Written Comments of the
Manufacturers of Emission Controls Association
on the California ARB's Proposed Amendments to the Evaporative Emission Requirements for Small Off-Road Engines

November 14, 2016

The Manufacturers of Emission Controls Association (MECA) is pleased to provide comments in support of the California Air Resources Board's (ARB's) proposed amendments to the evaporative emission requirements for small spark-ignited off-road engines rated at or below 19 kW (25 hp). We thank ARB for its continuing efforts to develop and implement effective control programs for significant sources of air pollution, including small off-road engines (SORE). We believe the proposed changes to the SORE regulations, including improving the certification procedures for SORE, revising the compliance testing procedure, updating the certification test fuel to represent commercially available gasoline, and aligning aspects of ARB's SORE requirements with those of the U.S. EPA, will help further reduce evaporative emissions from this category of engines, as well as help ensure that the expected reductions under the current SORE standards are met in the real world.

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 exhaust and evaporative emission controls for small SI engines used in lawn and garden equipment, generators, and small industrial equipment, as well as in mopeds and motorcycles.

MECA commends ARB staff for its comprehensive work on the SORE evaporative emission validation studies for model years 2008-2010 and 2013-2015. The low compliance rate for SORE determined from these validation studies (i.e., 55% of design-certified units and 60% of performance-certified units failed to meet the applicable diurnal emission standards in at least one of three diurnal emission tests) clearly showed that changes are needed to increase compliance with the standards. MECA supports staff's proposal to subject design-certified SORE to diurnal emission standards in compliance testing, as well as to align the requirements for compliance testing for design-certified SORE with the certification testing requirements for performance certification. As noted in ARB's Staff Report for the proposed amendments, this will give ARB the ability to enforce the diurnal emission standards for all engines with displacement greater than 80 cc, as well as enable ARB to conduct compliance testing on a greater number of evaporative families.

MECA also supports ARB's proposed changes to the design-certification option aimed at helping evaporative families using this method to more likely meet the diurnal emission standards. These changes include requiring fuel tanks to be tested in a configuration that represents their real-world use (including sealing with a fuel cap), and applying the fuel line permeation emission standard to fuel lines that are used to connect carbon canisters to fuel tanks and to return unused fuel to the fuel tank. Other supported changes include requiring carbon

canisters to be installed so that the carbon will not be exposed to liquid fuel or water, pressure testing all production fuel tanks, and testing fuel line assemblies to ensure the connections will remain secure throughout the useful life of the engine on which they are installed.

MECA also supports staff's proposal to require that the fuel used for SORE testing contain 10% ethanol (E10). Fuel at gasoline stations has contained 10% ethanol since January 2010. Therefore, SORE currently in use in California operate using E10 fuel. Requiring E10 certification test fuel will help to ensure SORE introduced into California meet current emission standards with commercially available gasoline.

Companies that manufacture evaporative emission controls have responded to the challenge of reducing hydrocarbon (HC) evaporative emissions from various mobile sources, including SORE. Through their efforts, a wide range of cost-effective technologies have been developed to reduce evaporative emissions. There are varying levels of complexity and efficacy of these controls, with the most advanced systems equipped on partial zero-emission vehicles (PZEVs) being certified to California's LEV III emission standards. The key technologies that control permeation emissions in passenger vehicles include fuel tanks made of low permeation polymers, multilayer co-extruded hoses, and low permeation seals and gaskets. Technologies designed to control diurnal, hot soak, and refueling HC emissions include advanced carbon canisters and high working capacity activated carbon. Spark-ignited off-road equipment such as SORE can benefit from much of these same advanced evaporative emission control technologies that are currently being applied to passenger vehicles in the U.S.

Separate from the SORE proposed amendments to be considered by the ARB Board at the November 17, 2016 Board hearing, ARB staff has said they plan to propose new SORE regulations in 2018 that will be designed to achieve ROG, NOx, PM, and greenhouse gas reductions of 80% by 2031. Staff said that it is likely that a combination of tightened exhaust and evaporative emission standards, incentives for manufacturers and consumers to increase the use of zero-emission equipment, and enhanced compliance testing will be needed to reduce emissions from SORE and achieve ARB's air quality goals. In support of the 2018 rulemaking proposal, staff intends to begin exhaust emission testing of SORE equipment in 2017. Staff has said they will first attempt to validate manufacturers' certification data, followed by additional testing to determine what additional reductions can be achieved using advanced three-way catalysts and/or various engine technologies (e.g., fuel injection). MECA remains committed to supporting this effort with catalyst technology.

The three-way catalytic converter has been the primary emission control technology on light-duty gasoline vehicles since the early 1980s. The use of a three-way catalyst, in conjunction with an oxygen sensor-based, closed-loop fuel delivery system, allows for the simultaneous conversion of HC, NOx, and CO emissions produced during the stoichiometrically calibrated air/fuel combustion process of a spark-ignited internal combustion engine. Although the primary components and function of a three-way catalytic converter has remained relatively constant during its more than forty years of use on light-duty vehicles, each of the primary components (catalytic coating, substrate, and mounting materials) has gone through a continuous evolution and redesign process aimed at improving the overall performance of the converter while maintaining a competitive cost effectiveness of the complete assembly. Current state-of-the-art,

stoichiometric gasoline emission control systems are defined by LEV III PZEV and SULEV (Super Ultra-Low Emission Vehicle) light-duty vehicles sold in the U.S. market.

MECA believes that the use of advanced catalyst technology can help SORE meet tighter exhaust emission standards in the future. The types of issues that have been raised in the past by engine and equipment manufacturers regarding the use of catalyst technology on SORE, such as heat management, packaging, poisoning, and durability, are straightforward engineering challenges that are well understood and have been readily addressed, as has been clearly demonstrated over the past several decades in which catalyst technology has been successfully applied to a wide variety of vehicles and equipment.

In conclusion, MECA commends ARB for taking important steps to further reduce evaporative emissions from small SI off-road engines and to help ensure that existing SORE standards are met. The proposed regulatory amendments, as well as the upcoming changes to the SORE regulations expected in 2018, are included in ARB's Mobile Source Strategy and will be critical towards helping California and air districts achieve their future SIP commitments for the 80 and 75 ppb national ambient ozone standards. We are committed to do our part to ensure that cost-effective, advanced emission control technologies are available to help meet ARB's SORE requirements.

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