

COMMENTS BY AMERICAN LUNG ASSOCIATION, CLEAN AIR TASK FORCE, CLEAN AIR WATCH, CENTER FOR AUTO SAFETY, EARTHJUSTICE, FRIENDS OF THE EARTH, NATURAL RESOURCES DEFENSE COUNCIL, AND SIERRA CLUB IN RESPONSE TO REQUEST FOR COMMENT AND NOTICE OF RECEIPT OF A CLEAN AIR ACT WAIVER APPLICATION TO INCREASE THE ALLOWABLE ETHANOL CONTENT OF GASOLINE TO 15 PERCENT

Docket ID No. EPA-HQ-OAR-2009-0211

July 20,2009

The organizations listed above oppose the Growth Energy request for a waiver request under Section 211(f) (4) to authorize the general sale of E-15. We assert that there exists little valid testing of E-15 to demonstrate that E-15 meets the requirements for a waiver.

Background

Section 211(f)(4) requires that Growth Energy establish that E-15 will not cause or contribute to a failure to achieve emission standards of ANY(emphasis added) emission control device or system over the useful life of motor vehicles, motor vehicle engines, nonroad engines or nonroad engines. We accept in principal EPA's requirements that the applicant provide vehicle/engine testing for tailpipe emissions, evaporative emissions, material compatibility and materials compatibility. Further, testing must include tailpipe and evaporative emissions testing over the full useful life of vehicle and equipment. Since the statutory language does not require Growth Energy to test every vehicle and engine, we accept EPA's requirement that tests be done with sufficient statistical rigor so as to capture "small effects" in order to properly assess whether a fuel or fuel additive could cause or contribute to the failure of "any" emissions control device or system.¹ These comments are limited to an assessment of emissions testing and not other factors which EPA considers as part of an application for a waiver. We assert Growth Energy did not submit sufficient scientifically based data to demonstrate the requirements of Section 211(f) (4) have been met with respect tailpipe emissions, evaporative emissions or durability of both on-road and non-road vehicles and engines.

Data regarding E-10 should not be used in support of an E-15 waiver request. The higher amount of ethanol in E-15 changes the fuel properties of the gasoline containing it including T-40 and T-50²as well as the level of oxygen. Increases in levels of oxygen provided by E-15 compared with E-10 have been shown to increase

¹ See Karl Simon, "Mid level Ethanol Blend Experimental Framework – EPA Staff Recommendations, June, 2008, p. 13.

² John R. Braeutigan, *Ethanol Blend Wall*, CEC Joint IEPR and Transportation Workshop on Transportation Fuel Infrastructure issues, April, 14, 2009, pp. 4-5.

exhaust temperatures in both vehicles and small non-road engines.³ Temperature increases of engines using E-15 were significantly higher than those using E-10. The long term impact of these temperature increases has not been studied.

GROWTH ENERGY PROVIDED NO DATA REGARDING VEHICLE OR ENGINE DURABILITY

Auto companies are required to certify that emissions control systems—principally catalyts—will operate for 120,000 miles. This is accomplished through a process that artificially ages engine systems by running for many hours. **There has been no testing of the impact of any level ethanol in gasoline on vehicle engines and emissions systems over their useful life.**

One study, done in Australia, raises a red flag on this issue. It appears that when pre-Tier II vehicles—model year 2004 and earlier—are operated in wide open throttle mode (WOT), the computer does not adjust carburetion to account for the oxygen added to the air-fuel mixture provided by the presence of ethanol in the fuel. As a result, **during acceleration, exhaust temperatures can rise**, as the DOE study found, **damaging the catalyst and engine.** In this 2004 study of Australian vehicles using E-20, two of five vehicles exhibited the problem and damage to the engine and catalyst after artificial “aging” of 50,000 miles. One vehicle had 200 percent increase in HC emissions and 500 percent increase in NO_x emissions and showed evidence of materials degradation. The other experienced a 20 percent increase in HC emissions and 150 percent increase in NO_x emissions.⁴ This study has several limitations. This study was not peer reviewed, it used Australian vehicles, nor does it necessarily include the same Tier I technology used in the U.S. It does demonstrate that **engine and catalyst durability could be a problem with mid-level grades of ethanol.**

The two vehicles that experienced damage in the Australian test failed to apply long-term trim correction during WOT, the same problem described in the DOE study

³ U.S. Department of Energy, Oak Ridge National Laboratory. *Effects of Intermediate Blends on Legacy Vehicles and Small Non-Road Engines, Report 1*, Updated. NREL/TP-540-43543, February, 2009, figure 3.5, p.3-8, Table 3.13, p. 3-28

⁴ Orbital Engine Company. *Market Barriers to the Uptake of Biofuels Study Testing Gasoline Containing 20% Ethanol(E20), Phase 2B Final Report to the Department of the Environment and Heritage.*, May 2004, p. 3. Available online at <http://www.environment.gov.au/atmosphere/fuelquality/publications/biofuels-2004/index.html>.

that occurred with seven of the vehicles tested.⁵ However, in the DOE study this effect also occurred in two 2007 model year vehicles and may not be limited to pre-Tier II vehicles. Before we risk the engines of 116 million pre-2004 vehicles on the road today, and also possible damage to a subset of Tier II vehicles durability testing is clearly needed.

GROWTH ENERGY MUST SHOW E-15 WILL NOT CAUSE STANDARDS EXCEEDENCES OVER THE USEFUL LIFE OF BOTH VEHICLES AND NON-ROAD ENGINES

Growth Energy asserts it may substitute a “reasonable theory” on emissions effects and testing to support such theory.⁶ In light of the data discussed above, we believe the questions raised can only be answered through representative testing of both vehicles and non-road engines through engine aging comparable to that required for engine certification. EPA cannot claim to be unaware of deteriorative effects of oxygenates as it did in Sun Refining's waiver decision as argued in Growth Energy's petition.⁷

The need to address engine durability is reinforced by revisions to Section 211(f) (4) adopted by Congress in EISA 2007. Among the changes adopted was the explicit addition of language that requires the Administrator find an applicant has demonstrated that a new fuel will not cause or contribute to a failure of emissions device or system of non-road engines and non-road vehicles over their useful life. Clearly, the statutory language and Congress's intent is to make an applicant's demonstration more comprehensive and cover a broader array of engines than that which could be derived from previous court decisions and EPA guidance, including that widely cited in the Growth energy petition.

Growth Energy has provided no data of testing specifically designed to demonstrate engine performance and emission control system over its useful life comparable to that required for vehicle certification.

ONLY TWO TESTS SUBMITTED BY GROWTH ENERGY MEET REASONABLE REQUIREMENTS FOR RIGOR AND DESIGN

⁵ DOE study, *Op. Cit.*, p. 3-7

⁶ *Application for a Waiver Pursuant to Section 211(f) (4) of the Clean Air Act for E-15*, Submitted by Growth Energy on Behalf of 52 U.S. Ethanol Manufacturers, March 6, 2009, p. 9.

⁷ *Id.*, p. 20.

We believe that testing to be scientifically based and credible it must:

- 1) Be specifically designed to test for emissions
- 2) measure cold start and multi speed emissions
- 3) include multiple tests for each vehicle
- 4) control for fuel parameters including boiling temperature(a measure of fuel vaporization)
- 5) include a representative variety of vehicle and engine types and emissions control technologies
- 6) undergo peer review

Growth Energy's petition identified only two studies that fully meet these criteria: the DOE Study and study of evaporative emissions conducted by the Coordinating Research Council.⁸

We comment on the elements above that are not met by the following studies cited in the Growth Energy petition and thus significantly call into question the reliability of the results with respect to emissions.

Minnesota Center for Automotive Research, **Optimal Ethanol Blend-Level Investigation**, October 2007. This study tested only three non-FFV 2007 model vehicles, thus it lacked a representative variety of vehicles. This study was primarily designed to measure fuel economy, not emissions, and was not peer reviewed. Fuel parameters were not controlled and emissions results have not been made available for public review.

Minnesota Center for Automotive Research Study, **Use of Mid-Range Ethanol/Gasoline in Unmodified Passenger cars and Light Duty Trucks**, July 1990. This study was designed primarily to test drivability over the course of one year's use. It tested 15 older model cars and trucks. The study was not peer reviewed and lacked controls on fuel parameters. The study did not measure cold start and multi-speed emissions as required for certification.

Rochester Institute of Technology, **Report to the U.S. Senate on E20 Ethanol Research**, October, 2008. This study of 10 older cars and trucks is designed to test both operability and emissions and is incomplete. The report is a summary of data that is not peer reviewed and not available to the public.

One well-conducted, peer reviewed study of emissions has recently been completed by the Department of Energy (DOE). Much of Growth Energy's petition relies on this

⁸ Coordinating Research Council, Inc., CRC Report No. E-65-3, Fuel Permeation from Automotive systems E0, E6, E10, E20, and E85. December, 2006.

study. However, the DOE study raises a number of troubling concerns about the conclusions it reaches. DOE reports no “significant” increase in regulated emissions from 16 vehicles tested. However, DOE applies a statistical measure requiring 90-95% confidence for emissions changes after averaging emissions across all vehicles. The use of a statistical measure is inappropriate in this case. Increases in emissions would have had to occur in 13 of 16 vehicles to meet DOE’s 95 percent certainty analytical criteria. In their analysis, reductions in emissions of some vehicles were allowed to “offset” increases in others.⁹

The Executive Summary fails to report that six vehicles had increase emissions of NO_x using E-15, four of them of 25 percent or more. Since the magnitude of these increases was off set by decreases in other vehicles, DOE deemed these findings statistically insignificant.¹⁰ While Section 211(f)(4) does not require a “no increase” in emissions, emissions increases must be evaluated to determine if they can worsen or are near the limits of certification standards.

DOE TEST RESULTS ON SMALL NON-ROAD ENGINES (SNREs) RAISES SIGNIFICANT QUESTIONS

While DOE did conduct a “scoping” of a very limited number of Small Non-Road Engines (SNREs), even this part of the study raises many questions. The Executive Summary reports that while emissions of NO_x went up, HC emissions went down and regulated emissions (combined HC+NO_x) decreased in “most cases”. While this statement is true of engines tested when they were new, the DOE durability testing on small engines was dismal. One of four classes of engines (Class IV) could not be operated long enough to test durability. Of the remaining seven engines, all seven when operated on E-0 after durability testing with E-10, E-15, or E-20 experienced emissions increases. Five of seven experienced HC+NO_x increases of 90 to 150 percent when compared to emissions when operated on E-0 when they were new.¹¹ The SNRE testing also found a significant exhaust temperature increase in many small engines.¹² Temperatures of engines operating on E-15 increased as much as 50° C. These findings are consistent with a potential durability degradation problem as discussed above with vehicle engines.

NON-ROAD ENGINE TESTING ON E-15 MUST BE CONDUCTED BEFORE GROWTH ENERGY’S PETITION CAN BE GRANTED

⁹ U.S. DOE Study, *Op. Cit.*, p. 2-6.

¹⁰ *Id.*, Table 3.1, p. 3-4.

¹¹ *Id.*, Tables 3.8-3.12, pp. 3-24 – 3-28.

¹² *Id.*, Table 3.13, p. 3-28.

There has been almost no testing on the use of mid-level ethanol non-road engines. Even the California Air Resources Board has been unable to estimate non-road emissions increases (mostly evaporative) attributable to increases of ethanol in gasoline (including E-10). EPA must identify a representative sample of the more than 900 non-road engines and testing must be conducted to determine if E-15 has an adverse impact on the ability of these engines to meet emissions standards. The Growth Energy petition does not address non-road engine or vehicle emissions at all. The absence of any data provided by Growth Energy combined with the limited and questionable results of data provided in the DOE study (as discussed below) provide a sufficient basis alone to deny the Growth Energy petition.

GROWTH ENERGY FAILS TO SHOW E-15 WILL NOT RESULT IN VIOLATION OF EVAPORATIVE EMISSIONS STANDARDS

Section 211(f)(4) makes it clear that a new fuel can receive a waiver only if it will not cause or contribute to exceedences of standards to which vehicles and engines were certified. With regard to meeting evaporative emissions all vehicles must certify to evaporative standards using E-0. Tier II vehicles must certify the durability of evaporative controls using E-10. Growth Energy attempts to argue that it need only show that E-15 would not increase evaporative emissions more than E-10, a “commercially available fuel.”¹³ The clear statutory basis of comparison should be between E-15 and E-0, the fuel used to certify such vehicles. The CRC permeation study submitted as part of Growth Energy’s petition raises serious questions. The study found that the use of E-20 in a 2001 model vehicle caused evaporative emission to reach 1765 mg, just below the 2000 mg standard.¹⁴ The evaporative emissions effects of E-15 were not studied. Given that the testing did not include an “aging” phase to assess the impact of ethanol in gasoline on evaporative emissions over time, this data supports the proposition that E-15 may “contribute to” exceedences of the certification standard for evaporative emission in older model vehicles. Clearly more testing is necessary to assess this finding.

Growth Energy also cites a Stockholm Study in support of its contention that E-15 causes no more evaporative emissions than E-10. We note that this study itself acknowledged the dearth of test data with the following,

“There is a need to generate data and experience by running tests and analyzing the environmental effects of blending ethanol with gasoline. The

¹³ Growth Energy application, *Op. Cit.*, p. 25.

¹⁴ CRC E-65-3, *Op. Cit.*, Figure 17, p. 18.

lack of data is more marked for blends with high ethanol content (~20%). Such blends should be avoided before a thorough analysis has been carried out and more data are available.”¹⁵

We could not agree more with this view.

RESPONSE TO REQUEST FOR COMMENT

(a) Whether an appropriate level of scientific and technical information exists for a waiver of E-15 regarding motor vehicles or motor vehicle engines.

As discussed above we assert there is not a sufficient level of scientific and technical information for the Administrator to determine whether the use of E-15 will or will not cause or contribute to a failure of emission control devices over the useful life of any motor vehicle or motor vehicle engine or any subset of motor vehicles or motor vehicle engines.

b) Whether an appropriate level of scientific and technical information exists for a waiver of E-15 regarding non-road vehicles or engines.

As discussed above, we assert there is not a sufficient level of scientific and technical information for the Administrator to determine whether the use of E-15 will or will not cause or contribute to a failure of emissions control devices over the useful life of any non-road vehicle or non-road engine.

(c) Whether an appropriate level of scientific and technical information exists for a waiver of an ethanol-gasoline blend greater than 10 percent and less than 15 percent.

We assert that a determination by the Administrator of a waiver under 211(f)(4) of other levels of ethanol-gasoline blends greater than 10 percent ethanol must be made pursuant to a specific waiver request accompanied by appropriate scientific and technical information in support of such request. The Administrator can not legally promulgate a waiver different from that published in the Growth Energy petition in absence of a separate waiver process. Because other ethanol-gasoline

¹⁵ Stockholm University et al, *Blending of Ethanol in Gasoline for Spark Ignition Engines: Problems Inventory and Evaporative Measurements*, 2004-2005, p. 1

blends have different fuel properties, and could well have different impacts on on-road and non-road engines, as well as fuel distribution systems, the comments provided by the public on the Growth Energy petition would not necessarily be relevant to such fuel. Therefore, the approval of such a fuel is not a logical outgrowth of the Growth Energy petition.

We further assert that there is not an appropriate level of scientific and technical information in order for the Administrator to determine whether the use of an ethanol-gasoline blend greater than 10 percent and less than 15 percent will or will not cause or contribute to a failure of any emissions control device or system over the useful life of any motor vehicle or motor vehicle engine or any nonroad vehicle or nonroad engine.

(d) Legal and technical aspect of granting a conditional or partial waiver restricted to a subset of gasoline vehicles.

As EPA has acknowledged, no “downstream” condition has ever been imposed on fuel manufacturers as part of a Section 211(f) (4) waiver.¹⁶ The requirements necessary to prevent misfueling and other distributional problems vary depending on the nature of the conditions that may be imposed. We can not provide sufficient comment here in the absence of specific proposed conditions for a waiver. For this reason, as discussed above, we assert that a conditional or partial waiver of E-15 designed to limit the use of such fuel to a subset of vehicles is not a logical outgrowth of the Growth Energy petition and must be the subject of a separate proposal subject to public notice and comment. We note that it is by no means clear that any conditional or partial waiver under Section 211(f)(4) designed to limit the use of E-15 and other ethanol-gasoline blend to a subset of vehicles or vehicle engines could meet the statutory requirements of Section 211(f)(4).

(e) Educational efforts needed for a partial waiver

As discussed in (d) above we assert this information should be the subject of a separate proposal.

(f) The extent to which the use of an E-15 blend would in practice help address the blend wall.

¹⁶ See discussion in RFS@ Preamble, p. 260.

Some experts claim that the blend wall, when the use of E-10 has been used in all feasible gallons of gasoline, may be reached as soon as 2009.¹⁷ EPA estimates that the blend wall may be reached at the end of 2012 and that an optimistic estimate of E-15 use could defer the blend wall until 2017.¹⁸ However, EPA identifies many regulatory and infrastructure hurdles which must be overcome before E-15 sales could achieve significant volumes.¹⁹

We believe that the combination of hurdles, not all of which have been identified, virtually assures that E-15 could not be marketed in substantial volumes for multiple years. Certainly, an E-15 waiver does not constitute a timely solution to the blend wall if the Growth Energy estimates prove correct. Among the most time consuming changes include: modifying federal reformulated gasoline regulations and the Complex Model to accommodate E-15, modifying section 211(h) of the Clean Air Act and accompanying regulations that limit the 1 pound RVP waiver exclusively to ethanol blends containing 9-10% ethanol, modifying state SIPs containing fuel requirements that limit the 1 pound waiver exclusively to ethanol blends containing 9-10% ethanol, and modifying state fire, safety, and leak protection codes to authorize the use of E-15 in existing gasoline storage and dispensing equipment. We note that the identification of these hurdles should not be interpreted as approval or support of any of the changes by any of the signatories to these comments. If existing infrastructure for gasoline storage and dispensing is required to be substantially modified to accommodate E-15, we believe a wiser, safer, more effective, and just as timely investment would be to implement a program to expand the availability and use of E-85.

We specially note that a partial waiver is especially unlikely to allow sufficient E-15 to address the blend wall. Assuming EPA identifies sufficient data to issue a partial waiver for the use of E-15 limited to Tier II vehicles, the limited volume of such cars in currently use limits the volume of additional ethanol sold via E-15 to levels that would do little to address the blend wall. According to DOE, Tier II vehicles constituted 15% of the motor vehicles registered for use in the U.S. in 2007²⁰ In the short term, assuming regulations that bar the use of E-15 in California cleaner Burning Gasoline and federal Reformulated Gasoline (41% of national pool) are not modified, a Tier II partial waiver would increase ethanol sales a mere 600,000 gallons per year if E-15 were used in every gallon available in the national

¹⁷ Braeutigan, *Op. Cit.*, p. 7.

¹⁸ RFS2 Preamble, Federal Register, May 26, 2009, Vol. 74, Number 99, pp. 24903-25143, Regulation of Fuels and Fuel Additives, Change to Renewable Fuel Standard Program; Proposed Rule, Figure V.D. 3-1, p256.

¹⁹ *Id.*, pp. 256-258.

²⁰ U.S. DOE study, *Op. Cit.*, Table 2.3, p. 2-3.

conventional gasoline pool that remained (approximately 80 B gallons). In our view, the modest benefit in ethanol sales associated with a partial waiver for E-15 is far outweighed by the risk of misfueling and substantial damage to the estimated 97 million non-Tier II vehicles that would operate in the areas where E-15 would be sold under this scenario.