

**STATEMENT
OF THE
MANUFACTURERS OF EMISSION CONTROLS ASSOCIATION
ON THE AIR RESOURCES BOARD'S
PROPOSED RULEMAKING FOR EMISSION CONTROL REQUIREMENTS
FOR SMALL OFF-ROAD EQUIPMENT AND ENGINES LESS THAN OR
EQUAL TO 19 KILOWATTS**

September 25, 2003

The Manufacturers of Emission Controls Association (MECA) is pleased to provide testimony in support of the Air Resources Board's proposed rulemaking to strengthen the emission control requirements for small SI off-road equipment and engines. We commend the Board for its continuing efforts to develop and implement effective control programs for major sources of air pollution, including small off-road engines. We believe that the proposed amendments, as detailed in the staff report, are an important step forward in further reducing emissions from small off-road engines. We also commend the ARB staff for its technical report that reflects a comprehensive and balanced analysis of the issues presented by this proposed rulemaking and for staff's willingness to work cooperatively with all interested stakeholders.

MECA is a non-profit association of the world's leading manufacturers of emission control technology for mobile sources. Our members have over 30 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 small engines used in lawn and garden equipment, as well as mopeds and motorcycles. Our members have invested millions of dollars in developing catalyst technology for small SI engines.

SUMMARY

- MECA concurs with the ARB staff analysis and conclusion that the proposed HC+NO_x exhaust emission standards for engines >80cc are technologically feasible and that catalyst technology can be fully optimized as part of a complete engine/emission control/exhaust system to help achieve the proposed limits.
- MECA also supports the ARB staff recommendation to harmonize the California HC+NO_x exhaust emission standard for off-road engines <50 cc with the U.S. EPA standard adopted in 2000. As the staff report indicates, a number of engines have certified at levels that meet the levels of the proposed standard. We concur with the staff's conclusion that the standard is technologically feasible and that a variety of options exists, including the use of catalyst technology, to enable the remaining engines to meet the proposed standards in the 2005 timeframe.

- MECA believes an important opportunity exists to achieve emission reductions beyond those that will result from the proposed standards by using market-based mechanisms to promote the manufacture, sale, and use of low emitting lawn and garden equipment. Therefore, we support adoption of the proposed optional low exhaust emission standards (“Blue Sky Series”). We also urge ARB to consider, as part of a future rulemaking, establishing a product labeling requirement and an emission information program for all lawn and garden equipment. The consumer deserves to know how much pollution they breathe and to have sufficient information available to them to make an informed choice.
- MECA supports ARB’s proposal to harmonize its small engine exhaust emission test procedures and to align its durability requirements with the U.S. EPA requirements to include a 1000 hour durability compliance option for engines greater than or equal to 225 cc.
- MECA supports ARB’s proposal to control evaporative emissions for small off-road engines. We will refrain from commenting on the specifics of the proposal since most of MECA members’ area of expertise is with controlling exhaust emissions. We note, however, that a growing number of MECA members are becoming involved in developing evaporative controls for some mobile source applications and we anticipate that if the proposed evaporative standards are adopted, it will accelerate interest in developing evaporative control components and materials for the small engine evaporative control.

DISCUSSION

In the time available at today’s hearings we would like to discuss in more detail the proposed exhaust standards for engines >80 cc. Based on over thirty years of experience in designing and applying catalyst technology to a variety of mobile sources, including small off-road engines, we are convinced that catalyst technology can be developed and optimized for use on small off-road engines >80 cc to help meet the proposed HC+NO_x standards. The ARB/industry test program at SwRI provides convincing evidence that the proposed standards are technologically feasible. The types of issues, such as heat management, packaging, poisoning, and durability, raised by engine and equipment manufacturers are straightforward engineering challenges that are well understood and can be 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 engine and vehicles.

As noted in the ARB staff’s report, three engines, representing a range of engine displacements, equipped with catalyst technology achieved emission levels below the proposed standards at the end of the engine’s prescribed durability testing that ranged from 250 hours to 500 hours. The catalyst technology used achieved conversion efficiencies well in excess of 50 percent at the conclusion of the durability testing. Two additional catalyst-equipped engines also demonstrated in excess of 50 percent reductions

in NMHC + NO_x exhaust emissions in zero hour testing of these systems. In each test engine only relatively minor changes, if any, in the original muffler envelope supplied by the manufacturers were needed to accommodate the catalysts used in this test program. The test program achieved its objective of providing a “proof of concept” that catalyst technology can be used to help off-road engines >80 cc meet the proposed standard.

The next step for our industry will be to optimize and integrate the catalyst for the particular engine on which it will be utilized. The major focus of catalyst manufacturers will be in the design, proper sizing, and utilization of the most effective catalyst formulation for the particular engine application. Meeting the proposed standards will involve a systems approach in which the engine/catalyst/exhaust system are fully integrated. MECA agrees with the ARB staff that proper fuel management will be an important consideration, but this fact does not mean that expensive fuel delivery systems will be required. Design improvements such as improved combustion efficiency, leaner engine setting, and improved fuel delivery are possible strategies. The addition of air may also be part of the system strategy, but this can be achieved using a pulse valve or even a simple opening. Also, the muffler will need to be designed to house the properly sized catalyst. The types of engine, catalyst, and exhaust optimization needed are principally design and product improvements that can be made within the lead-time provided by the proposed rule.

MECA believes the cost estimates in the staff report for catalyst technology represents a reasonable range. We also note, however, that the experience with cost estimations for compliance with other categories of engines and vehicles often proved to be less than the estimates made at the time of proposal.

As noted above, issues, such as heat management, packaging, poisoning, and durability, raised by small off-road engine and equipment manufacturers are straightforward engineering challenges that are well understood and can be readily addressed. 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 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. In each case, all of these issues were successfully address for each application. The situation is no different in the case of off-road engines >80 cc. Indeed, the 30 years of catalyst experience in general and the over 10 years of experience with applying catalyst to small engines provide an experience base that has enabled catalyst technology to continue to be improved and has provided an increased understanding of how to optimize the engine/catalyst/exhaust system to work effectively will facilitate application of catalyst technology to help meet the proposed standards. In fact, as the ARB staff noted in its staff report, catalyst technology has been applied on four-stroke garden engines in Europe and on selected four-stroke engine applications here in the U.S. The European experience includes the sale of more than 600,000 lawn mowers equipped with catalysts since the mid-1990s.

As the staff noted in its report, external and internal heat management and packaging can be successfully addressed by optimizing the engine/catalyst/exhaust

system design. Two striking examples of successes in addressing this issue can be seen with the successful integration of catalyst technology on over 15 million two-stroke motorcycles and mopeds worldwide and on more than 1 million small handheld two-stroke engines used on such equipment as chainsaws and trimmers. Generally, two-stroke engines have been regarded by ARB and the U.S. EPA, engine and equipment manufacturers, and emission control manufacturers as the more challenging application for catalyst technology compared to comparable four-stroke engines. Notwithstanding this fact, catalyst technology has been successfully integrated on these small engine applications within the available space and in such a manner to 1) insure user safety, 2) meet exhaust and surface temperature requirements or design targets and 3) ensure engine performance and durability is not compromised. One striking, early example of the success of taking the systems approach was the introduction in the late 1990s of the Husqvarna catalyst equipped two-stroke engine used on lawn and garden equipment which the manufacturer reported achieved a 60 percent reduction in HC+NO_x emissions while improving power and fuel economy.

Similarly, as the staff report discusses, thermal and mechanical catalyst durability, as well as potential catalyst degradation from lubricating oil contamination has been addressed in other catalyst applications and can be for small off-road engines >80 cc. Catalyst technology has been readily applied to other applications with rigorous operating environments and have repeatedly demonstrated excellent durability. Based on over thirty years of experience, catalyst technology has continued to advance in terms of thermal durability, physical integrity and contamination resistance. This body of knowledge will enable the successful application of catalyst technology on off-road engines >80 cc to help meet the proposed standards.

CONCLUSION

In closing, we commend the Air Resources Board for its leadership in reducing emissions from small of-road engines. We support the proposed regulations and we are committed to do are part to ensure that emission control technology is available to help meet these standards.

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