

**STATE OF CALIFORNIA
AIR RESOURCES BOARD**

**Amendments to the Current Regulations)
For Large Spark-Ignition Engines with an)
Engine Displacement Less than or Equal)
To One Liter)
)**

Agenda Item: 08-10-4

**Board Hearing:
November 21, 2008**

**COMMENTS OF THE
OUTDOOR POWER EQUIPMENT INSTITUTE
November 18, 2008**

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On behalf of the Outdoor Power Equipment Institute (OPEI), we appreciate the opportunity to submit these comments in response to the Amendments to the Large Spark-Ignited Engine Regulations.

OPEI represents approximately 80 manufacturers that produce handheld products (like chainsaws), ground-supported lawn and garden products (like lawnmowers and commercial turf riding equipment), and the engines that power these products, including LSI engines that are ≤ 1 liter in displacement. Over the last twelve months, OPEI has proactively worked with ARB staff suggesting numerous improvements and effective solutions to address ARB's air quality goals in a practical manner. OPEI looks forward to continuing to work with ARB staff on implementing the suggested improvements and amendments described below in these comments.

OPEI COMMENTS

I. PORTIONS OF THE PROPOSAL SUPPORTED BY OPEI

OPEI fully supports ARB's proposed standards and useful life periods for engine families ≤ 825 cc (greater than 19 kW). These engines (and the affected utility and turf care products) closely resemble, and should be regulated the same as Class II-SORE engines.

The proposed control of evaporative emissions for all LSI engines ≤ 1 liter displacement and the equipment they power is appropriate – based on the strong product similarities to small engine-powered products. Additionally, the use of the small SI evaporative program appropriately and efficiently allows the use of component certified products (utilized for small SI engine powered products) to be utilized for this segment of LSI engine powered products.

II. 2015 EXHAUST STANDARDS FOR >825 CC ENGINES SHOULD BE AMENDED

Unlike forklifts and certain other industrial applications, turf care, tractors and related equipment typically depend on air-cooled engines to maintain weight, compact-size, and cost in order to meet product performance requirements. CARB's ultimate 0.8 g/kw-hr HC and NOx standard for >825 cc – ≤1.0 liter engines will effectively eliminate the vast majority of gasoline-powered utility and turf equipment in this subcategory. In fact, even after installing 3-way catalysts with a heated oxygen sensor and multiport fuel injection on current "optimized" engines, OPEI members are certifying (with ARB) 0.953 cc displacement engines used on lawn tractors at 6.6 HC and NOx g/kW-hr.

The ARB Executive Office has made an initial determination that the proposed "LSI amendments would not have an adverse economic impacts directly affecting businesses in California." (See page 5 of ARB LSI Notice, page 209 of the full Board Book for the November 20-21st hearing). However, thousands of California landscape contractors depend on commercial turf care equipment to perform their essential operations. ARB staff has apparently not evaluated whether these California landscape businesses will be adversely impacted. (See pp. 224-25 of ARB Staff Report which is at pp.235-39 of the Board Book for the November 20-21st hearing).

ARB staff is incorrectly and simplistically assuming that automotive-style, liquid-cooled engines can be used to replace the current types of air-cooled engines that are used to power utility vehicles, turf care and related products. In order to make a well-informed decision based on accurate data and to avoid the elimination of products needed in California, the ARB Board should ask staff to answer the following three questions. These questions assess whether ARB's staff's assumptions are valid, whether turf care equipment can practically meet the

proposed 0.8 gram standard, and what will be the impacts on California landscape businesses.

Question #1: Can automotive-style engines meet the performance demands and operational challenges associated with commercial lawn and garden applications?

Answer:

Only automotive-based gasoline engines could practically meet ARB's 0.8 gram standard. Several OPEI members have tried to use liquid-cooled, automotive-based engines in turf care equipment. In these member's development programs, automotive-style engines completely failed to meet the extreme operational challenges and constraints for lawn and garden products. These failures resulted from:

- lack of speed control governors on automotive engines
- automotive engines are not designed for continuous application of 70% to 90% power (engine durability failures occurred prior to 50% life tests)
- cooling system pumps and engine components not adequate for turf care machine duty cycles
- induction air system requiring extensive re-design for remote mounting and dual element/3-stage
- exhaust system requiring 2-way or 3-way catalyst to address emissions and off-nominal conditions (need fuel injection)

Question #2: What equipment redesign challenges, actions and costs would result from converting existing air-cooled engines to water-cooled engines?

Answer:

Air-cooled engines cannot practically or cost-effectively be modified to include water jackets to the block and cylinder head, water pumps, hoses, radiators and other components. Much larger and heavier water-cooled engines would not fit into most existing equipment designs, requiring equipment-design changes to maintain low turf load and equipment balance. The enclosed technical comments documents the major equipment challenges,

redesigns and costs that would result from trying to convert turf care and utility products to liquid-cooled engines. (See technical comments from MTD attached as Exhibit A).

Based on their recent experience, OPEI equipment manufacturers estimate – exclusive of the additional engine costs – that the costs for equipment redesigns and related equipment-engineering, testing and production (to accommodate 0.8 gram-compliant engines) will be between \$600,000 and \$1.5 million for each common, equipment “platform.”

This cost projection optimistically assumes similar equipment models under the same “platform” can be redesigned under a single engineering project. As OPEI members recently discussed with ARB, the greatest costs will be required for those equipment models or platforms exclusively powered with air-cooled engines – that are not currently offered with the larger liquid-cooled and/or taller horizontal crankshaft engines. Many existing platforms are only offered with air-cooled engines. (See Exhibit A, and teleconference with OPEI Counsel, Toro, MTD and ARB staff on November 13, 2008).

Question #3: Given the small market for California turf care equipment, what are the per-unit equipment re-tooling costs and are these per-unit costs acceptable to the market?

Answer:

OPEI members estimate that the additional costs of liquid-cooled engines with the necessary fuel injection, exhaust and cooling systems would be between \$1,150 and \$2,500. (See Exhibit A). Even assuming that turf and related riding products could practically be re-designed to accommodate much larger, heavier and more expensive water-cooled engines (with EFI, high pressure fuel pumps, ECU, O₂ sensors, and 3-way catalysts), then the per-unit equipment costs would be prohibitive – given the small volumes of California turf equipment

sales. There are too small a number of sales in California of turf care equipment to recoup the additional engine costs as well as the additional equipment redesign costs for most product lines. Common turf equipment “platforms” (produced for the California market) are around 100 units. (Teleconference with OPEI Counsel, Toro, MTD and ARB staff on November 13, 2008, and prior comments submitted by OPEI through Dr. Sahu from May 12, 2008 – attached as Exhibit B). Assuming a 5-year production period (a total of 500 California units) and a \$1 million in equipment re-design and re-tooling and testing for these products, the equipment retooling costs would be around \$2,000 per common equipment-platform (\$1 million redesign costs/ 500 products) – exclusive of the additional engine costs which could be another \$2,000.

Many turf product platforms are niche products and constitute less than 10 units per year sold in California. (Teleconference with OPEI Counsel, Toro, MTD and ARB staff on November 13, 2008, and Exhibit B). For these niche products, the equipment manufacturer would incur (in equipment redesign costs) roughly \$20,000 on a per equipment basis (\$1 million costs/ 50 products sold over 5 years). Obviously, per-unit redesign costs for these niche California products (even without the additional engine costs) could dramatically exceed the total retail costs of these units.

Gasoline engines that are below 825 cc cannot provide the needed power for commercial turf care and utility vehicles that are currently powered by >825 cc gasoline engines. If ARB proceeds along the lines proposed, new gas-powered turf care equipment will not be offered in California and/or most turf care equipment users (using >825 cc engines) will switch to diesel powered product options. In turn, this will: 1) cause harm to California businesses and landscape operators; and 2) disrupt the marketplace – with no commensurate benefits.

OPEI RECOMMENDATION

The Board should direct ARB staff to submit to the Board an analysis of: 1) the impacts on California landscape businesses due to the lack of product availability; and 2) the costs (per unit of the redesigned turf care sold in California). Such an analysis would further support the final alternate limit proposed by EMA of 5 g/kw-hr (starting in 2014) for at least air-cooled engines, ≤ 1 liter that are used in utility and turf care equipment.

EMA's proposal would preserve the ability to produce very clean, substantially improved, spark ignition engines for this product category with a minimal impact on the projected air quality benefit of the program. When volume projected growth is corrected, the EMA proposal provides almost an equivalent air quality benefit to the proposed amendments not taking into account the expected shift from spark ignition to diesel product.

ARB's growth projections for turf care equipment overestimates the future market for these products. In fact, this market segment has been fairly flat and in the current market is trending downwards. ARB should correct its exaggerated cost-effectiveness calculations to account for turf equipment's low volume sales and its flat growth projections – as well as the likely switch to >825 cc diesel engines.

At a minimum, ARB should also create an equipment-based small volume exemption – to avoid the total elimination of certain products in the California market.