

**STATEMENT OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE AIR RESOURCES BOARD'S
PROPOSED AMENDMENTS TO THE REGULATION FOR IN-USE OFF-ROAD
DIESEL-FUELED FLEETS**

January 22, 2009

MECA is pleased to provide testimony in support of ARB's proposed amendments to the regulation for in-use off-road diesel vehicles including the extension of the deadline for fleets to receive double emission credit for suitable retrofits. Although the proposed amendments extend the deadline for double credits, we believe that the most efficient use of these credits occurs when retrofits are focused on equipment that represents a larger portion of the state fleet and with which there has been the most retrofit experience rather than trying to retrofit specialized unique pieces of equipment. We believe that the proposal presents a balanced approach that extends flexibility to fleets interested in early compliance while allowing additional time for expanding the selection of verified diesel emission control systems (VDECS) available for retrofitting off-road equipment and vehicles. MECA members are committed to continue to develop and verify the VDECS technologies that will be needed to meet the emission reduction targets by the implementation date of this regulation in 2010.

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 including a majority of the devices on ARB's verified technology list.

Today's economic environment has put a significant strain on businesses of all sizes including manufacturers of 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. A recent survey of our members shows that our industry contributes over 65,000 green jobs around the country including a significant number of jobs in California. These jobs involve technical and service personnel responsible for developing, installing and maintaining diesel retrofit devices. New diesel emission control products continue to be added to ARB's list of verified technologies. The number of VDECS suitable for off-road vehicles has more than doubled in the past year including four passively regenerated Level 3 DPF devices. Manufacturers are expected to verify even more passive and active filter technologies in the coming year for off-road applications to further expand the options available to fleet owners to comply with ARB's requirements. Recently one manufacturer has verified a Level 3 DPF + 40% NOx reduction technology based on HC-SCR/ Lean NOx catalysts for off-road applications. Several manufacturers are closely engaged in verifying urea-SCR retrofit technology with ARB and these efforts should lead to additional commercial, verified NOx

reduction technologies. Beginning this year, tighter regulations on retrofit technology require lower NO₂ emission from retrofit devices. In order to obtain a plus designation, a PM retrofit device can emit no more than 20% higher NO₂ than the baseline engine-out emissions. Manufacturers have been active in re-verifying retrofit PM reduction technologies to the plus designation to comply with this change in regulation.

Demonstration projects such as the off-road showcase, supplemental environmental projects (SEPs), and a variety of off-road retrofit demonstrations in California and across the country are an essential part of the verification process. The showcase alone represents 24 new retrofit devices that are in the process of being verified. 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 NO_x control devices (including passive and active DPFs) on over 30 pieces of construction equipment, including excavators, bulldozers, backhoes, and cranes. For example, an SCR+DPF system was installed on a 170 hp John Deere compressor engine at the Croton site. Over 50,000 active and passive DPF retrofit systems have been installed worldwide on off-road applications. More than 20,000 of these filters have been successfully employed in Europe on construction equipment used in tunneling projects. The durability and performance of PM control technologies is being demonstrated on OEM on-road applications beginning with the 2007 model year. Since 2007, nearly every new diesel vehicle sold in the U.S. or Canada has been equipped with a high efficiency diesel particulate filter to comply with the U.S. EPA's 2007/2010 on highway regulations. This represents over 800,000 new trucks operating on DPFs mostly in the U.S. In 2010 the same new highway trucks will be required to reduce NO_x emissions by 90% relative to pre-2007 requirements and will be equipped with NO_x control technologies such as lean NO_x trap catalysts, urea-SCR catalysts and high flow EGR systems.

SCR technology is a proven NO_x emission control strategy. To reduce NO_x, these catalysts rely on either a urea or hydrocarbon (HC) reductant. Typically the HC reductant is the diesel fuel on board the vehicle. 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 or Euro 5 heavy-duty NO_x emission standards. There are now more than 300,000 SCR-equipped trucks operating in Europe. SCR has been identified by several engine manufacturers as their chosen strategy 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 and commercializing SCR systems for light-duty diesel vehicles that are being sold in California and across the U.S. A major heavy duty engine manufacturer recently achieved over seven million miles of durability demonstration testing on 2010 technology engines employing SCR and DPF emission control technologies. A number of on-road diesel demonstrations have been done with combination SCR+DPF retrofit systems. There are over 50 such systems currently operating in California on utility vehicles, transit buses, trash trucks and on-highway Class 8 trucks. In some of these applications these SCR + DPF equipped retrofit systems have achieved over 80% NO_x reduction. There are nearly 300 SCR + DPF retrofit devices operating on medium and heavy-duty on-road vehicles in Europe. Although important differences exist between on-road and off-road diesel applications, many of the same manufacturers develop similar systems for OEM on-road and off-road applications. The experience from on-road applications are typically carried

over into more challenging off-road vehicles. Integrated HC-SCR + DPF retrofit devices have been installed on thousands of on-road vehicles and a system capable of Level 3 PM and 40% NO_x reduction has been demonstrated on construction equipment and is now on ARB's verified technology list.

Both PM and NO_x control technologies are being demonstrated today on off-road applications around the country. 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 non-road engines worldwide, including construction and mining equipment where vehicle integration has been challenging. An important requirement for installing emission control technology on off-road equipment is to ensure that the device can withstand the vibration and/or extreme operating conditions that the vehicles experience in every day use. 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.

Despite the ever growing experience base with off-road retrofit devices, the diversity in design and duty cycle of off-road applications pose engineering challenges and special requirements. 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 minimizes the impact on operator visibility, and 3) to ensure safe operation of the vehicle and safety to the operator. Safety is an essential component of the engineering and installation of retrofit emission control devices. Over 30 years of experience in integrating emission control technologies on a variety of diesel and spark-ignition 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 vehicles to meet ARB's proposed 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. Surface temperature measurements conducted by MECA members have demonstrated that DPF surface temperatures are no higher than those measured on OEM mufflers and in some cases actually lower. As for OEM installed mufflers, surface temperature issues are often addressed by the use of heat shielding in cases where vehicle operators or maintenance personnel may inadvertently come in close proximity to hot surfaces. In certain instances, international standards have also recognized that the use of mirrors and

CCD cameras can be successfully used on off-road equipment to ensure adequate operator visibility.

MECA and our members are actively involved with ARB staff to further clarify criteria used in granting exemption from retrofit requirements for applications or installations deemed to be unsafe. Having a well defined review process in place would ensure that implementation of the proposed regulations are accomplished with minimal administrative delays or judgments. We look forward to working with Cal/OSHA, ARB and interested stakeholders to develop effective and realistic amendments to the California Code of Regulations that will serve to ensure that modifying construction equipment with VDECS is done with consideration to the safe operation of the vehicle, the operators and workers on construction sites.

A safe work environment must also consider the hazards associated with the ambient air quality at the work site. A 2004 study conducted in the Northeastern United States at five construction sites measured air quality at the perimeter of the site and within the cab of construction equipment. Analysis of measurement results found that construction workers were exposed to up to 16 times more PM_{2.5} than the average ambient level outside the construction site and peak concentrations during active work may present acute health risks to workers and nearby residents. When averaged over 24 hours, in cabin measurements of PM_{2.5} were shown to exceed the National Ambient Air Quality Standard (NAAQS) by 4-6 times. The study also found elevated levels of benzene, 1,3-butadiene, formaldehyde, acetaldehyde and heavy metals commonly found in diesel fuel and lubricants. The levels of some of these compounds exceeded the 8-hour exposure limit established by the American Conference of Governmental Industrial Hygienists or ACGIH. The catalysts and filters that are components of Level 2 and 3 VDECS are designed to substantially remove these pollutants and air toxics from diesel exhaust and in effect serve as engineering controls for a safer work environment on construction sites.

We commend the Air Resources Board for its continuing efforts to provide the people of California with healthy air quality and for demonstrating true leadership in this innovative regulatory program that will significantly reduce PM and NOx emissions from in-use, off-road diesel vehicles operating in the State. We urge the Board to remain vigilant on any attempts to stay or delay the overall goals of ARB's off-road fleet rules or ARB's broader Diesel Risk Reduction Plan. These important emission reductions strategies not only protect the health of all the citizens of California but also provide an important source of economic growth and green jobs for the state. We also wish to thank the ARB staff for its willingness to work closely with all interested parties throughout the regulatory process. Our industry pledges its continued support and commitment to do its part to help achieve the goals of this regulation.

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