WRITTEN TESTIMONY

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"HITTING THE ETHANOL BLEND WALL: EXAMINING THE SCIENCE ON E15"

by

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Good afternoon Chairman Harris, Ranking Member Miller and members of the Committee. Thank you for the opportunity to appear.

INTRODUCTION

My name is Ron Sahu. I am an independent technical consultant. I am representing myself as well as members of the Outdoor Power Equipment Institute (OPEI), a trade association whose members make a wide range of outdoor power equipment, including lawn and garden equipment.

I have provided my curriculum vitae to the Subcommittee as requested (Attachment I). Briefly, I have a Batchelor's degree in Mechanical Engineering from the Indian Institute of Technology (IIT); followed by Masters and Ph.D degrees, also in Mechanical Engineering, the latter with an emphasis in combustion, from the California Institute of Technology (Caltech), in Pasadena, CA. I am also adjunct faculty at a number of local universities including UCLA. And, I have served as expert witness for the EPA on Clean Air Act matters.

MID-LEVEL ETHANOL AND ITS IMPACTS ON ENGINE AND EQUIPMENT

As the committee may be aware, all current engines and equipment sold and operated in the US, collectively a universe of over 500 million legacy products valued at around 2 trillion dollars, that rely on motor gasoline as fuel, can handle up to 10% ethanol as part of the gasoline. Many auto manufacturers have also designed cars that can run on E85, which contains 85% ethanol. I am not aware of any non-automotive or non-road applications with E85. I will use the term "mid-level" ethanol to denote ethanol contents of greater than 10% but less than 85%. Typically, however, mid-level will mean ethanol contents of greater than 10% to perhaps 15% or even 20% in gasoline.

Driven by a number of factors producers of ethanol have been proposing to increase the ethanol content of gasoline to greater than 10% for the last several years. For the last six years I have been very involved in various assessments of what would occur if this happened, particularly in non-road engines. I am examined in detail all prior work done in this country and abroad in this regard. I have evaluated work done in Australia, other countries and by the Dept. of Energy (DoE) and have critiqued the DoE work (Attachment II). I have also conducted additional technical analyses. These are provided in a technical paper in Attachment III to this testimony.

Unequivocally, the answer is that millions of products including most non-road engines and equipment will sustain a range of damage if the ethanol content of gasoline is increased to 15%. I believe that work by the US Dept. of Energy, also confirms this. Extensive documentation of likely adverse impacts, including impacts on safety, durability, loss-of performance, environmental impacts, etc. is documented in many reports and studies and is summarized in my paper in Attachment III.

In brief, the impacts include

A. Heat

Increased Ethanol in gasoline could result in increased engine heat, including consumer accessible components, such as the plastic engine cover, guards, etc. Higher engine heat may result in potential safety concerns, especially in smaller hand held lawn and garden products that are held in close proximity to the operator. A product operator could inadvertently come in contact with the hotter

plastic engine housing or other surfaces because they are unaware of the added heat caused by the higher ethanol gasoline.

Current two-cycle engine oils do not mix well with alcohol, which may also increase engine heat and lead to premature engine failures.

Increased heat causes damage to gaskets and piston seals, which in turn, causes increased emissions of HC and NOx, as documented by the tests performed by DoE.

B. Fuel Leaks and Evaporative Emission Increases

The effects of higher ethanol levels on engine components are not fully known, but may result in earlier degradation of existing and legacy engine seals, gaskets, fuel lines, etc.; the deterioration of these components could lead to fuel leaks and increase the risk of fire if an ignition source is present.

E-15 also causes increased permeation and evaporative emissions.

C. Unintended/Early Clutch Engagement

Higher levels of Ethanol will also mean higher oxygen levels in fuel and result in higher engine speeds.

The higher engine speed may present unintended clutch engagement, which may result in potential safety concerns for bladed products, such as brush cutters, edgers, chain saws, hedge trimmers and pruners where the customer is expecting the blade to start moving at a different speed from prior product experience.

For example, a chain saw chain may now turn at idle speed when it did not with the lower ethanol content fuel, which may surprise the operator and cause an accident.

Ethanol damage to engines and products is permanent. The DoE's testing on outdoor power equipment concluded that 28 engines in four families showed increased heat, performance irregularities, failure and unintentional clutch engagement.

EPA's REGULATORY ACTIONS

Let me say at the outset that EPA is faced with difficult decisions in balancing competing objectives and we are sensitive to its predicament.

In response to the problems discussed above, the EPA, in granting Growth Energy's petition, has excluded from the waiver approval the entire universe of non-road engines and equipment, along with automobiles that are model year 2000 and prior. However, the practical effect of EPA's waiver to allow greater than 10% ethanol in gasoline will certainly affect non-road engines. Since this large non-road universe is actually is relatively small user of gasoline, by overall volume as compared to on-road automobiles, fuel suppliers and gas stations are unlikely, in general, to make available E10 or lower ethanol content gasoline in addition to E15.

EPA's answer to this dilemma is to rely on a label at the dispenser that fails to adequately warn consumers of the adverse impacts of greater than 10% ethanol on their engines and equipment. However, disappointingly, EPA's recent label rule proposes a mild, "ATTENTION" in an unobtrusive color label that is unlikely to

be effective at this. EPA also declines to mandate the continued availability of E10 in order to support this universe of equipment – stating that market forces would continue to make this fuel available.

LIKELY FUTURE IMPACTS

Thus, the most likely scenario would be the introduction of greater than 10% ethanol fuel into this non-road universe that cannot and is not designed to handle it. Of course there will be substantial damage to millions of products and millions of consumers will be faced with with loss of durability and loss of functionality from equipment already paid for. But, more crucially, one should also expect more risk to consumers due to potential fuel leaks and fires (perhaps on a boat in open water or in an enclosed garage), equipment starting when not intended (such as a chainsaw), or burns sustained by an operator due to the increased exhaust gas temperatures associated with greater than 10% ethanol.

Avoidable financial and human loss/suffering aside, one of the more lasting unintended impacts of all of this will be to the perception of ethanol itself as a fuel or fuel component. I am not sure that this is what the backers of higher ethanol in gasoline intend. Yet, that would be the logical consequence of pushing EPA to introduce ethanol into gasoline at levels for which the user population is simply not ready.

SUGGESTIONS FOR PROPOSED NAS STUDY

I have reviewed the language of the proposed legislation that would require a study by the National Academy of Sciences to address this issue. While I generally agree with the scope of the proposed study, I have a couple of suggestions. First, I recommend that the focus of the study be on the implications and ramifications,

including increased financial and non-financial risks from the use of greater than E10, particularly in the non-road fleet. Second, the NAS study scope should also include a critical examination of the issue of mis-fueling under the proposed EPA labeling scheme and investigate how mis-fueling can be minimized via options other than labeling.

I will be happy to answer any questions that members of the committee may have.