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
DOCKET ID NO. EPA-HQ-OAR-2005-0172

March 19, 2010

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 proposed 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 hydrocarbon, 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 most stringent ozone standards proposed by EPA. MECA commends EPA for reconsidering the ozone standards to ensure that the standards are as protective as recommended by EPA's Clean Air Scientific Advisory Committee (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 are being phased in over the 2008-2015 timeframe. Both of these regulatory programs 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 greater than 90% reductions in both PM and NOx emissions compared to the new on-road and non-road diesel engines that complied with previous EPA regulatory programs.

Diesel exhaust emission control technologies that are expected to play a major role in

complying with EPA's future emission standards for new diesel engines include diesel oxidation catalysts (DOCs), diesel particulate filters (DPFs), closed crankcase filters (CCFs), selective catalytic reduction catalysts (SCR), and NOx adsorber catalysts. High efficiency diesel particulate filters are already standard equipment on all new light-duty diesel vehicles and on-road heavy-duty diesel trucks sold in the U.S. and Canada. These filters provide more than 90% reduction in particulate mass over a very broad range of particle sizes and have proven durability over hundreds of thousands of miles of service. Similar diesel particulate filter systems will be used by manufacturers to comply with EPA's Tier IV interim emission standards in the near future. The significant reductions in diesel particulate emissions that result from the use of filters not only provides significant health-related benefits but also significant climate change impacts due to the large reduction in black carbon emissions associated with filter operation on diesel engines. Filter technology could also be used in the future as a strategy to reduce the mass and number of particulate emissions from direct injection gasoline vehicles to ensure that these future powertrain technologies' PM emissions are equivalent to those associated with filtered diesel exhaust.

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 beyond the 2010 on-road requirements and the Tier 4 off-road requirements 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 20 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 200,000 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 used by most engine manufacturers for complying with on-road heavy-duty diesel engine emission standards in both the U.S. for 2010 compliance, and Japan for 2009 compliance. Several heavy-duty diesel engine manufacturers have already certified 2010-compliant heavy-duty engines that will use SCR catalyst technology with the U.S. EPA. Applying SCR to diesel-powered engines provides simultaneous reductions of NOx, PM, and HC emissions. In addition to reductions in criteria pollutants, SCR applications on heavy-duty trucks allows engine manufacturers to further optimize and reduce fuel consumption of these engines, providing important reductions in greenhouse gas 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 200 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. Recently SCR systems have been successfully installed on one of New York City's Staten Island ferries and ferries operating in the San Francisco area. 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 Tier 4 locomotive and commercial marine diesel engine emission standards that begin in 2014. SCR technology is also expected to be applied to future new ocean-going vessels to reduce NOx emissions consistent with the International Maritime Organization's Tier 3 NOx requirements that will be required in designated Emission Control Areas near many coastlines around the world (including expected ECA designations for the coastlines of the U.S. and Canada).

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. Light-duty diesel introductions here in the U.S. market that employ NOx adsorber catalysts comply 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 California 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 hydrocarbon and NOx exhaust emissions below EPA's fully phased-in Tier 2 fleet average NOx limit of 0.07 g/mile and current light-duty vehicle EPA evaporative emission limits. 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 NOx emission limit. California is already moving forward with a LEV III regulatory program that would require manufacturers to meet a fleet average NMOG+NOx emission limit of 30 mg/mi in 2022 when adopted (adoption expected before the end of 2010).

These proposed LEV III regulations would also require gasoline light-duty vehicles to meet tougher evaporative emission requirements than currently required by EPA. Technologies including advanced carbon canister designs, the use of advanced materials with ultra-low fuel permeation characteristics for fuel tanks and fuel lines, and air intake hydrocarbon adsorbers are available today to meet the anticipated tough California LEV III evaporative emission requirements. ARB is also proposing tighter exhaust and evaporative emissions for medium-duty vehicles (up to 14,000 lbs. gross vehicle weight). Exhaust emission and evaporative emission technologies that will be used to meet these California proposed limits for both light-duty and medium-duty vehicles are available today and EPA should follow California's lead and adopt regulations that mirror these California proposals.

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 and ambient ozone levels.

MECA believes that further reductions of hydrocarbon and NOx emissions can be achieved by adopting aftermarket converter requirements for light-duty, gasoline vehicles that set higher performance and durability standards consistent with performance standards required by California for aftermarket gasoline converters. ARB's regulation eliminates 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. 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. For example, ARB estimated that requiring these newer aftermarket converters in California would result in the reduction of over 36 tons/day of HC + NOx by 2012 when the new technology is likely to be fully implemented. When translated to a national level, these reductions will be significant.

Another strategy that can achieve additional NOx 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 used on well over 300,000,000 automobiles with outstanding results. These same catalyst technologies have been 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 stationary applications.

In July 2006, EPA finalized its regulation for new stationary compression ignition internal combustion engines to reduce diesel air pollution emissions. Recently, in February 2010, EPA issued its final regulation for existing stationary reciprocating internal combustion engines that would reduce toxic pollution emissions. The technologies discussed in this document for gasoline and diesel engines on vehicles are available and have been proven effective for stationary internal combustion engines. These include DOCs and SCR catalysts as well as DPFs to reduce PM emissions from stationary diesel engines. Three-way catalysts, also known as non-selective catalytic reduction catalysts (NSCR) have 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. Additional tightening of standards for both existing and new stationary internal combustion engines should be considered in the future to further reduce the HC, NOx and PM emissions that contribute to ozone levels across the country from these stationary diesel engines.

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 of 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, outboard marine engines, and snowmobiles are contributors to mobile-source hydrocarbon and 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. All classes of off-road, spark-ignited engines can also benefit from advances materials and systems developed for controlling evaporative emissions from PZEV or SULEV light-duty, gasoline vehicles. EPA should review their evaporative emission requirements for all classes of off-road, gasoline engines and revise them to ensure that best available evaporative emission technologies are used in these applications.

On-road motorcycles have begun 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 and evaporative emissions of these catalyst-equipped on-road motorcycles will still be at levels considerably higher than late model, light-duty gasoline cars and trucks. Additional HC + NOx reductions can be obtained from on-road motorcycles through the use of engine, exhaust, and evaporative emission control strategies employed on today's best-in-class light-duty gasoline vehicles.

Conclusion

In closing, we believe that numerous proven strategies are available to further reduce hydrocarbon and NOx emissions from mobile source engines to meet the most stringent ozone ambient standards proposed by EPA. 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.

Contact Person:
Dr. Joseph Kubsh
Executive Director
Manufacturers of Emission Controls Association
2020 N. 14th Street, Suite 220
Arlington, VA 22201
Tel.: (202)296-4797
E-mail: jkubsh@meca.org