WRITTEN COMMENTS OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON PROPOSED MODIFICATIONS TO MEXICO'S EMISSION STANDARDS FOR HEAVY-DUTY DIESEL ENGINES AND VEHICLES
(PROY-NOM-044-SEMARNAT-2014)

January 27, 2015

The Manufacturers of Emission Controls Association (MECA) is pleased to provide comments in support of SEMARNAT's proposed modifications to the emission standards for heavy-duty diesel engines and vehicles (PROY-NOM-044-SEMARNAT-2014). Finalizing these standards for new heavy-duty diesel engines and vehicles will provide significant economic, climate change and health benefits for the citizens of Mexico. These proposed heavy-duty diesel engine and vehicle emission standards build on the extensive, successful experience with diesel particulate filters (DPFs) for controlling diesel particulate emissions, and selective catalytic reduction (SCR) technology for controlling NOx emissions that spans more than 15 years in the major vehicle markets of the United States, Canada, Europe, and Japan. DPFs and SCR technology have been used on millions of heavy-duty engines and vehicles to provide cost-effective, durable reductions of diesel PM and NOx emissions, consistent with SEMARNAT's proposed 2018 compliance with U.S. 2010/Euro VI heavy-duty engine emission limits.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for mobile sources. Our members have over 40 years of experience and a proven track record in developing and manufacturing emission control technology for a wide variety of on-road and off-road vehicles and equipment, including extensive experience in developing emission controls for gasoline and diesel engines and vehicles in all world markets. Our industry has played an important role in the emissions success story associated with mobile sources in the United States and Canada, and has continually supported efforts to develop innovative, technology-forcing, emissions programs to deal with air quality problems. Our industry has a significant economic footprint in North America, employing in excess of 60,000 professionals in research, product development, manufacturing, and customer support. MECA member manufacturing facilities include operations in Mexico.

The experience base with DPFs and SCR technology on engines and vehicles is extensive. MECA's annual sales survey of retrofit technologies sold by MECA members has shown that since 2001, more than 50,000 Level 3 retrofit DPFs have been deployed in California and more than 125,000 retrofit DPFs have been installed across the U.S. on both on-road and off-road vehicles and equipment (MECA estimates that total worldwide retrofit DPF installations exceed over 300,000 filters). For over 30 years, off-road diesel engines in the mining, construction 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). Since 2007 every new heavy-duty diesel vehicle sold in the U.S. or Canada has been equipped with a high efficiency diesel particulate filter to comply with U.S. EPA's 2007/2010 heavy-duty highway engine emission regulation. This represents over 3 million new trucks operating on DPFs, mostly in the U.S. In 2010, new U.S. and Canadian highway trucks were required to reduce NOx emissions by 90 percent relative to pre-2007 levels

and have been equipped with NOx control technologies, in addition to DPFs. The NOx control technology of choice for these heavy-duty applications has been urea-SCR technology. European regulators addressed NOx emissions first on heavy-duty trucks and SCR systems were equipped on new trucks to comply with the 2005 heavy-duty Euro IV emission regulations. DPFs became standard equipment on new European heavy-duty trucks starting in 2013 to comply with Euro VI heavy-duty highway emission standards. Light-duty diesels make up about 50 percent of new European passenger car sales in Europe and DPFs were first offered on diesel passenger cars in 2000 and are now standard equipment on all new European diesel light-duty vehicles. DPFs and SCR technology are now being applied to a variety of off-road diesel engines and equipment to comply with U.S. EPA Tier 4/Euro Stage 4 emission standards. Diesel particulate filters are utilized by tens of millions of vehicles and universally recognized as a reliable, effective and best available vehicle particulate control technology by industry and regulators around the world. SCR technology has become the NOx control technology of choice for diesel mobile source engines with successful applications on light-duty vehicles, heavy-duty vehicles, off-road equipment, marine engines, and locomotive engines in all major markets of the world.

The Advanced Collaborative Emission Study (ACES, reports available at: http://crcao.org/publications/emissions/index.html) demonstrated the effectiveness of DPF technology on 2007 commercial heavy-duty diesel engines from four of the major manufacturers, all equipped with DPFs. The 2007 OEM-equipped DPF technology reduced PM emissions by over 99 percent (90 percent below the standard). When these filters are catalyzed, they reduce HC emissions, polycyclic-aromatic hydrocarbons (PAHs), dioxins and other toxics by 80 percent or more from their engine-out levels. The second phase of the ACES study evaluated three commercial 2010 technology heavy-duty diesel engines with both DPF and SCR technology and showed a further performance improvement above and beyond the 2007-compliant engines of an additional 70 percent lower PM emissions, including a further 70 percent reduction in ultrafine particles as represented by particle number emissions. This result was supported by a separate European study that demonstrated that these advanced wall-flow DPFs not only capture over 99 percent of the soot particles in the PM2.5 range, they are even more efficient at capturing over 99.8 percent of ultrafine particles. Ultrafine particles in the less than 100 nanometer size range contribute almost nothing to the overall mass of PM in the exhaust however; they may represent a huge number of particles with an extremely high surface area. Ultrafine particle toxicity has been the focus of numerous health studies that have shown that these ultrafine particles may pose the greatest adverse health effects due to their high surface area that can attract volatile toxic compounds and their ability to penetrate deep into the lungs. Although ultrafine particles are not currently regulated they are the topic of extensive research and discussion among the health community. A co-benefit of DPF filters is that they capture or oxidize the majority of ash, carbonaceous or volatile ultrafine particles present in the exhaust.

In the highway, heavy-duty sector, DPF-equipped engines are routinely being certified at PM emissions levels that are 90% or more below the 0.01 g/bhp-hr 2010 U.S. EPA PM heavy-duty highway diesel engine standard. The “bonus” PM reductions provided by DPFs in the heavy-duty highway sector provide significantly more public health benefits than estimated by the U.S. EPA in their final 2007-2010 heavy-duty highway regulation. In addition to “bonus” public health benefits afforded by DPFs, DPFs have also provided important co-benefits on

climate change due to the large reductions in black carbon emissions that result from the use of high efficiency DPFs (a California Air Resources Board funded study highlighting the significant impact of reducing black carbon emissions from diesel engines on climate change was released in June 2013).

Heavy-duty engines and vehicles equipped with a DPF and SCR technology require the use of ultra-low sulfur diesel fuel and a quality-controlled urea reductant to ensure proper operation and durability of the exhaust emission control system. Mexico recognizes the importance of establishing availability of this diesel fuel and exhaust fluid ahead of the proposed January 1, 2018 implementation date and has begun taking steps to ensure their availability across the country. The American Petroleum Institute has established and administers a urea quality program in the U.S. This urea quality program serves as a good example for Mexico to duplicate moving forward with their regulatory program. Ultra-low sulfur diesel (ULSD) fuel is already available in some major metropolitan areas of Mexico and near the U.S. border. ULSD availability is expected to expand across the country ahead of the proposed January 1, 2018 emission standards and SEMARNAT plans to monitor the rollout of ULSD across Mexico in the coming two years. It should be noted that a U.S. 2010/Euro VI-compliant truck equipped with a DPF+SCR emissions system could utilize a tankful of 500 ppm sulfur diesel fuel in the event ULSD is not available, without any long term negative impacts on the overall emissions performance or durability of the DPF+SCR system. The negative impact of higher fuel sulfur on the catalysts present in this emission system can be largely reversed by a return to the use of ULSD after operation on a single tank of 500 ppm sulfur diesel fuel. Elevated filter regeneration conditions with normal ULSD operation that occur regularly on the vehicle will purge sulfur off of the catalysts that accumulates under engine operation with an "emergency" tankful of 500 ppm sulfur fuel. This reversibility of negative sulfur impacts on the catalysts will allow SEMARNAT to move forward with their proposed January 1, 2018 implementation date with some limited availability of 500 ppm sulfur fuel still in the Mexican market. Extensive operation of a DPF+SCR system with 500 ppm sulfur diesel fuel needs to be avoided to ensure compliance with the proposed U.S. 2010/Euro VI emission standards.

With engines equipped with DPF+SCR systems, the importance of proper engine maintenance cannot be overemphasized for the durability and long term performance of the vehicle and the DPF+SCR emissions system. Regular maintenance becomes critical once a DPF+SCR system is installed because the presence of smoke in the exhaust can no longer be used as an indicator of engine operation problems. High smoke opacity could be a sign of excessive oil consumption or a bad fuel injector, both of which result in high engine-out PM that may lead to plugging of the filter. Once a DPF is installed in the exhaust system, it will capture the PM and mask any signs of high smoke. Therefore MECA believes that it is good regular maintenance practice to have an opacity-based check of the engine-out exhaust, each time a filter is removed for cleaning (if the truck's OBD system allows for this). An opacity test is an inexpensive, simple measurement that should be an integral part of a proactive preventative maintenance program. The Society of Automotive Engineers (SAE) standard (J1667) provides a recommended practice for performing an opacity measurement. Performing an annual, engine-out opacity measurement is a way for fleets to actively monitor the condition of their engines and perform the necessary maintenance to keep their equipment functioning within the engine manufacturers recommended guidelines and minimize the chance of filter plugging. This will

have the added co-benefit of better performance and longer engine life. There are new portable instruments emerging that can also easily measure particle number emissions (instead of opacity) that could be useful in detecting elevated engine-out PM emissions or compromised filter issues that could be used in effective preventive maintenance practices. The California Air Resources Board has recently initiated an effort to identify best maintenance practices for heavy-duty engines and Mexico should utilize information under development in California to inform truck and bus owners of the importance of utilizing effective, preventive maintenance practices. MECA also applauds SEMARNAT for including full OBD requirements with the implementation of U.S. 2010/Euro VI diesel engine and vehicle standards. OBD provides another important check on the performance of key emissions-related components and ensures that the emissions benefits of clean diesel technology are delivered over the full regulated, useful life of the engine.

MECA applauds SEMARNAT for bringing forward this important proposal for reducing emissions from heavy-duty diesel engines and vehicles. Once finalized, these regulations will provide the citizens of Mexico with significant economic, air quality and climate change benefits. MECA encourages SEMARNAT to finalize these regulations as soon as possible in 2015 and to continue their efforts to make sure that ultra-low sulfur diesel fuel and urea reductant are made available across all of Mexico ahead of the proposed January 1, 2018 implementation date for these new, more stringent emission regulations. MECA urges SEMARNAT to also move forward with further harmonizing Mexico's mobile source emission regulations with those in place in the United States and Canada (e.g., light-duty Tier 2/3 emission standards, nonroad Tier 4 standards, light-duty and heavy-duty vehicle greenhouse gas regulations, and a marine vessel Emission Control Area along Mexico's coastline). MECA members stand ready to work with their customers to deliver the needed emission control technologies that will allow future new trucks in Mexico to comply with the proposed U.S. 2010/Euro VI emission standards.

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