STATEMENT OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE CALIFORNIA AIR RESOURCES BOARD'S PROPOSED
AMENDMENTS TO THE CURRENT REGULATIONS FOR LARGE SPARK-IGNITION (LSI) ENGINES WITH AN ENGINE DISPLACEMENT LESS THAN OR EQUAL TO ONE LITER

November 21, 2008

The Manufacturers of Emission Controls Association (MECA) is pleased to provide comments in support of the California Air Resources Board's (ARB) proposal to amend the current regulation for large spark-ignited engines with horsepower ratings greater than 25 horsepower to include engines with displacements ≤ 1 L.

MECA is a non-profit association made up of the world's leading manufacturers of emission control technology for on-road and off-road vehicles and engines, as well as stationary internal combustion engines. MECA's member companies have over 35 years of experience and a proven track record in developing and commercializing emission control technologies for a wide range of vehicles and engines. Our member companies have developed control technologies for gasoline, diesel, and alternative-fueled engines, including large spark-ignited engines. Some of our members have expertise in the development, manufacture, and application of evaporative control systems for on- and off-road vehicles from the simplest passive purge canisters to the most advanced fully integrated PZEV-compliant active purge technologies.

When ARB adopted emission regulations for LSI engines in 1998, it exempted engines with displacements ≤ 1 L because manufacturers argued that these smaller displacement engines were designed differently and were more similar to small off-road engines (SORE) and thus less amenable to the incorporation of exhaust controls. These smaller engines are typically used in portable generators, large lawn-care equipment, and other industrial equipment. In May 2006, when ARB further tightened emission requirements for LSI engines > 1 L, some MECA members warned that a shift in the marketplace would occur for LSI engines above 19 kW to displacements just below 1000 cc in order to take advantage of ARB's less stringent emission standards for these engines. Over the past 18 months, as a result of this loop hole, the number of certifications for engine families in the range of 825 cc to ≤ 1 L has grown significantly, and now represents almost 40% of all new LSI certifications. The incorporation of modern engine controls has resulted in 2008 certification emission levels for all LSI engines ≤ 1 L to fall below the current standard (12 g/kW-hr) without the use of catalysts. Several catalyst-equipped engines are certified below 1.0 g/kW-hr to as low as 0.5 g/kW-hr (HC+NOx). The U.S. EPA has included this smaller displacement group of LSI engines into their recently adopted Phase 3 emission standards at an emissions limit of 8.0 g/ kW-hr effective in 2011. MECA supports staff's proposal to establish a new emission cut point of 825 cc with an emission limit of 6.5 g/kW-hr (HC+NOx) effective in 2011 for engines in the range of 825 cc to 1 L. We also believe that the further reduction to an emission limit of 0.8 g/kW-hr (HC+NOx) in 2015 is reasonable given that some manufacturers are already exceeding this limit today. We concur with the staff proposal that engines smaller than 825 cc should fall under the Tier 3 emission standards for

SORE ≥ 225 cc in 2011 with an emission limit of 8.0 g/ kW-hr. Because of the synergies in technologies used on some recreational vehicles, we support the proposal to require LSI engines ≤ 1L used in off-highway recreational vehicles (OHRV) be certified to the 2011 emission limits using the OHRV test procedures until they are incorporated into the OHRV regulations in the future.

We believe that the proposed changes to the emission limits outlined in the staff report are reasonable and achievable based on the existence of emission control technologies available today. The technology to reduce emissions from spark-ignited, off-road engines included in the proposed amendments is based on automotive-type, three-way catalyst closed-loop technology. This technology has been used on well over 300,000,000 automobiles with outstanding results. Three-way catalysts have also been used effectively on thousands of large, natural gas-fueled, reciprocating engines (so-called rich burn or stoichiometric natural gas engines) used for power production or pumping applications. These same catalyst technologies have been adapted to spark-ignited engines used in off-road mobile sources such as forklift trucks, airport ground support equipment, and portable generators and can similarly be incorporated into smaller displacement LSI engines ≤ 1 L. The catalyst technology can be cost effectively incorporated directly into existing muffler designs. MECA believes that the cost estimates provided in the staff report represent a reasonable range. Catalyst and muffler design issues, such as heat management, packaging, poisoning, and durability, are straightforward engineering challenges that are well understood. These types of issues have been raised virtually every time the use of catalyst technology has been proposed for use on a spark-ignition engine, be it an automobile, heavy-duty truck, off-road engine over 25 hp such as a forklift, a motorcycle or moped, or a small handheld engine used on lawn and garden equipment. All of these issues were successfully addressed for each application. As before for other mobile sources of emissions, achieving the 2015 long term emission limits will require a systems approach combining cleaner, closed loop controlled engine technology with advanced exhaust catalysts.

Closed-loop, three-way catalyst-based systems are already being used on large, spark-ignited, off-road engines to meet ARB's and EPA's 2004 3.0 g/bhp-hr HC+NOx standard. The same systems are the primary technology pathway for meeting ARB's 2007 exhaust emission standard of 2.0 g/bhp-hr HC+NOx. Retrofit kits that include air/fuel control systems along with three-way catalysts have been sold into the LPG-fueled forklift industry for installation on uncontrolled engines (an LSI application) for nearly 10 years. In both new engine and retrofit applications, these closed-loop three-way catalyst systems have shown durable performance in LSI applications, consistent with the excellent durability record of closed-loop three-way catalyst systems used in automotive applications for more than thirty years.

Significant improvements in three-way catalyst system performance can be achieved in these LSI applications by readily available catalyst design changes and optimizations that more closely approach the catalyst designs used in modern light-duty automobiles. These design changes include the use of high performance catalyst formulations with layered catalyst architectures and the latest oxygen storage promoters, larger catalyst volumes relative to the engine displacement, and the use of higher cell density metallic or ceramic substrates. Improved engine control strategies are already beginning to find use on some new LSI engines ≤ 1 L as evidenced by the fact that 37% of engine families in the ARB 2008 LSI ≤ 1 L engine certifications already meet the 2011-2014 proposed emission standard (as reported in the ARB staff initial statement of reasons for these proposed amendments). Furthermore, these advanced engine controls are already being combined with advanced catalysts by some manufacturers to meet the proposed 2015 standard of 0.8 g/kW-hr HC+NOx. These facts clearly demonstrate that the technologies are available and applicable to this smaller displacement category of LSI engines.

Furthermore, we agree with ARB's approach to require that LSI engines ≤ 1 L meet the same evaporative emissions as SORE ≥ 225 cc in 2011. Evaporative control technology has been successfully incorporated on passenger vehicles for over 30 years and has advanced to allow automobiles to meet the zero evaporative emissions required by California's LEV II PZEV emission limits. Passive evaporative controls have been used on passenger cars for over 25 years and more recently have been successfully applied on smaller spark-ignited vehicles, from on-road motorcycles to small off-road engines of all shapes and sizes. This year manufacturers of SORE ≥ 225 cc are meeting similar evaporative emission requirements. These LSI engines ≤ 1 L can benefit from the same carbon canister technology to further reduce HC emissions.

In closing, MECA believes that advanced three-way catalyst and evaporative emissions control technology based on automotive applications can provide a cost-effective, durable, high performance solution for controlling HC and NOx emissions from new large spark-ignited engines with displacements less than one liter used in off-road applications. We thank the staff for their hard work and dedication in bringing forth this proposal. MECA members are committed to working with engine manufacturers and end-users to provide proven emission control solutions to meet California's emission standards for this category of large spark-ignited engines.

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