STATEMENT
OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE AIR RESOURCES BOARD'S
PROPOSED AMENDMENTS TO THE CALIFORNIA DIESEL FUEL REGULATIONS

November 18, 2004

The Manufacturers of Emission Controls Association (MECA) is pleased to provide testimony in support of the Air Resources Board's proposed amendments to California's diesel fuel regulations. Requiring the use of ARB's motor vehicle diesel fuel ("CARB diesel fuel") for diesel fuel used in intrastate locomotives and commercial and recreational harborcraft is absolutely essential to achieving significant emission reductions from these diesel engines.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for mobile sources. Our members have decades of experience and a proven track record in developing and manufacturing emission control technology for a wide variety of new and existing on-road and off-road vehicles and equipment. As our industry faces the challenges of developing and optimizing advanced technologies to reduce particulate matter and NOx emissions from all categories of both new and existing diesel engines, the availability of low sulfur fuel is absolutely critical to ensuring the ultimate success of these technologies. MECA has consistently supported ARB's and EPA's efforts to require the use of ultra-low sulfur diesel in all on-road and off-road mobile source and stationary engine applications since the use of this clean diesel fuel is a key enabler to the development and use of best available emission control technologies for existing and new diesel engines.

The use of ultra-low sulfur diesel fuel in existing intrastate locomotive and marine engines will enable, in some cases, the use of the same catalyst-based diesel particulate filters that are now being used on existing on-road and off-road diesel engines and will facilitate and enhance the use of other PM retrofit controls, such as diesel oxidation catalysts and NOx retrofit technologies, such as low pressure EGR systems, lean NOx catalysts, and selective catalytic reduction systems. The ability to use retrofit emission controls for reducing PM and NOx emissions from existing locomotive and marine engines will also depend on other criteria such as the engine-out emission characteristics of a given engine, the available space for installing retrofit controls, and the lubricating oil consumption rates of a given engine. Not all existing engines in the locomotive and marine category will be candidates for retrofit control technologies even with the use of ultra-low sulfur fuel.

The early implementation of ultra-low sulfur diesel fuel in locomotive and marine applications in California that would result from the adoption of this proposal may also encourage the early introduction of new cleaner engines by manufacturers that utilize the

same types of NOx and PM emission control technologies that will be used to meet the 2007-2010 on-road heavy-duty engine emission standards. In this manner, California can provide manufacturers with a proving ground for the next generation clean locomotive and marine diesel engines equipped with the best available emission control technologies in advance of future federal emission standards that the EPA is due to propose in 2005.

ARB has demonstrated true leadership in the worldwide movement towards ultra-low sulfur diesel fuel and in recognizing early on that achieving very low emission rates from diesels requires an engineered systems approach combining the best in engine designs, advanced emission control technology, and low sulfur diesel fuel. In 2000, ARB established the first low sulfur fuel regulatory program in North America when it set a requirement that <15 ppm sulfur be available for use by urban buses beginning in 2004. At that time, ARB also announced its intention to set a 15 ppm sulfur cap on all diesel fuel sold for use by on-road and off-road diesel engines. Following ARB's lead, the U.S. EPA subsequently proposed and finalized a 15 ppm sulfur limit for on-road diesel fuel (starting in June 2006), and, in 2004, EPA finalized the 15 ppm sulfur limit for off-road diesel fuel (starting in July 2010), including the mandatory use of ultra-low sulfur diesel fuel in marine and locomotive applications starting in July 2012. Adoption of this rule affecting intrastate locomotives and harborcraft operating in California waters would accelerate the use of ultra-low sulfur diesel fuel in these California applications a full five years ahead of the current EPA requirements and continue California's leadership tradition on the use of clean fuels in all mobile source and stationary source sectors.

The Role of <15 ppm Sulfur Diesel Fuel in Achieving Very Low Emission Levels

The adverse impacts of sulfur in diesel fuel on catalyst-based diesel particulate filters and NOx adsorbers is now clearly established and is well documented in a variety of public documents (including previous supporting documents issued by EPA and ARB in requiring ultra-low sulfur diesel fuel in on-road and off-road mobile source applications). Sulfur affects precious metal catalyst-based diesel particulate filter performance by inhibiting the performance of catalytic materials upstream of or on the filter. This phenomenon not only adversely affects the ability to reduce emissions, but also adversely impacts the capability of these filters to regenerate – there is a direct trade-off between sulfur levels in the fuel and the ability to achieve regeneration. Sulfur also competes with chemical reactions intended to reduce pollutant emissions and creates particulate matter through catalytic sulfate formation. The availability of <15 ppm sulfur fuel will enable these filters to be designed for improved PM filter regeneration and emission control performance, as well as to minimize any increase in sulfate emissions. Indeed, diesel fuel containing <15 ppm sulfur is required to ensure maximum emission control performance on the broadest range of diesel on-road and off-road engines possible, including locomotive and marine applications.

Diesel fuel with less than 15 ppm sulfur is absolutely essential to commercializing NOx adsorber systems that can function effectively for both on-road and off-road diesel engine applications. At higher sulfur levels, a NOx adsorber quickly becomes ineffective

as the sulfur attaches to the sites meant to "trap" the NOx. The sulfur remains attached to these sites until high temperature, rich conditions, which are not characteristic to normal diesel engine operation, are met.

Also, while a sulfur regeneration mode or desulfurization cycle will need to be employed in any case, the frequency of desulfurization must be kept to a minimum to avoid substantial fuel economy penalties and perhaps a degradation of the NOx adsorber performance that, in turn, will require an even more frequent desulfurization. As the sulfur level increases, the frequency, as well as the severity, of regenerations needed increases.

The effectiveness of other NOx control technologies, such as SCR, EGR, and lean NOx catalyst technology, that will also play a role in reducing emissions from on-road and off-road diesel engines would greatly benefit from the use of <15 ppm in terms of improved emission control performance and durability, and minimization of the sulfate formation when precious metals are used. Finally, while diesel oxidation catalyst technology will function effectively using diesel fuel currently being sold in California, the availability of <15 ppm sulfur diesel fuel will improve overall catalyst PM control efficiency by reducing the sulfate production and will enable the utilization of more active catalyst formulations that could provide greater reductions in toxic HCs and the soluble organic fraction (SOF) of PM emissions.

Conclusion

In closing, we commend the Air Resources Board for its leadership in recognizing the importance of making <15 ppm sulfur fuel available to help enable the use of emission control technologies that can and will provide significant emission reductions from some diesel engines used in locomotive and marine applications. Adoption of the proposed amendments to the California diesel fuel regulations will help extend the era of the truly clean diesel engine to locomotive and marine applications.

# # #