STATEMENT
OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE CALIFORNIA AIR RESOURCES BOARD'S U.S. EPA WAIVER REQUEST FOR CALIFORNIA STATE NONROAD COMPRESSION IGNITION ENGINE IN-USE FLEETS STANDARD
DOCKET ID NO. EPA-HQ-OAR-2008-0691

October 16, 2008

The Manufacturers of Emission Controls Association (MECA) is pleased to provide comments in support of the Air Resources Board's (ARB) waiver request for California regulation of in-use fleets that operate non-road, diesel fueled equipment with engines 25 horsepower and greater. Over the past three decades, ARB has shown leadership in its continuing efforts to develop and implement effective air pollution control programs for mobile sources. We believe that ARB's emission standards for nonroad compressed ignition in-use vehicles present a balanced, fair, and flexible approach that will achieve significant particulate matter (PM) and nitrogen oxide (NOx) emission reductions in a cost-effective manner. MECA believes it is important that EPA grant California a waiver for its efforts to control emissions from these in-use nonroad diesel vehicles.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for motor vehicles. Our members have over 30 years of experience and a proven track record in developing and manufacturing emission control technology for a wide variety of diesel and gasoline on-road and off-road vehicles and equipment. A number of our members have extensive experience in the development, manufacture, and application of PM and NOx control retrofit technologies.

Our members have invested and continue to invest significant resources in developing and verifying diesel retrofit technologies for the whole range of in-use diesel engines currently operating in California, including on-road, off-road, and stationary sources. An important opportunity exists to significantly reduce emissions from the existing off-road diesel fleet by taking advantage of the retrofit technology that has been successfully developed for on-road vehicles and applying it to appropriate off-road diesel engines, such as those used in construction, industrial, mining, airport ground service equipment and other vehicles covered by this rule. This regulation will provide manufacturers with a level of certainty in the market for retrofit technologies for off-road vehicles so they can focus resources on verifying technologies specific to off-road vehicles and engines. New products are continually added to ARB's list of verified technologies including passive DPF systems. Several manufacturers are closely engaged in verifying SCR retrofit technology with ARB and these efforts should lead to additional commercial, verified NOx reduction technology in the near future.

Technologies to Reduce Diesel PM and NOx Emissions

MECA offers some additional comments regarding the technological feasibility and retrofit experience with emission control technology options available to reduce PM and NOx emissions from existing off-road vehicles to meet diesel emission reduction goals. MECA has recently provided the stakeholders with documents on diesel retrofit technologies, such as "Retrofitting Emission Controls on Diesel-Powered Vehicles" and "Case Studies of Construction Equipment Diesel Retrofit Projects." Both of these documents are available on MECA's diesel retrofit web site at: www.dieselretrofit.org.

Important differences exist between on-road and off-road diesel applications. Although off-road applications will pose engineering challenges and special requirements, the use of exhaust emission control technology for off-road diesel engines is not new. Both PM and NOx control technologies are being demonstrated today on off-road applications in California and elsewhere. For over 30 years, off-road diesel engines used in the construction, mining, and materials handling industries have been equipped with exhaust emission control technology – initially with diesel oxidation catalysts (DOCs) and followed later by diesel particulate filters (DPFs). These systems have been installed on vehicles and equipment both as original equipment and as retrofit technology on over 250,000 nonroad engines worldwide, including construction and mining equipment where vehicle integration has been challenging.

A number of advanced emission control technologies exist today to significantly reduce PM and NOx emissions from off-road diesel engines. These include diesel particulate filters (DPFs), diesel oxidation catalysts (DOCs), selective catalytic reduction (SCR), NOx adsorbers, lean NOx catalysts, exhaust gas recirculation (EGR) and crankcase filters (CCF).

Diesel Particulate Filters – Diesel particulate filters (DPFs) are commercially available today. When used in combination with ULSD, high-efficiency DPF technology can reduce PM emissions by up to 90 percent or more, ultra-fine carbon particles by up to 99+ percent and, depending on the system design, toxic HC emissions by up to 80 percent or more. Over 200,000 on-road heavy-duty vehicles worldwide have been retrofitted with passively or actively regenerated DPFs. In addition, over four million new passenger cars have been equipped with DPFs in Europe since mid-2000, and starting this year every new heavy-duty on-road engine sold in the U.S. and Canada is being equipped with a high-efficiency DPF. Significant investments in DPF production capacity have been made and will be expanded in the future to ensure that DPF demands for both new vehicles and retrofit applications in North America can be met. The operating and durability performance of DPFs has been very impressive. For example, a growing number of on-road DPF-equipped heavy-duty vehicles have been successfully operating for several-hundred thousand miles or more.

Local Law 77 in New York City is responsible for putting retrofit devices on a wide variety of city-owned and contracted construction equipment. For example, the Croton Water Treatment Project in North Bronx, NY, successfully installed PM and NOx control devices (including passive and active DPFs) on over 30 pieces of construction equipment, including excavators, bulldozers, backhoes, and cranes. A number of off-road diesel demonstrations have been done in California, such as the runway expansion at LAX airport. These off-road

applications include the use of both passive and active filter regeneration strategies. Active off-road DPF options include diesel fuel injection strategies, engine throttling strategies, the use of electrical heating elements, and fuel burners. Over 50,000 active and passive DPF retrofit systems have been installed worldwide on off-road applications.

New, flow-through filter technologies are also emerging for diesel retrofit applications. These "partial" filters make use of wire mesh supports or tortuous metal substrates that employ sintered metal sheets. These metal substrates can be catalyzed directly or used in combination with an upstream catalyst to facilitate regeneration of soot deposits. These partial filter designs are less susceptible to plugging and can offer PM reduction efficiencies in the 50-75 percent range depending on engine operating conditions and the soluble fraction of the PM. Some of these partial filter designs have also been shown to operate over long periods of time without the need for ash cleaning associated with engine lubricant consumption.

Development work is underway to further enhance the performance of filter system designs. For example, work continues on developing and implementing additional filter regeneration strategies that will expand the applications for retrofitting DPFs. Development work on filter materials and designs to further enhance filter system durability and to further reduce backpressure are under development. Manufacturers are also developing DPF options that minimize NO_2 emissions in systems that make use of NO_2 for filter regeneration.

Selective Catalytic Reduction (SCR) – SCR technology is a proven NOx emission 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. There are now more than 100,000 SCR-equipped trucks operating in Europe. SCR is 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 auto manufacturers are also developing SCR systems for light-duty diesel vehicles that will be sold in California and across the U.S. before the end of this decade. Applying SCR to diesel-powered engines provides simultaneous reductions of NOx, PM, and HC emissions.

A number of off-road diesel demonstrations have been done with combination SCR+DPF retrofit systems. For example, an SCR+DPF system was installed on a 170 hp John Deere compressor engine involved in the Croton Water Treatment project in New York City. In California, a 300-ton gantry crane powered by a turbocharged, after-cooled diesel engine rated at 850 kW was equipped with such a combined emission system in 2001. A number of combined SCR+DPF systems have also been installed on stationary diesel engines used for power production, including six Caterpillar 3516B engines operating in southern California.

Volvo AB, in the summer of 2004, launched 27 diesel transit buses in Sweden that are operating with a combined SCR+DPF system to reduce PM and NOx emissions below the European Euro 5 heavy-duty emission limits that do not come into force until 2008. A number of small test fleets of heavy-duty over-the-road diesel vehicles are also operating within the U.S.

to demonstrate the capabilities of combined PM and NOx control using SCR and DPFs. The U.S. Department of Energy's APBF-DEC program included the evaluation of two different combined SCR+DPF systems on a 12-liter heavy-duty diesel engine. These results included the operation of these two different SCR+DPF systems for 6,000 hours of durability with emission performance near the EPA 2010 heavy-duty on-road emission limits.

Lean NOx Catalyst (LNC) Technology – ARB has already verified a technology option that combines a lean NOx catalyst with a diesel particulate filter to achieve 25 percent NOx reduction with Level 3 particulate control on a wide variety of on-road heavy-duty engines. This technology is also being demonstrated and commercialized for a variety of off-road retrofit applications, including construction equipment, agricultural pumps, and portable engines.

Low-Pressure EGR – This technology is being successfully demonstrated in retrofit applications on trucks, buses, and other applications. Over 2,000 systems are running worldwide. Low-pressure EGR has demonstrated a NOx control capability in the range of 30 to 60 percent. ARB has verified two low-pressure EGR+DPF systems with up to 50 percent NOx reduction for a range of on-road and stationary diesel engines.

Proper integration of emission control technology on off-road vehicles and equipment is important for three reasons: 1) to ensure the system is installed at the appropriate place in the exhaust system to optimize effectiveness, 2) to ensure the system physically fits in the available space, and 3) to ensure safety. Over 30 years of experience in integrating emission control technologies on a variety of diesel and SI off-road vehicles and equipment ranging from <25 hp to over 750 hp provides a clear indication that emission control technology can be successfully integrated on a wide range of off-road vehicles to meet ARB's standards and ensure the safety of the vehicle operator and others. In addition, exhaust emission control technology has been integrated on to vehicles to address special operating concerns and environments. For example, where equipment is used in explosive operating environments, such as underground coal mines, emission control technology has been designed to meet special surface temperature requirements. Finally, exhaust emission control technologies have been installed on vehicles so as not to impair operator visibility. Safety is an essential component of the engineering and installation of retrofit emission control devices

An important requirement for installing emission control technology on off-road vehicles is to ensure that the device can withstand the vibration and/or extreme operating conditions associated with the operation. Emission control technology can be designed, installed, and operated to provide effective, reliable, and durable performance under these extreme conditions. This has been demonstrated by the particulate filter systems that have been used in underground mining applications for over 15,000 hours in rugged work environments and continued to provide effective emission reduction performance. A 2003 survey (SAE Paper 2004-01-0076) of 3,848 construction retrofit installations from 2001 to 2003 in Europe found a failure rate of 1-2 percent. The failures were identified as a combination of fuel/lubricant, operator, and product issues, which have been addressed through further product improvements.

Conclusion

In closing, we ask EPA to grant ARB a waiver for this innovative regulatory program that will significantly reduce PM and NOx emissions from in-use off road diesel vehicles operating in California. Our industry pledges its continued support and commitment to ensure that the existing control technologies area available to achieve desired emission reductions outlined in the Regulation for In-Use Off-Road Diesel Vehicles within the time frame specified in the regulation.

Contact:

Joseph Kubsh
Executive Director
Manufacturers of Emission Controls Association
1730 M Street, NW
Suite 206
Washington, D.C. 20036
Tel.: (202) 296-4797
E-mail: jkubsh@meca.org