

EXHIBIT A

**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**

**TECHNICAL SUPPORT TO
COMMENTS OF THE
OUTDOOR POWER EQUIPMENT INSTITUTE**

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Products
1777 Miller Parkway
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My name is Jimmy Eavenson and I am the Chief Engineer at Commercial Turf Products Ltd., a division of MTD. I have had extensive recent experience modifying a lawn care product line to accommodate a new 17 kW (745 cc) water-cooled engine to replace the prior air-cooled engine. That 17 kW engine would not be powerful enough to use in any of our large commercial products that need engines >825 cc. However, experience with the 17 kW product retrofit confirmed the following challenges and costs.

First, liquid cooled engines above 825 cc are typically V-twin configuration with cooling systems that are attached in a somewhat integrated manner or mounted remotely (over the top, aft, or along the side). These liquid-cooled configurations require more space (width and length), and would therefore require that the machine weight-balance be addressed by means such as altering the wheelbase and track-width, re-arranging the various system component locations, or by adding additional mass as counter-weight.

Second, liquid-cooled engines typically have horizontal crankshafts – whereas most air-cooled engines on turf care products have vertical crankshafts that allow a simple-direct drive belt for the implements. This means that for liquid-cooled products, the OEM needs to somehow make a 90 degree turn in the pulley system – typically with a much more expensive and complex shaft, or hydraulic drive system.

Third, because horizontal crankshaft water-cooled engines are typically 8 to 10 inches taller/higher than air-cooled engines, they require more complex and expensive heat management systems and guarding.

Below are the estimated additional costs associated with converting from our current air-cooled to liquid-cooled horizontal crankshaft engines above 825 cc.

A. Additional Engine Costs – Need Total Costs (\$1150 to \$2250)

- engine (horizontal crankshaft versions cost more (typically + \$100 than vertical)
- cooling system (heat exchangers, fans, shrouds, hoses, coolant) components are additional cost & weight (+ \$ 350 to \$500)
- exhaust systems more complex, generally requiring guards - more cost (+ \$50 to \$100)
- engines with liquid-cooling cost more ((+ \$500 to \$1200)
- fuel injection higher cost (+ \$180 to \$400)

B. Additional Equipment Re-tooling Costs -- (\$500,000 to \$650,000)

- control panels and consoles (\$140,000)
- fuel tanks (\$120,000+)
- exhaust systems including manifolds, canisters and guards (\$50,000+)
- cooling system components including guards and shrouds (\$100,000+)
- frame and sub-frame fixtures (\$90,000+)

C. Additional Testing and Validation Costs (\$67,500)

- 3 machine minimum for life cycle tests (\$25,000 machines + \$30,000 test hours)
- 1 machine for compliance testing (\$7500 machine + \$5000 test hours)