

January 25, 2020

Mr. Gavin Hoch  
California Air Resources Board  
1001 I ST  
Sacramento, CA 95814

**Subject: Renewable Diesel (RD) and Biodiesel Blends**

Dear Gavin:

CARB's "Second Notice of Public Availability of Modified Text" opening paragraph states,

"[t]he amendments will reinforce the emissions certification testing requirements and require biodiesel additives and alternative diesel fuel (ADF) formulations to be certified uniformly according to new certification procedures. The amendments will further ensure that additives or ADF formulations are certified to mitigate potential oxides of nitrogen (NOx) emissions increases from the use of biodiesel compared to conventional diesel, consistent with rigorous and appropriate protocols."

(Emphasis added.) The proposed ADF, Appendix 1 of Subarticle 2. In-use Requirements for Pollutant Emissions Control, (a)(1)(B), "Approved ADF Formulations," lists formulations 1 and 2 that allow certain RD and biodiesel blends (hereinafter, the "RD Formulations"). By including these RD Formulations in the proposed ADF, CARB is either not following its own guidelines, withholding vital data necessary in support of said RD Formulations, or placing itself outside its stated regulatory justification whose amendments are designed to ensure that ADF Formulations, including the RD Formulations, are certified uniformly according to new certification procedures".

CARB's recent Low Emissions Diesel (LED) 2009 John Deere (legacy vehicle) emissions' study<sup>1</sup> (hereinafter, the "LED Program") confirms that a 65% RD, 35% biodiesel (ratio of 1.85) blend does not meet the proposed ADF's "new certification procedures" and standards. Appendix 1 of Subarticle 2. In-use Requirements for Pollutant Emissions Control (a)(2)(G)(1) states, "[t]he average NOx emissions during testing with a candidate fuel that contains renewable hydrocarbon diesel demonstrate at least a two percent reduction relative to the average NOx emissions during testing with the Diesel Test Fuel." (Emphasis added.) Using CARB's ADF statistical analysis to account for the proposed ADF formulation 2% NOx reduction requirement, both the D2 and NRTC cycles failed to meet CARB's proposed ADF NOx reduction requirement. Results for each LED Program cycle are provided on page 2. CARB cannot dispute using the D2 and NRTC cycles nor the John Deere engine given the internal and external debate about the representativeness and agreement to use such as indicated in the documents produced by CARB in response to Cal Fueling's Public Records Act ("PRA") request.

<sup>1</sup>[http://www.californiafueling.com/documents/news\\_low\\_emissions.pdf](http://www.californiafueling.com/documents/news_low_emissions.pdf)

**D2 Cycle**

		X <sub>R</sub>	X <sub>C</sub>
NOx	AVERAGE	2.690	2.653
	STD. DEV.	0.047	0.017

X <sub>R</sub>	+ δ	-S <sub>p</sub>	* v(2/n) *	t(0.15,df)	=	X <sub>R</sub> Adjusted
2.690	0.027	0.036	0.333	1.052	=	2.651

	X <sub>C</sub>	<	X <sub>R</sub> Adjusted
NOx	2.653	Fail	2.651

**NRTC Cycle**

		X <sub>R</sub>	X <sub>C</sub>
NOx	AVERAGE	2.801	2.788
	STD. DEV.	0.059	0.041

X <sub>R</sub>	+ δ	-S <sub>p</sub>	* v(2/n) *	t(0.15,df)	=	X <sub>R</sub> Adjusted
2.801	0.028	0.051	0.333	1.052	=	2.755

	X <sub>C</sub>	<	X <sub>R</sub> Adjusted
NOx	2.788	Fail	2.755

Based on information received through the PRA process, it appears that CARB has used Cal Fueling’s confidential trade secrets in the process of developing the LED Program (which will be the subject of separate legal proceedings, if necessary). In the absence of CARB issuing any type of LED Program report (which they informed us would occur by the end of 2020 made more egregious by the fact they’ve had the data since May 2020) for stakeholders to consider during the ADF rulemaking process, on January 18, 2021, Cal Fueling posted the LED Program emissions data on our web site ([www.californiafueling.com](http://www.californiafueling.com)). We have also posted a statistical analysis spreadsheet (updated on 1/22/21, engine repeatability results included). CARB has stonewalled Cal Fueling in response to our PRA request and continues to hold back critical information. Its slow walking response gives significant cause for concern because there’s likely more data which does not support its proposed ADF. CARB should delay the proposed ADF rulemaking until it is 100% transparent with all stakeholders regarding the LED Program data.

CARB has stated that “[p]revious CARB certifications of ADF formulations have provided testing data that demonstrates the ability of various renewable diesel and biodiesel formulations to reduce NOx emissions and offset emissions from biodiesel blends below the NOx control level”

and further that “staff relied on data from the 2009 study<sup>2</sup>, data from prior CARB certified ADF formulations, and previous staff analyses on biodiesel and renewable diesel, to estimate the overall potential NOx emissions that could be a result of the proposed modifications.” In a disingenuous attempt to justify RD Formulations, CARB references data obtained from (1) its now outdated 2009 study and (2) stakeholder ADF formulations’ certifications, such data being inapplicable, as it was based on the now precluded Detroit Diesel Series 60 engine using a reference fuel formulation that does not meet the ADF’s requirements. CARB’s reliance on the forgoing has yet to be explained in light of its more recent LED Program. Ironically, CARB seem to value (1) and (2) above over the LED Program and an RD study, using one producer’s RD, in new technology diesel engines (NTDE) indicating that RD increases emissions versus a CARB Diesel (hereinafter referred to as the “Karavalakis paper”).<sup>3</sup> Furthermore, we are not aware of any emissions studies comparing different manufacturers’ RD. CARB’s cherry-picking data based on their preferred outcome runs entirely against the newly stated spirit of the proposed ADF - “[d]emonstration that use of the proposed ADF additive or formulation to mitigate NOx emissions is based on sound principles of science and engineering.”

#### **Questions:**

1. Has CARB considered the LED Program and Karavalakis paper in drafting the proposed ADF?
2. If not, why? Shouldn’t the latest scientific evidence (LED Program and Karavalakis paper) be used as opposed to (1) and (2) above?
3. Does CARB concur that the LED Program emissions data does not meet the proposed ADF requirements necessary for an ADF formulation approval?
4. If not, why?
5. To date, CARB considered ADF Formulations to be proprietary, based on each manufacturers RD and would not allow anyone other than “Producers” to apply for formulation certification. What’s CARB’s justification in allowing for this change given, to our knowledge, no studies have been conducted comparing different manufactures’ RD emissions?

<sup>2</sup> See “CARB Assessment of the Emissions from the Use of Biodiesel as a Motor Vehicle Fuel in California, “Biodiesel Characterization and NOx Mitigation Study,” Final Report.” Durbin et al. 2011. October, [https://www.arb.ca.gov/fuels/diesel/altdiesel/20111013\\_CARB%20Final%20Biodiesel%20Report.pdf](https://www.arb.ca.gov/fuels/diesel/altdiesel/20111013_CARB%20Final%20Biodiesel%20Report.pdf).

<sup>3</sup> “Emissions and Fuel Economy Evaluation from Two Current Technology Heavy Duty Trucks Operated on HVO and FAME Blends,” SAE Int. J. Fuels Lubr. 9(1):2016, <https://doi.org/10.4271/2016-01-0876>.

6. Has CARB conducted any RD compositional analysis confirming that all RD's are created equal, or for that matter, emission studies confirming that they react similarly across different feedstocks?
7. If not, how can CARB justify allowing any RD Formulation(s)?

The proposed ADF's "Approved ADF Formulations" are based on renewable diesel to biodiesel ratios of 3.75 (formulation 1) and 2.75 (formulation 2), both which limit the biodiesel content to 20%. These ratios are significantly higher than those tested and failed in the LED Program, whose data was compiled on a renewable diesel to biodiesel ratio of 1.85. As such, there's no technical basis for CARB to include the RD Formulations in the proposed ADF based on the LED Program data.

To fully understand the LED Program's gravitas, look at the testing circumstances. CARB (1) solicited assistance in formulating a "dirty as possible" reference fuel, (2) solicited assistance in selecting a "clean as possible" biodiesel which did not meet either the ADF's current or proposed requirements, and (3) selected a legacy engine (John Deere) that they felt would give the best possible emissions results. Notwithstanding CARB's efforts to manufacture a positive outcome, the results showed that a ratio of RD to biodiesel of 1.85 does not meet the proposed ADF's performance standard. In conclusion, there is no factual basis or justification, given what CARB knows, to include RD Formulations in the proposed ADF. Prior to the approval of RD Formulations, CARB must hold itself to the same standards it is seeking to impose on stakeholders and conduct ADF compliant testing that demonstrates efficacy under the same proposed "uniform certification standards."

#### **Questions:**

1. What is CARB's technical basis for including RD Formulations in the proposed ADF?
2. Does either RD Formulation meet the >2% NOX emissions reduction required as part of the proposed ADF?
  - a. What testing was conducted in connection with each RD Formulation?
  - b. What specifically are the demonstrated NOx reductions from each RD Formulation?
  - c. Where is the resulting data? Why has it not been shared publicly?
3. If RD Formulations do not meet the >2% NOX emissions reduction required as part of the proposed ADF, or if CARB does not have data supporting such a conclusion, why is CARB putting forth such formulations? What is the environmental impact of the formulations?
4. Why has CARB failed to release any LED Program emissions results and report given they've had at least a portion (2009 John Deere) of the results and a CE-CERT Interim

Report since May 2020?

5. What was the basis for CARB’s decision to use as “dirty” as possible a reference fuel, and as “clean” as possible (high cetane) biodiesel, in its LED testing?
  - a. Relatedly, in light of CARB’s reliance on a biodiesel with cetane number over 56 in its LED Program, will CARB be similarly waiving the biodiesel 50 cetane cap for NOx Mitigant applicants under the proposed ADF regulation? If not, why is CARB using different standards for itself?

CARB’s expressed view of the “Importance of Renewable Diesel as an Offsetting Factor”<sup>4</sup> is that “[t]he ADF regulation NOx mitigation framework relies on NOx emissions reductions from the use of renewable diesel to offset NOx emissions increases from biodiesel blends below the NOx control level (usually B5).” To date, based on the LED Program data, CARB has grossly overstated RD’s NOx emission benefit by a two-fold factor. In the LED study, 100% RD reduced NOx 5.23% and 4.89%, respectively based on the D2 and NRTC cycles. RD results for each LED Program cycle are provided following.

**D2 Cycle**

		X <sub>R</sub>	X <sub>C</sub>
NOx	AVERAGE	2.690	2.550
	STD. DEV.	0.047	0.019

**NRTC Cycle**

		X <sub>R</sub>	X <sub>C</sub>
NOx	AVERAGE	2.801	2.664
	STD. DEV.	0.059	0.051

On the average, based on the LED Program, 100% RD reduces NOx just over 5% versus CARB diesel. CARB has stated “[s]ufficient volumes of renewable diesel not used to mitigate biodiesel NOx above the control level must be available to fully offset NOx emission increases from biodiesel blends below the NOx control level”. Given CARB’s overstated RD NOx reduction benefit, the volume of RD required to neutralize NOx from biodiesel blends below the seasonal allowances is double that previously stated. Clearly, CARB must re-state their past findings and correct its future estimates.

Cal Fueling has estimated that 500 million gallons of RD is required to neutralize NOx from B5. Based on RD’s actual use over the last four quarters and considering the 5% RD NOx emission benefit not 10% as previously assumed, there is minimal RD available for use in blends above

<sup>4</sup>Proposed Amendments to the Regulation on the Commercialization of Alternative Diesel Fuels – 15 day changes, Appendix B, “Staff Analysis of Renewable Diesel/Biodiesel Formulations and NOx Emissions”, page 3.

the seasonal allowance to neutralize NOx. In a desperate attempt to offer stakeholders a NOx Mitigant option, because of their unjustified and careless effort to craft a proposed ADF revoking all current NOx Mitigant Executive Orders, CARB are egregiously overstating both the volume of RD available for NOx mitigation and the actual reduced NOx that RD Formulations would deliver. 500 million gallons of RD is required to neutralize the NOx From B5, considering that over the last four (4) quarters 580 million gallons of RD was consumed, then only 80 million gallons of RD would be available for use in RD Formulations. Best case, in order for biodiesel volume not to go down, 61 million of the 80 million gallons of RD would need to be used in RD Formulation 1 (61 million \* 3.75 = 229 million gallons of biodiesel which equates to the last four quarters biodiesel consumption). CARB has no market distribution control of RD and hence CARB's offset factor rationale does not hold water and, in fact, is impossible. Conversely, the proposed ADF's RD Formulations will result in NOx increases because RD does not reduce NOx at the level previously indicated by CARB based on the most recent LED Program data.

**Questions:**

1. How will CARB be addressing its overstated RD offset factors (emissions reductions benefits) on B5?
2. Does CARB plan on updating their RD volume and offset viewpoints (as compared to the calculations above) for RD Formulations, past and future?

CARB appeared to have the greatest intent when they crafted the original ADF. The NOx Mitigant certification process, at the time, was rigorous and left the door open for CARB to shape the regulation as necessary to meet all stakeholder requirements. However, something went drastically wrong and CARB's missteps, poor decisions and over corrections have led us to where we are today. CARB are seemingly unwilling or incapable of accepting responsibility for their actions. CARB is already in the midst of defending itself in a lawsuit filed by another stakeholder, which is likely not the last lawsuit CARB will face as a result of its improper actions in connection with the ADF. While there are many aspects of the proposed ADF that represent a positive step forward in CARB's mission, the bulk of the regulations continue to be plagued by bad science and lack of recognition of the marketplace. Instead of moving forward with the current flawed regulations, CARB should reengage with stakeholders to draft an ADF proposal that is grounded in science, equitable for all stakeholders, and, most of all, is transparent in its impact on the California environment.

Thank you for the opportunity to submit this comment.

Respectfully,

*Patrick J McDuff*

Patrick J. McDuff

CEO

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