

August 30, 2018

Mr. Sam Wade  
California Environmental Protection Agency  
Air Resources Board  
1001 I Street  
Sacramento, CA 95814

**Subject: Comments Submission**  
**X. Modification to In-Use requirements for Specific ADFs Subject to Stage 3A**  
**Section 2293.6 of the ADF Regulation**

Dear Mr. Wade,

Thank you for the opportunity to submit comments specific to the subject matter. California Fueling has previously submitted (6/26/18) comments outlining practical concerns associated with bifurcation. Beyond the practical concerns, there are technical concerns associated with bifurcation which are outlined following.

**Sunset of Biodiesel In-use Requirements – On-Road Vehicle Concerns**

Two recent studies, as outlined following, highlight the concerns associated with NTDE's, Selective Catalytic Reduction (SCR) and NOX emissions. One study focuses on SCR operation whilst the other study focuses on biodiesel's impact on SCR operation.

- Karavalakis, G., Jiang Y., Yang, J., Durbin T. et al., "Emissions and Fuel Economy Evaluation from Two Current Technology Heavy Duty Trucks Operated on HVO and FAME blends," *SAE International Journal of Fuels & Lubricants, Volume 9, Issue 1 (April 2016)*
- Kanok Boriboonsomsin, Kent Johnson, George Scora, Daniel Sandez, Alexander Vu, Tom Durbin, and Yu (Jade) Jiang, "Collection of Activity Data from On-Road Heavy-Duty Diesel Vehicles, FINAL REPORT, (ARB Agreement No. 13-301)", May 2017

The SAE paper studied 2 vehicles (2014 Cummins ISX15 and 2010 Cummins ISB6.7), under two modes of operation (EPA Urban Dynamometer Driving Schedule and CARB's Heavy-Duty Diesel Truck Transient Cycles) and concluded that biodiesel (B20) showed a statistically significant increase in NOX versus CARB diesel in both vehicles over both cycles. The authors theorized on the mechanisms of NOX production as well as the negative impact biodiesel has on SCR operation both of which are evidentiary support of NOX emission increases observed in NTDE's.

Specific to SCR operation, the authors indicated that the SCR's on vehicles studied did not negate biodiesel's effect on NOx emissions but rather contributed to such.

The May 2017 Air Resources Board report studied a much broader selection of vehicles (approximately 90) representative of the NTDE fleet (EMFAC2011). "One of the primary objectives of this research is to identify the fraction of vehicle operation that SCR may not control NOx effectively." The key conclusion of the study specific to SCR operation was as follows:

"Overall, it is found that on average the vehicles in this study operate with SCR temperature lower than 250 °C for 42-91% of the time and lower than 200 °C for 11-87% of the time, depending on their vocation. These portions of vehicle operation with low SCR temperature have a significant implication on the vehicles' real-world NOx emission. By assuming a generic NOx reduction curve as a function of SCR temperature for all the vehicles, the weighted average %reduction in engine-out NOx emission ranges from 16% for agricultural trucks to 69% for refuse trucks. This would have a significant impact on the NOx emission inventory of heavy-duty diesel vehicles in California."


Put a different way, SCR's in NTDE's do not operate properly 31-84% of the time.

The combination of biodiesel, its negative impact on SCR operation and ARB's study indicating California, fleet representative, NTDE's do not provide expected NOx reduction provides no reasonable basis for CARB to bifurcate an on and off-road sunset provision based on either vehicle population age or vehicle miles travelled. Furthermore, our June 2018 comment submission supports the impractical nature of applying a bifurcation concept because of its potential adverse effect on NOx.

We believe that all things considered, bifurcation is not prudent or in the best interest of the public at this time – the risk is more than the reward. There are just too many unknowns and the better decision would be to readdress bifurcation once more progress is made with the ADF.

We sincerely appreciate the opportunity to comment on CARB's LCFS proposed amendments. As always, we look forward to working with CARB through the rulemaking process.

Sincerely,



Patrick J. McDuff  
CEO