

Product Alert: Fuel Additives
October 31, 2019

The California Air Resources Board (CARB) has conducted emissions testing designed to determine, consistent with the emissions mitigation requirements of CARB's Regulation on the Commercialization of Alternative Diesel Fuels (ADF regulation), that additives certified pursuant to that regulation are effective at mitigating biodiesel NOx emissions to equivalence with CARB diesel.

This testing was conducted at the University of California, Riverside, and included the additives listed in the attachment summary to this notice. The testing showed that the additives failed to effectively mitigate to the regulatory standard. These results raise significant questions both as to the specific additives addressed by the testing and regarding how best to ensure appropriate performance of additives and formulations generally under the ADF regulation going forward. Accordingly, CARB intends soon to propose modifications to the ADF regulation that will ensure that additives perform consistently with all regulatory requirements. These amendments may, for instance, require additional testing of currently certified additives, among other steps to ensure conformance with regulatory standards for currently certified additives and additives certified in the future. As part of this amendment process, CARB may consider approving blends of renewable diesel with biodiesel (approx. R80/B20) for use by any blender to meet the NOx control requirements, in case additive availability is limited due to the regulatory changes.

Pending further notice, all California biodiesel producers, importers, and blenders may continue to use CARB certified NOx mitigation additives to comply with the ADF regulation's NOx mitigation requirements. In order to ensure that regulated parties currently using certified NOx mitigation additives to comply with the ADF regulation have adequate time to transition to other compliance strategies in the event CARB considers and ultimately adopts regulatory amendments as described above, any changes to the existing additive certifications will not be effective prior to January 1, 2020.

This alert does not affect biodiesel blends B5 and below (~70 percent of the California biodiesel market), as no mitigation is required for those blends. Additionally, exempted fleets and stations would need not take additional action as no additives are required by those fleets or stations. CARB action to address these concerns will not affect the validity of Low Carbon Fuel Standard (LCFS) credits associated with biodiesel supplied to the California market that is compliant with the ADF and LCFS regulations.

Please contact Alexander "Lex" Mitchell (at 916-327-1513 or alexander.mitchell@arb.ca.gov) with any questions.

Attachment: Summary of ADF Biodiesel Additive Testing

October 31, 2019

- The Alternative Diesel Fuels (ADF) regulation governs the introduction and use of innovative alternative diesel fuels in California, while preserving or enhancing public health, environmental, and emissions benefits of the existing motor vehicle diesel fuel regulations. The regulation consists of two main parts:
 - A three-stage process for ADFs to be introduced into the California market; and
 - In-use requirements for biodiesel as the first ADF.
- The biodiesel portion of the ADF regulation includes provisions designed to control potential increases in NO_x emissions that could otherwise be caused by the use of biodiesel under certain and limited circumstances. These provisions include a process for certification of additives or ADF formulations that have been demonstrated through emissions testing to mitigate potential NO_x increases from the use of biodiesel.
- CARB has certified six biodiesel additives under the ADF regulation based on testing submitted by the applicants. The original certification testing for each of the additives was performed at the same third-party laboratory at the direction of the applicants.
- Due to CARB concerns regarding the efficacy of the certified additives, CARB designed a biodiesel additive testing program to determine whether the certified additives meet the in-use requirements under the ADF regulation.
- CARB contracted with the University of California, Riverside Center for Environmental Research and Technology (CE-CERT) to conduct the additive testing program.
- CE-CERT conducted the emissions testing using a 1990s model Detroit Diesel Corporation (DDC) Series-60 engine installed on a heavy-duty engine dynamometer, in accordance with the ADF regulation testing requirements.
- CE-CERT conducted testing in two phases, which involved evaluating the emissions equivalence of NO_x and PM emissions from additives in B20 and B10 with NO_x and PM emissions from the reference fuel. The testing and results are summarized in **Table 1** below.
- Statistical analysis of the NO_x results demonstrated that all additive blends tested failed the certification test criteria for NO_x because the additive blends did not reduce NO_x emissions to a level equivalent to the reference fuel.

- Statistical analysis of the PM results demonstrated that all additive blends tested passed the certification test criteria for PM. PM reductions for the additized blends were similar to those found for the unadditized B20 blend.

Table 1: NOx Emissions Results of CARB ADF Biodiesel Additive Testing

Phase	Additive	ppm Additive Candidate Fuel	Percent Biodiesel in Candidate Fuel	Number of Tests	Reference NO _x , X _R (g/bhp-hr)	Candidate NO _x , X _C (g/bhp-hr)	NO _x Emissions Increase Compared to Reference Fuel (% of X _R)	Passed Statistical Test for NO _x Emissions Equivalence?
1	Best Corp. BC-EC1c	20	20	20	4.536	4.709	3.82	No
	None (Unadditized B20)	0	20	8	4.564	4.742	3.90	No
	VESTA™ 5100	1000	20	20	4.515	4.624	2.41	No
2	VESTA™ Active Ingredient	2200	20	8	4.516	4.604	1.94	No
	VESTA™ 1000	3000	20	20	4.602	4.705	2.25	No
	VESTA™ Active Ingredient	3000	10	4	4.586	4.616	0.66	No