional incentives through significantly increased funding for EPA's National Clean Diesel Campaign or mandatory in-use, vehicle emission regulations to reduce both PM and NOx emissions are necessary to accelerate the retrofit of the older, in-use on-road and off-road diesel engines, and provide current and future ozone non-attainment areas with an important regional or national strategy for reducing emissions.

MECA believes that further reductions of NOx emissions can be achieved by adopting California's proposed aftermarket converter requirements for light-duty, gasoline vehicles that set higher performance and durability standards. ARB's proposed regulation will eliminate the sale of older aftermarket converter products that have modest performance standards and a limited 25,000 mile warranty, and require that higher performance and more durable OBD-compliant aftermarket converter products be used on both non-OBD and OBD-equipped vehicles starting in January 2009. The ARB Board is expected to approve these revised aftermarket converter requirements at their October 25-26, 2007 Board hearing. These ARB-approved OBD-compliant aftermarket converters are warranted for 50,000 miles based on the use of a more aggressive, high temperature accelerated engine-aging protocol compared to the vehicle durability demonstration currently required by EPA for approved aftermarket converter products. EPA has not updated its aftermarket converter requirements since 1986 and with more than three million aftermarket converters sold per year across the U.S. (based on surveys completed by MECA with aftermarket converter manufacturers), significant additional reductions of hydrocarbon emissions, including toxic hydrocarbon emissions, and NOx emissions could be

achieved with a national aftermarket converter policy that made use of the same higher performance OBD-compliant aftermarket converters available in California.

Another strategy that can achieve NOx additional emission reduction to meet the most stringent ozone standards would be to adopt California's 0.6 g/bhp-hr HC + NOx, 2010 emission standard for off-road spark-ignited engines with horsepower ratings greater than 25 horsepower. The technology to reduce emissions from these SI engines is based on automotive-type three-way catalyst closed-loop technology. This technology has been use on well over 300,000,000 automobiles with outstanding results. Three-way catalysts have also been used effectively on thousands of large, natural gas-fueled, reciprocating engines (so-called rich burn or stoichiometric natural gas engines) used for power production or pumping applications. These same catalyst technologies can be adapted to spark-ignited engines used in off-road mobile sources such as forklift trucks, airport ground support equipment, and portable generators.

Closed-loop, three-way catalyst-based systems are already being used on these large, spark-ignited, off-road engines to meet ARB's and EPA's 2004 3.0 g/bhp-hr HC + NOx standard. Closed-loop, three-way catalyst systems will also be the primary technology pathway for meeting the EPA and ARB 2007 exhaust emission standard of 2.0 g/bhp-hr HC + NOx. Retrofit kits that include air/fuel control systems along with three-way catalysts have been sold into the LPG-fueled fork lift industry for installation on uncontrolled engines (an LSI application) for nearly 10 years. In both new engine and retrofit applications, these closed-loop three-way catalyst systems have shown durable performance in LSI applications, consistent with the excellent durability record of closed-loop three-way catalyst systems used in automotive applications for more than twenty-five years. MECA believes that advanced three-way catalyst technology based on automotive applications can provide a cost-effective, durable, high performance solution for controlling NOx and HC emissions from new and existing large spark-ignited engines used in off-road applications.

MECA believes that additional NOx emissions reduction can be achieved by adopting more stringent HC + NOx emission standards for Class II off-road, spark-ignited engines with horsepower ratings less than 25 horsepower. Further reductions of HC + NOx emissions than what is required by the current proposed Phase III EPA standards for these nonroad gasoline engines is technologically feasible through the use catalyst technology that is fully optimized as part of a complete engine/emission control/exhaust system. MECA understands that small engine manufacturers believe that proposed Phase III EPA exhaust emission standards for these engines will be largely met through the redesign of existing Class II engines without the application of three-way catalysts. Both EPA and ARB have shown that the application of catalysts to nonroad equipment with Class II spark-ignited engines can be accomplished using available engineering exhaust system design principles in a manner that does not increase the safety risk relative to today's uncontrolled equipment. In particular, the EPA safety study on non-handheld equipment equipped with catalyzed mufflers represents the most thorough safety study completed to date on this class of spark-ignited engines. The results of this EPA study showed that properly designed catalyzed mufflers pose no incremental increase in safety risk (and in many cases even lower muffler surface temperatures) relative to currently available non-handheld equipment sold without catalysts. An opportunity for further reductions in Class II HC + NOx emissions through the application of three-way catalysts should be considered by EPA in

the next decade if indeed small engine manufacturers comply with the proposed Phase III standards without the use of catalyzed mufflers.

Other off-road spark-ignited engines including those used on ATVs, off-road motorcycles, and snowmobiles are contributors to mobile-source NOx emissions. MECA believes that hydrocarbon and NOx emissions from these recreational engines can be significantly reduced by adopting tighter regulations that employ the use of advanced three-way catalysts for these mobile sources. On-road motorcycles will begin wide spread use of three-way catalysts in the U.S. to comply with ARB's 2008 and EPA's 2010 exhaust emission standards. However, the exhaust emissions of these catalyst-equipped on-road motorcycles will still be at levels considerably higher than late model, light-duty cars and trucks. Additional HC + NOx reductions can be obtained from on-road motorcycles through the use of engine and emission control strategies employed on today's light-duty vehicles.

Conclusion

In closing, we believe that numerous strategies are available to further reduce hydrocarbon and NOx emissions from mobile source engines to meet the most stringent ozone ambient standards under discussion by EPA experts and others. Once appropriate health-based standards are in place, our industry is prepared to do its part and deliver these cost-effective, advanced emission control technologies to the market.

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