

**Comments of the Manufacturers of Emission Controls Association
on the California Air Resources Board's Proposed Amendments to the Airborne
Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units
(TRUs) and TRU Generator Sets, and Facilities where TRUs Operate**

October 17, 2011

The Manufacturers of Emission Controls Association (MECA) is pleased to provide comments in response to the California Air Resources Board's (ARB) proposed amendments to the Airborne Toxic Control Measure (ATCM) for transport refrigeration units (TRUs). We commend the agency for its continuing efforts to implement effective emission control measures for major sources of air pollution such as this category of engines.

MECA is a non-profit association made up of the world's leading manufacturers of emission control technology for mobile source applications and stationary internal combustion engines. A number of our members have extensive experience in the development, manufacture, and commercial application of retrofit emission control technologies for diesel engines, including those used in TRU applications. Currently there are three devices verified to the LETRU (Level 2) requirements and two devices that meet future ULETRU (Level 3) PM emission limits.

Discussion

MECA generally supports ARB's proposed amendments to the TRU ATCM which would provide model year 2001 through 2003 TRU engines that complied with the low emission TRU in-use performance standards (LETRU) by the original implementation period a one to two year extension from the more stringent ultra-low emission TRU in-use performance standards (ULETRU). MECA and our members have been actively engaged in the regulatory development process and we believe that the staff's inventory and emission impacts analysis provides strong justification for retaining the seven year operational life for 2004 model year and newer TRU engines. Furthermore, given the generally low compliance rates in the California based TRU fleet, MECA supports the proposed amendments which include provisions requiring that entities generally responsible for the shipping and receiving of refrigerated freight employ only compliant operators.

In discussions with MECA member companies, we believe there is an effective plan in place for the sufficient supply of Level 3 filters to meet the expected demand for these devices. Currently, there are two Level 3 VDECS available for TRU engines. MECA members are in the process of verifying with ARB additional retrofit devices that can meet ULETRU requirements. These units are extensions of the current LETRU designs, with only slight mechanical and filter medium modifications required in order to achieve the higher efficiency required for ULETRU performance. They will incorporate all of the durability improvements identified during the LETRU program. One MECA member has over 5,000 units in the field, which have accumulated an estimated one

million operating hours, and has developed a network of at least 50 dealers in and outside of California who sell, install, and service TRU retrofit devices.

In supporting the proposed amendments, MECA believes any further delays would be unnecessary and counterproductive to ARB's mission of reducing particulate matter emissions to protect public health and the environment. MECA member companies have invested and continue to invest significant resources in developing and commercializing emission control technologies for the whole range of in-use diesel engines currently operating in California and the rest of the U.S. Retrofit technology providers, including those developing and verifying ULETRU compliant devices, rely on regulatory stability and effective enforcement in order to continue making the necessary investments to meet the commercial needs in time for future implementation targets. However, delays in the implementation of emission control requirements and ineffective enforcement will only cause retrofit manufacturers to be extremely cautious in making these investments. Our members experience has shown that market adoption by fleets is heavily influenced by the regulatory deadlines and few if any operators elect to comply early. LETRU systems were available in mid-2008; however, minimal compliance activity was experienced even 60 days prior to the actual compliance date.

MECA member companies are committed to developing and commercializing diesel retrofit technologies that cover a broad range of in-use engines and applications, including in-use diesel engines used in TRU applications. The success of ARB's efforts to clean up the existing diesel vehicles and equipment depends on the agency having adequate staff and support to manage its verification and enforcement programs for diesel emission control strategies. Going forward, we urge the ARB Board to continue to provide sufficient resources to these programs to enable the agency to maintain a verified retrofit technology portfolio that provides end-users with a variety of proven, cost-effective, retrofit options from a number of suppliers and enforcement of a level economic playing field for end users. MECA members are actively engaged with verification staff on the next round of amendments to the diesel retrofit verification and in-use compliance regulation. We believe that significant opportunities exist to streamline the process and provide economic relief to VDECS manufacturers in light of the recent changes to the on-road, off-road fleet rules and the proposed TRU regulations, while still achieving the goals of the program. Furthermore our members estimate that less than 40% of the TRUs that have been impacted by this regulation are compliant at this time and therefore further enforcement is required to insure that those operators that chose to comply are not economically penalized in the market place.

Technologies to Reduce Diesel PM from Transportation Refrigeration Units

Diesel Particulate Filters for ULETRU – Diesel particulate filters (DPFs) are the most effective PM reduction technology for a wide range of diesel engine applications. High-efficiency DPF technology can reduce PM emissions by over 85 percent or more. Catalyzed filters have the added co-benefit of reducing toxic HC emissions by up to 80 percent or more. Over 200,000 on-road heavy-duty vehicles and 50,000 off-road pieces of equipment have been retrofitted with passively or actively regenerated DPFs

worldwide. The same technology has been extended across a wide range of engine sizes and operating conditions including TRU engines. The durability and performance of this PM control technology 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. An increasing number of new off-road diesel engines are now being certified with DPFs to comply with EPA's interim Tier 4 PM emission standards. MECA's annual sales survey of retrofit technologies has shown that since 2001, approximately 25,000 Level 3 DPFs in California and nearly 60,000 across the country have been installed on vehicles from construction equipment to long-haul Class 8 tractors and many others including TRUs and stationary engines.

These advanced wall-flow DPFs not only capture soot particles in the PM_{2.5} range, they are also very effective at capturing over 99+% of ultrafine particles. Ultrafine particles in the less than 20 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. Recently numerous health studies 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 Level 3 DPF filters is that they capture or oxidize the majority of ash, carbonaceous or volatile ultrafine particles in the exhaust.

Flow-Through Filters for LETRU – These “partial or flow-through” 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 longer periods of time before ash cleaning associated with engine lubricant consumption is necessary.

Development work is underway to further enhance the performance of wall-flow and flow-through 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 also under development. DPFs are typically designed to minimize backpressure impacts on fuel economy. The real world experience from new OEM installed DPF technologies since 2007 and passive retrofit DPFs integrated into the exhaust systems of on-road and off-road vehicles has shown a fuel economy impact attributed to increased backpressure of only 1-2%.

Although early designs of LETRU and ULETRU technologies have identified some issues, these were easily addressed in redesigns, MECA members experience with

TRUs in the field has been extremely positive. The over 5,000 LETRUs in the field have demonstrated excellent results. The latest versions of ULETRU demonstration units have accumulated thousands of operating hours with a high degree of reliability.

MECA provides additional documents on diesel retrofit technologies on our website, www.dieselretrofit.org, such as “Retrofitting Emission Controls on Diesel-Powered Vehicles”. Given the effectiveness of diesel particulate filter systems in reducing PM emissions, ARB should consider maximizing the use of these technologies wherever possible to help the agency meet its regulatory obligations (e.g., the ATCMs under ARB’s Diesel Risk Reduction Plan, as well as ARB’s State Strategy for meeting California’s State Implementation Plan).

Conclusion

MECA generally supports ARB’s proposed amendments to the Airborne Toxic Control Measure for transport refrigeration units. However, MECA advises ARB to fully take into consideration the feasibility, costs, and emission impacts of the changes to this ATCM, as well as changes to other ATCMs. MECA and its member companies look forward to continuing to work with ARB and its stakeholders in implementing the control measures under the agency’s Diesel Risk Reduction Plan.

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