

California Environmental Protection Agency



Air Resources Board

Proposed Regulation on the Commercialization of New Alternative Diesel Fuels

Staff Report: Initial Statement of Reasons



**Stationary Source Division
Alternative Fuels Branch**

Release Date: October 23, 2013

To Be Considered by the Board: December 12-13, 2013

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State of California
Air Resources Board

Staff Report: Initial Statement of Reasons for Proposed Rulemaking

Proposed Regulation on the Commercialization of New Alternative Diesel Fuels

Date of Release: October 23, 2013
Scheduled for Consideration: December 12-13, 2013

Location:

California Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

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Initial Statement of Reasons

Public Hearing to Consider the Proposed Regulation on the Commercialization of New
Alternative Diesel Fuels

Air Resources Board Meeting
December 12-13, 2013, at 9:00 a.m.
California Environmental Protection Agency
Air Resources Board
Byron Sher Auditorium
1001 I Street
Sacramento, California 95814

For those unable to attend the meeting in person, live video webcast will be available beginning at 9:00 a.m. on December 12-13, 2013, at <http://www.calepa.ca.gov/broadcast>.

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Glossary

List of Acronyms and Abbreviations

AAQS	Ambient Air Quality Standards
ADF	Alternative Diesel Fuels
ARB or Board	California Air Resources Board
CAA or the Act	Clean Air Act
CDFA	California Department of Food and Agriculture
CEPC or Council	California Environmental Policy Council
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CCR	California Code of Regulations
DME	Dimethyl Ether
DMS	Division of Measurement Standards, (Division within CDFA)
EISA	Energy Independence and Security Act of 2007
EO	Executive Officer
FAME	Fatty Acid Methyl Esters
GHG	Greenhouse Gas
HC	Hydrocarbons
H&SC	California Health and Safety Code
LCFS	California Low Carbon Fuel Standard
MMT	Million Metric Tons
MMWG	Multimedia Working Group
MOU	Memorandum of Understanding
NO _x	Oxides of Nitrogen
NREL	National Renewable Energy Lab
NTDE	New Technology Diesel Engines
OSFM	Office of the State Fire Marshal
PAHs	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matter
ppmw	Parts per Million by Weight
RFS	Renewable Fuels Standard
SCR	Selective Catalytic Reduction
SWRCB	California State Water Resources Control Board
SVO	Straight Vegetable Oil
U.S. EPA	U.S. Environmental Protection Agency
UST	Underground Storage Tanks
WVO	Waste Vegetable Oil

EXECUTIVE SUMMARY

The staff of the Air Resources Board (ARB or Board) is proposing a new regulation to govern the commercialization of motor vehicle alternative diesel fuels (ADF) in California. The ADF regulation is intended to provide a legal pathway for new, emerging diesel fuel substitutes to enter the commercial market in California, while managing and minimizing environmental and public health impacts, and to preserve the emissions benefits derived from the ARB motor vehicle diesel regulations. New ADFs are those alternative diesel fuels that do not have an established ARB fuel specification in effect prior to January 1, 2015. The proposed regulation consists of two major parts: a three stage phase-in of ADF fuels into California commerce, and mitigation measures set in place and applied as needed to ensure no degradation in air quality. Although this will be a new regulation, the proposal consolidates many current administrative and regulatory practices into one regulation that provides a clear pathway to commercialization of ADFs.

ARB has not previously regulated ADFs under a comprehensive and structured program except in very limited cases. It has become necessary to establish a formal legal framework for regulating such fuels for two primary reasons. First, programs such as the State's Low Carbon Fuel Standard (LCFS) and the federal Renewable Fuels Standard (RFS) are expected to incentivize the rapid development of new ADFs. Many of these fuels provide criteria and toxic emission reductions in addition to their greenhouse gas (GHG) benefit. Second, testing by ARB and others shows that some ADFs can have adverse effects on emissions under certain circumstances. For these and other reasons, we are proposing the regulation to ensure that new ADFs are commercialized in California under specific requirements and conditions that maintain public health protections and ensure no degradation in air quality.

The first ADF that will be regulated under this action is biodiesel. We based the proposed regulation in large part on our experience with analyzing biodiesel and renewable diesel over the past several years. Fuel specifications and other requirements for future ADFs will be incorporated into this regulation through additional rulemakings.

What are we proposing?

The proposed regulation would require an ADF to undergo a three-stage process that evaluates the ADF for environmental impacts prior to its widespread use in California. As part of that evaluation process, the regulation puts into place measures that would apply when needed to maintain current air quality protections. Many of the provisions in this regulation are already required under existing State law. The three stages of this process are described below.

Stage 1: Pilot Program. In this stage, an ADF proponent(s) would apply to ARB for a pilot program under which no more than 1 million gallons total of the ADF could be used in the State in well-defined fleets within a year. During that time, the applicant would

conduct required testing and emissions evaluations. The application process includes disclosure of the chemical composition of the ADF, as well as other important information, which would enable staff to conduct a screening analysis. This screening analysis is intended to help ARB staff determine whether use of the ADF presents a potential adverse impact to the public health or environment. Advancement to Stage 2 requires the ADF proponent to fulfill the Stage 1 requirements and enter into an agreement with the Executive Officer (EO) to complete and satisfy specified terms and conditions, such as additional emissions testing, which will apply during the second stage.

Stage 2: Fuel Specification Development. In this stage, an ADF proponent(s) would apply for a broader, but still limited, agreement allowing use of up to 30 million gallons of that ADF per year in a larger fleet. The larger volume and sample fleet would allow more comprehensive testing and analyses that would inform a multimedia evaluation; help develop consensus standards for the ADF; identify what circumstances, if any, could result in a significant adverse impact on public health or the environment; and determine what, if any, potential mitigating options can be implemented for the ADF under those circumstances.

During this stage, ARB staff would determine whether a significance threshold for a pollutant of concern exists for the fuel. For example, based on our comprehensive testing program to date, ARB staff determined that biodiesel has a significance threshold for oxides of nitrogen (NO_x) of 10 percent biodiesel by volume. In other words, once the biodiesel blend level in the State or in an air basin reaches 10 percent or more by volume, staff would expect a statistically significant increase in NO_x emissions in the absence of any mitigating factors.

Stage 3: Commercial Sales. This stage is split into Stage 3A and Stage 3B. Stage 3A is applicable to ADFs for which ARB staff has identified a significance threshold. An ADF sold in California under this stage would be subject to potential sales conditions and mitigation measures that are based on the significance threshold(s) determined in Stage 2. By contrast, Stage 3B is applicable to ADFs for which no significance threshold has been identified. Accordingly, ADFs in Stage 3B can be used at any blend and without any potential conditions or mitigation measures.

An ADF subject to Stage 3A is subject to enhanced monitoring and recordkeeping. The ARB staff would use such monitoring and records, along with other market and fleet data, to calculate an “effective blend level” annually or more frequently, as specified in the regulation. The effective blend level is the statewide average blend of an ADF that accounts for and benefits from the effects of mitigating factors identified by the staff. This concept is illustrated as follows.

As noted, ARB testing showed that biodiesel blends, derived from soy, at or higher than B10 (10% biodiesel and 90% CARB diesel, by volume) tend to yield statistically significant increases in NO_x (relative to conventional CARB diesel) when those blends are used in older heavy-duty vehicles. A simplistic prohibition theoretically could be

based on this fact alone. However, prohibiting B10 and higher biodiesel blends, while conceptually simple to implement, would ignore a number of real and significant factors that affect the overall NOx impact. A more nuanced, sophisticated and market-reflective regulatory approach would incorporate those factors. For example, the same ARB testing and research program that showed potential NOx increases with higher biodiesel blends also showed that the NOx can be tempered and negated by a number of factors, such as:

- biodiesel used in blends at B9 or below, including the B5 (B0 to B5) in predominant use today, does not increase NOx;
- use of renewable diesel actually decreases NOx, with higher renewable diesel blend levels yielding greater NOx reductions;
- similarly, use of low-NOx diesel (a subset of CARB diesel that has a high natural cetane number and other distinctive properties) also reduces NOx, with higher blends of low-NOx diesel yielding greater NOx reductions;
- use of certain diesel additives at specified dosage rates can also reduce NOx;
- use of biodiesel derived from animal feedstocks results in a substantially lower NOx impact than biodiesel derived from soy;
- use of biodiesel in 2010-compliant engines and other so-called “New Technology Diesel Engines” does not increase NOx, regardless of the biodiesel blend level; and
- use of biodiesel in light and medium duty vehicles does not increase NOx.

Thus, a more sophisticated regulatory approach would account for these effects and consolidate them into a single calculation. The proposed regulation employs this approach in what is called the effective blend level. There is a specific calculation for biodiesel’s effective blend level that takes the above factors into account, and there would be similar but different equations unique to other ADFs that account for the mitigating factors specific to each ADF.

For biodiesel, the effective blend level calculation shows that the NOx effects from the use of biodiesel are tempered and negated by the cumulative effects of the above mitigating factors. Thus, based on our projections and analysis of these mitigating factors that are already occurring in the California market, it is highly unlikely that the volumes of biodiesel at the State and regional levels can reach a blend level that compromises existing air quality protections. In the unlikely event that biodiesel volumes increase beyond the ability of ongoing market factors to fully offset the NOx effects, the proposal establishes specific mitigation measures that would go into effect prior to reaching such high biodiesel volumes. This would ensure that current air quality protections are maintained even in those circumstances.

The effective blend level calculation reflects the results of ARB’s testing program and research and sends a much stronger market signal that incentivizes increased use of those mitigating factors, rather than merely banning all higher biodiesel blends. The proposal provides that if the calculated effective blend level, statewide or regionally, reaches 95 percent of the significance threshold for a pollutant of concern, the

mitigation requirements would be triggered. Thus, by implementing the mitigation measures at 95 percent of the significance threshold, we can ensure that the use of an ADF would not result in increased air pollution, degradation of air quality, or reduced protection for the environment or public health.

As noted, an ADF that is subject to Stage 3B has been determined to have no significance threshold. Thus, such an ADF would be subject only to periodic reporting and recordkeeping provisions, but it can be sold in full commercialized volumes without any mitigation-related requirements.

Why are we taking this action?

Consumption of ADFs, such as biodiesel, is expected to increase in the coming years due to a variety of policy incentives including the RFS, LCFS, and federal blending tax credits. As such, it is important to ensure that the full commercialization of these fuels does not increase air pollution or cause other environmental concerns. The proposed regulation will ensure this by subjecting new ADFs to a rigorous environmental review conducted in specified phases with definite terms and conditions. As part of the environmental review, the ARB staff will determine whether the ADF has a significance threshold for a pollutant of concern. In that case, the staff will identify the circumstances under which the significance threshold may be reached and the specific mitigation measures that will be applied when conditions are such that the effective blend level has reached 95 percent of the identified significance threshold.

As noted, it has been determined that higher blends of biodiesel, the first ADF to be subject to the proposed regulation, can increase NO_x under certain circumstances and in the absence of mitigating factors. However, ARB staff has also determined that NO_x associated with these higher blends are mitigated by a number of factors. Accordingly, ARB staff has designed the proposed regulation to ensure that biodiesel can be commercialized at any blend level without an increase in NO_x. The regulation provides for a proper accounting of mitigating factors already occurring in the California market and the application of mitigation measures in the unlikely event the effective blend level for biodiesel reaches 95 percent of the significance threshold.

In general, the ADF regulation will provide a clear pathway for emerging ADFs and drive the development of clean, low carbon fuels to improve California's energy security and energy independence.

Who is affected by this regulation?

The regulation applies primarily to producers and importers of an alternative diesel fuel. A proponent of a new ADF would typically be an entity seeking to produce or import the ADF into California, and that entity would typically be the one that applies for entry into the various stages set forth in the regulation. To the extent needed, the applicant producer or importer generally would be responsible for applying any mitigation measures that are triggered when the effective ADF blend level is approached. Retail

marketers and distributors of alternative diesel fuels are generally not affected by the mitigation measures unless they are also conducting fuel blending. Retailers may be required to do some of the required recordkeeping and monitoring, but these generally would apply to the higher blends of an ADF (e.g., for marketers of B10 or higher blends).

What are the costs of this regulation?

Staff expects the costs directly attributable to this regulation to be minimal. Regulatory costs are primarily some increases in reporting and testing of ADFs. Many of the requirements of this regulation already exist under other State law, and as such cannot be considered an additional cost of this regulation. For example, much of the reporting associated with this regulation is required to comply with the LCFS regulation or other State or federal programs. The requirement for a multimedia evaluation of new ADFs is already required by ARB pursuant to Health and Safety Code (H&SC) section 43830.8, and development of consensus standards is already required by existing regulations implemented by the California Department of Food and Agriculture. The difference between existing law and this regulation is primarily the enhanced monitoring required, and a more streamlined route to the commercial market. Staff also estimated potential costs of mitigation. However, staff's analysis shows that mitigation being needed is highly unlikely and therefore these costs are not assumed to occur.

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CHAPTER 1. INTRODUCTION

A. Air Quality

Due to its unique geography, California has unique air pollution challenges. Ambient air quality standards designed to protect public health have been established for several pollutants in the State. Although California has made substantial progress, in many parts of the State, air pollution exceeds these ambient air quality standards for some pollutants. To attain the ambient air quality standards, the California Air Resources Board (ARB or Board) has designed a multi-faceted strategy, including emission reductions from mobile sources. The ARB uses its legal authority to regulate emissions from motor vehicle fuels in the State when appropriate to reduce air pollution. To date, ARB has developed fuel quality standards for gasoline, diesel and several alternative fuels.

Because of anticipated new motor vehicle fuels in California, ARB staff recognizes the need for a new regulation to preclude future commercial substitute diesel fuels from increasing air pollution.

B. Alternative Motor Vehicle Fuels

There is a trend in California toward increasing consumption of alternative motor vehicle fuels in place of conventional petroleum-based gasoline and diesel fuels. This trend is primarily due to economic incentives and policies at the State and national level that incent the use of lower polluting, less toxic, and lower carbon intensity fuels in the commercial market. A more detailed discussion of these new fuels is presented in Chapters 2 through 4. As a result of this diversification, some diesel fuel substitutes have started to enter commerce in California without clear regulatory requirements to ensure there are no detrimental impacts to air pollution as a result of their use. In response to this, ARB staff is proposing a new Alternative Diesel Fuel (ADF) regulation that will put the proper regulatory structure into place that will ensure no detrimental impacts to air quality as California moves toward increased alternative motor vehicle fuels consumption.

C. Alternative Diesel Fuels Overview

In general, alternative diesel fuels are a category of motor vehicle fuels that are not conventional diesel and do not solely consist of hydrocarbons. While there are a few alternative diesel fuels in existence today, biodiesel is by far the most notable. While renewable diesel is also an innovative diesel fuel replacement, it consists solely of hydrocarbons and is virtually indistinguishable from conventional diesel; therefore, renewable diesel is not considered an alternative diesel fuel under this proposed regulation.

1. Biodiesel:

Biodiesel has already been in use in California for several decades. There are misperceptions about biodiesel and some relate biodiesel to grease from fast food restaurants that is directly used in a diesel engine. Grease is referred to as straight vegetable oil (SVO), which has a long history of use in diesel engines. Peanut oil, a type of SVO, was the fuel that powered Rudolph Diesel's original compression ignition engine at the 1911 World Fair.

Other feed stocks such as animal tallow and waste vegetable oil contain high concentrations of triglycerides, which is the main component of fats and oils. These feed stocks can also be processed into biodiesel and depending upon the specific feed stock, there may be a range of emissions effects. For example, soybean oils tend to produce higher emitting biodiesel than animal tallow.

Although SVO can be used in most diesel engines, its use leads to durability issues, such as clogging of fuel injectors and fatty engine deposits. To create a fuel that is more appropriate for the modern diesel engine, SVO must be chemically converted to a form that has improved combustion properties through a process called transesterification. In order to accomplish this conversion, the SVO, or other feed stock, is chemically converted to fatty acid methyl esters (FAME) by reacting the SVO with methanol and a catalyst. The resulting FAME biodiesel is much cleaner burning and less viscous, reducing or eliminating many of the problems caused by SVO.

2. Renewable Diesel

In addition to biodiesel, ARB considered renewable diesel during this rulemaking. Renewable diesel uses essentially the same feed stocks that are used to make biodiesel, but instead of the transesterification reaction, renewable diesel is produced by hydroprocessing, which results in a fuel containing pure hydrocarbons, paraffinic compounds and nearly no aromatics. Renewable diesel has few of the disadvantages normally associated with biodiesel such as poor cold weather performance, biological degradation or oxidation stability. Alternatively, renewable diesel exhibits poor lubricity and generally must be used in a lubricated mixture or have a lubricity additive incorporated in the fuel. Additionally, renewable diesel is generally more homogeneous and does not exhibit the chemical variability of biodiesel made from different production feedstocks.

Biodiesel and renewable diesel are both low carbon fuels that can be produced domestically and in some cases may reduce air pollution. Biodiesel and renewable diesel produced from conventional feed stocks also reduce greenhouse gasses (GHG), with carbon intensities about 25 percent lower than petroleum diesel fuel. Using waste feedstocks, the carbon intensity can be as much as 80 percent lower than petroleum diesel fuel.

In some cases, biodiesel and renewable diesel may decrease emissions of harmful air pollutants. For example, many blends of biodiesel have been shown to decrease the emission rates of particulate matter, hydrocarbons and carbon monoxide. Additionally renewable diesel has been shown to reduce NOx, particulate matter, hydrocarbons and carbon monoxide.

D. Development Process for the Proposed Regulation

Staff evaluation of ADFs and biodiesel began in earnest in the early 2000s. During the informal rulemaking process, ARB staff conducted numerous meetings of the Multimedia Working Group (MMWG), multiple public workshops, and numerous meetings with individual stakeholders to discuss the proposed regulation. Below is a timeline of the public actions taken leading up to this proposal, each of the meetings below included opportunities for public comment, which were considered when developing the proposed regulation.

Table 1.1: ADF Regulatory Development Timeline

Date	Meeting
2004-2005	Two Biodiesel Work Group Meetings
2006-2007	Five Meetings of the Biodiesel Work Group
2008-2009	Six Meetings of the Biodiesel Work Group
2010	Two Rulemaking Development Workshops for Biodiesel Regulation
December 8, 2010	Multimedia Evaluation Meeting
October 4, 2011	Released Biodiesel Guidance Document
February 15, 2013	ADF Concept Paper
April 23, 2013	First ADF Rulemaking Workshop
June 13, 2013	Second ADF Rulemaking Workshop
September 5, 2013	Third ADF Rulemaking Workshop

For each of the rulemaking meetings above, over 7,000 individuals or companies were notified and invited to participate. Each of these meetings was well attended, and included a variety of stakeholders including refiners, oil marketers, alternative fuel producers, non-governmental organizations, academia, and other State agencies. Notices for the workshops, and associated materials, were posted to ARB's biodiesel and renewable diesel webpage at: <http://www.arb.ca.gov/fuels/diesel/altdiesel/biodiesel.htm>, and emailed to subscribers of our "altdiesel" listserve. Rulemaking workshops were made available to remote attendees by either webcast or webinar in all cases.

In addition to the public meetings, staff had many meetings with stakeholders, attended several trade meetings, and exchanged technical information on a regular basis with staff from other State agencies, academia, industry groups, and non-governmental organizations. As a result of this extensive communication with the affected entities, the proposal contained herein is based upon feedback from nearly every corner of the

regulated industry as well as other impacted organizations and individuals that are affected by actions concerning or regulate the fuels industry.

E. Organization of this Report

This report is organized into twelve chapters with three appendices. We start with four chapters of background and introduction followed by chapters for description of the proposed regulation, the technology assessment, environmental assessment, multimedia assessment, environmental justice, economic impacts analysis of this proposed regulation and concluding with a summary and rationale for the regulation as well as a references chapter.

CHAPTER 2. CALIFORNIA MANDATES ON AIR QUALITY

A. Ambient Air Quality Standards

Ambient air quality standards (AAQS) define clean air, and are established to protect even the most sensitive individuals in our communities. An air quality standard defines the maximum amount of a pollutant that can be present in outdoor air without harm to the public's health. Both the ARB and the U.S. Environmental Protection Agency (U.S. EPA) are authorized to set ambient air quality standards.

Air pollution harms the health of California residents, damages agricultural crops, forests and other plants, and creates the haze that reduces visibility. A large body of scientific evidence associates air pollution exposure with a variety of harmful health effects. To address air pollution, both the California ARB and the U.S. EPA have adopted ambient (outdoor) air quality standards. These legal limits on outdoor air pollution are designed to protect the health and welfare of Californians.

B. Greenhouse Gases and Climate Change

California's major initiatives for reducing climate change, or GHG emissions, are outlined in the California Global Warming Solutions Act of 2006 (AB 32), codified in H&SC section 38500 through 38599, and Executive Orders S-3-05 and B-16-2012. These efforts aim at reducing GHG emissions to 1990 levels by 2020 - a reduction of approximately 30 percent, and then an 80 percent reduction below 1990 levels by 2050.

AB 32 directed the Board to begin developing discrete early actions to reduce GHG emissions in California to 1990 levels by 2020. Among other provisions, AB 32 required the Board to identify and adopt discrete early actions in 2007 and to approve a Scoping Plan in 2008. Some specific requirements include the following responsibilities of ARB:

- Prepare and approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in GHG emissions from sources or categories of sources of GHG by 2020 (H&SC §38561); and
- Identify the statewide level of GHG emissions in 1990 to serve as the emissions limit to be achieved by 2020 (H&SC §38550); and
- Adopt a regulation requiring the mandatory reporting of GHG emissions (H&SC §38530); and
- Identify and adopt regulations for discrete early actions that could be enforceable on or before January 1, 2010 (H&SC §38560.5). LCFS is one of the discrete early actions identified and adopted by ARB

1. Scoping Plan

In 2006, AB 32 required the ARB to develop a Scoping Plan that describes the approach California will take to reduce GHGs to achieve the goal of reducing emissions to 1990 levels by 2020. The Scoping Plan was approved by the Board and must be

updated at least every five years to evaluate the mix of AB 32 policies to ensure that California is on track to achieve the 2020 GHG reduction goal. The initial scoping plan relied upon implementation of the LCFS to achieve the 2020 goal.

In early 2013, ARB initiated activities to update the AB 32 Scoping Plan. A series of workshops were held in summer 2013. In December 2013, ARB expects to bring an updated Scoping Plan document to the Board for consideration.

The AB 32 Scoping Plan update will define ARB's climate change priorities for the next five years and lay the groundwork to reach post-2020 goals set forth in Executive Orders S-3-05 and B-16-2012. The update will highlight California's progress toward meeting the "near-term" 2020 GHG emission reduction goals defined in the original Scoping Plan (2008). It will also evaluate how to align the State's longer-term GHG reduction strategies with other State policy priorities, such as for water, waste, natural resources, clean energy and transportation, and land use.

CHAPTER 3. CALIFORNIA POLICIES AFFECTING MOTOR VEHICLE DIESEL FUEL

This chapter provides a summary of various State policies that affect motor vehicle diesel fuel and specifically the development of the ADF regulation. These policies broadly include statutes, regulations, or initiatives that impact the development of the ADF regulation.

A. California Health and Safety Code

California Senate and Assembly bills pertinent to motor vehicle diesel fuels are codified in the California Health and Safety Code (H&SC). These statutes are then administered as rules and regulations in the California Code of Regulations (CCR). The relevant statutes and regulations are provided below but are primarily contained in *H&SC Division 26, Parts 1, 2, and 5; and CCR Division 3, Titles 13 and 17.*

1. Development of Diesel Fuel Regulations

H&SC Sections 39600, 39601, 43013, 43018, 43101, and 43833 authorize the Board to adopt motor vehicle diesel fuel regulations. Section 43013 is the primary source of ARB's legal authority to adopt and implement motor vehicle fuel specifications, motor vehicle emission standards, and in-use performance standards for the control of air contaminants and sources of air pollution which the Board has found to be necessary, cost effective, and technologically feasible.

Section 43018 expands ARB's authority to adopt whatever control measures pertaining to fuels that are technologically feasible, cost-effective, and necessary to attain the state AAQS by the earliest practicable date.

2. Fuels Multimedia Evaluation

H&SC section 43830.8 requires the state Board to conduct a multimedia evaluation before adopting any regulation that establishes motor vehicle fuel specifications. Section 43830.8(b) defines "multimedia evaluation" as "the identification and evaluation of any significant adverse impact on public health or the environment, including air, water, or soil, that may result from the production, use, or disposal of the motor vehicle fuel that may be used to meet the state board's motor vehicle fuel specification."

Section 43830.8 also requires the California Environmental Policy Council (CEPC or Council) to review the multimedia evaluation and determine if any significant adverse impact on public health or the environment may result from a proposed regulation. If the Council determines that the proposed regulation will cause a significant adverse impact on public health or the environment, or that alternatives exist that would be less adverse, the Council shall recommend alternative or mitigating measures to reduce the adverse impact on public health and the environment.

B. Low Carbon Fuel Standard

In January 2007, Executive Order S-01-07 called for a low carbon fuel standard for transportation fuels to be established for California. The Executive Order specifies a reduction of at least 10 percent in the average carbon intensity of California's transportation fuels by 2020.

The Executive Order instructs the California Environmental Protection Agency to coordinate activities between the University of California (UC), the California Energy Commission (CEC), and other state agencies to develop and propose a draft compliance schedule to meet the 2020 target. Furthermore, it directed ARB to consider initiating regulatory proceedings to establish and implement the LCFS. The ARB identified the LCFS as an early action measure and approved it on April 23, 2009. The LCFS regulation will reduce GHG emissions in California by reducing the carbon intensity of transportation fuels used in the State by an average of 10 percent by the year 2020.

California's LCFS will reduce GHG emissions from the transportation sector in California by about 16 million metric tons (MMT) in 2020. These reductions account for almost 20 percent of the total GHG emission reductions needed to achieve the State's mandate of reducing GHG emissions to 1990 levels by 2020. In addition, the LCFS is designed to reduce California's dependence on petroleum, create a lasting market for clean transportation technology, and stimulate the production and use of alternative, low-carbon fuels in California.

The LCFS is designed to provide a framework that uses market mechanisms, based carbon intensity – a full lifecycle accounting of a fuels carbon emissions relative to its energy potential, to spur the steady introduction of lower carbon fuels. The framework establishes performance standards that fuel producers and importers must meet each year beginning in 2011. Since the regulation went into effect, regulated parties have operated under the LCFS program with no significant compliance issues.

In general, the LCFS is working as designed and intended. Fuel producers are innovating and achieving material reductions in their fuel pathways' carbon intensities, an effect the LCFS regulation is expressly designed to encourage.

C. California Diesel Fuel Programs

Diesel and biodiesel are regulated by multiple state agencies in California. This section gives an overview of major state regulations affecting ADF use in California.

1. ARB Regulations

As the state air pollution agency, ARB is authorized to adopt standards, rules, and regulations to achieve the maximum degree of emission reduction possible from vehicular and other mobile sources in order to accomplish the attainment of the State

ambient air quality standards at the earliest practicable date. ARB regulations can be found under California Code of Regulations (CCR) *Division 3, Titles 13 and 17*.

a. California Reformulated Diesel Fuel

In November 1988, the Board approved regulations limiting the allowable sulfur content of motor vehicle diesel fuel to 500 parts per million by weight (ppmw) statewide and the aromatic hydrocarbon content to 10 percent by volume with a 20 percent limit for small refiners. These diesel fuel regulations, which became effective in 1993, are a necessary part of the State's strategy to reduce air pollution through the use of clean fuels, lower-emitting motor vehicles, and off-road equipment. The regulation limiting the aromatic hydrocarbon content of diesel fuel includes provisions that enable diesel fuel producers and importers to comply through alternative diesel formulations that may cost less. The alternative specifications must result in the same emission benefits as the 10 percent aromatic standard (or in the case of small refiners, the 20 percent standard).

On July 24, 2003, the Board approved amendments to the California diesel fuel regulations. The amendments reduced the sulfur content limit from 500 ppmw to 15 ppmw for diesel fuel sold for use in California in on-road and off-road motor vehicles starting in mid-2006. The lower sulfur limit aligned the California requirement with the on-road diesel sulfur limit adopted by the U.S. EPA, but expanded the limit to include off-road motor vehicle diesel fuel. The new sulfur standard enabled the use of the emissions control technology required to ensure compliance with the new emissions standards adopted by the U.S. EPA for 2007 and subsequent model-year heavy-duty engines and vehicles.

In 2005, the Board also adopted a measure that applied the diesel fuel standards to harborcraft and intrastate locomotives.

b. Alternative Fuels

"Alternative fuel" generally means any motor vehicle transportation fuel that is not gasoline or diesel fuel. This includes, but is not limited to, those fuels that are commonly or commercially known or sold as one of the following: M-100 fuel methanol, M-85 fuel methanol, E-100 fuel ethanol, E-85 fuel ethanol, biodiesel, compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG), or hydrogen.

The quality of alternative motor vehicle fuels is subject to ARB-approved composition specifications under Title 13, California Code of Regulations, Sections 2291.1 through 2292.6, as follows:

- M-100 fuel methanol (13 CCR §2292.1),
- M-85 fuel methanol (13 CCR §2292.2),
- E-100 fuel ethanol (13 CCR §2292.3),
- E-85 fuel ethanol (13 CCR §2292.4),

- compressed natural gas (13 CCR §2292.5), and
- liquefied petroleum gas (13 CCR §2292.6).

Biodiesel is considered to be an alternative diesel fuel, but there are currently no ARB standards for biodiesel fuel.

2. SWRCB Regulations

The California State Water Resources Control Board (SWRCB) regulates the storage of diesel and biodiesel in Underground Storage Tanks (UST). These tanks must undergo compatibility testing by an independent certification lab, such as Underwriters Laboratory, for any new fuel that may be stored in them. B5 has undergone such a certification. Fuels above B6 have not undergone independent certification and there is no current activity to obtain certification.

3. CDFA-DMS Regulations

The Division of Measurement Standards (DMS) of the California Department of Food and Agriculture (CDFA) regulates diesel and biodiesel for compliance with California specifications and measurement. DMS is statutorily obligated to adopt specifications for new fuels when an independent specification organization, such as ASTM, sets specifications for that fuel.

In 2008, ASTM international adopted three biodiesel specifications. First, ASTM updated its specifications for B-100 blendstock, D6751-08, "Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels." Second, ASTM approved revisions to D975-08, "Standard Specification for Diesel Fuel Oils," which would subject biodiesel blends from B-1 to B-5 to the same specification as regulation diesel fuel. Finally, ASTM adopted new fuel specifications for B-6 to B-20 in D7467-08, "Standard Specification for Diesel Fuel Oil Biodiesel Blend (B6 to B20)."

DMS has adopted *ASTM D6751-08 Standard Specification for Biodiesel fuel Blend Stock (B100) for use in Middle Distillate Fuels*. DMS has not yet adopted *ASTM D7467-08 Standard Specification for Diesel Fuel Oil, Biodiesel Blend (B6 – B20)*.

4. OSFM Regulations

The Office of the State Fire Marshal regulates diesel and biodiesel storage, dispensing, and vapor recovery. All diesel and biodiesel facilities must follow California building and fire code and adhere to the specific provisions regarding diesel and biodiesel.

5. Air Quality Improvement Program (AB 118)

The Air Quality Improvement Program (AQIP), administered by ARB, is a voluntary incentive program created under the *California Alternative and Renewable Fuel, Vehicle Technology, Clean Air, and Carbon Reduction Act of 2007* (Assembly Bill (AB) 118;

Núñez, Chapter 750, Statutes of 2007). Through AQIP, ARB invests in clean vehicle and equipment projects that reduce criteria pollutant and air toxic emissions, often with concurrent climate change benefits. AQIP provides funding for projects not covered by other ARB incentive programs and have supported the initial deployment of hybrid and zero-emission trucks, zero-emission and plug-in hybrid passenger cars, and demonstrated other advanced technologies critical to meeting California's long-term air quality and climate change goals. The AQIP Guidelines and annual funding plans guide ARB's implementation of AQIP. There is a companion program administered by the California Energy Commission (CEC) pursuant to its authority under AB 118. The CEC's program is governed by its AB 118 Investment Plan, through which the CEC has provided nearly \$26 million to date in funding for production and infrastructure projects involving diesel substitutes, including biodiesel and renewable diesel.¹

¹ California Energy Commission, 2013-2014 Investment Plan Update for the Alternative and Renewable Fuel and Vehicle Technology Program, Table ES-1, p. 5, May 2013

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CHAPTER 4. FEDERAL POLICIES AFFECTING MOTOR VEHICLE DIESEL FUEL

This chapter summarizes various Federal policies that affect motor vehicle diesel fuel and may specifically impact the ADF regulation. The policies covered in this chapter include pertinent federal fuel regulations, standards, and requirements.

A. Federal Fuel Registration

U.S. EPA regulations establish fuel registration and formulation requirements. U.S. EPA requires that all diesel fuels and fuel additives for on-road motor vehicle use be registered in accordance with 40 CFR Part 79. To become registered, a new fuel must apply for registration and meet “substantially similar” requirements. The “substantially similar” requirement means that the fuel must be of mostly the same composition as the fuel it is displacing, in this case diesel. Any biodiesel used in California must also be registered as a fuel with U.S. EPA.

The registration requirements for diesel fuels apply to fuels composed of more than 50 percent diesel fuel by volume, and their associated fuel additives. Manufacturers may enroll a fuel or fuel additive in a group of similar fuels and fuel additives through submission of jointly-sponsored testing and analysis, conducted on a product which is representative of all products in that group.

B. Federal Regulations Affecting Diesel Fuel Quality

U.S. EPA motor vehicle diesel fuel standards, contained in 40 CFR Part 80 Subpart I, requires on-road motor vehicles diesel fuel to have a sulfur content of no greater than 15 ppm. In addition, the regulation requires a cetane index of at least 40 or an aromatic hydrocarbon content of no greater than 35 volume percent. All on-road motor vehicle diesel fuel sold or supplied in the United States, except in Alaska, must comply with these requirements.

The diesel fuel sulfur regulations require refiners, importers, distributors, and retailers who produce, import, sell, store, or transport diesel fuel to meet the standards specified in the diesel regulations. Sulfur standards were phased in from 2006 to 2010, and were designed to ensure widespread availability of highway diesel fuel containing 15 ppm sulfur or less.

C. Federal Renewable Fuels Standard

Congress adopted the RFS in 2005 and strengthened it (RFS2) in December 2007 as part of the Energy Independence and Security Act of 2007 (EISA). The RFS2 contains, among other provisions, requirements for increasing volumes of biofuels every year, up to a required volume of 36 billion gallons by 2022. Of the 36 billion gallons, 16 billion gallons must be advanced biofuels from cellulosic sources. Successful implementation

of the RFS2 will result in significant quantities of low carbon intensity biofuels that could be used toward compliance with California's LCFS. In addition, successful implementation would also signal that the necessary technological breakthroughs to produce second and third generation biofuels have occurred.

1. Renewable Fuel Volume Requirements

The RFS2 requires fuel producers to use a progressively increasing amount of biofuel, culminating in at least 36 billion gallons of biofuel by 2022. The U.S. EPA must establish regulations to ensure that the transportation fuel sold in, or imported into, the United States contains at least the applicable quantity of renewable fuels. Responsible parties under the U.S. EPA regulations relating to biofuels include refiners, blenders, and importers of gasoline. The total volume of renewable fuel required in the U.S. in 2009 is 9.0 billion gallons. RFS2 differentiates between "conventional biofuel" (corn-based ethanol) and "advanced biofuel." Advanced biofuel is renewable fuel, other than corn-based ethanol, with lifecycle greenhouse gas emissions that are at least 50 percent less than greenhouse gas emissions produced by gasoline or diesel. Starting in 2009, a progressively increasing portion of renewable fuels must be advanced biofuels, such as cellulosic ethanol.

2. Renewable Fuels GHG Requirements

The RFS2 requires GHG reductions for the various categories of renewable fuels, but only in discrete "bins" (e.g., both advanced biofuel and biomass-based diesel must achieve a life-cycle GHG emission-reduction threshold of 50 percent). This federal program does not use a carbon intensity standard like the LCFS. As noted, there are specific requirements for the different classifications of renewable fuels. In general, these specifications are set relative to the baseline lifecycle GHG emissions for gasoline and diesel fuel sold or distributed in 2005. The lifecycle GHG emissions are specifically defined as:

"The term 'lifecycle greenhouse gas emissions' means the aggregate quantity of greenhouse gas emissions (including direct emissions and significant indirect emissions such as significant emissions from land use changes), as determined by the Administrator, related to the full fuel lifecycle, including all stages of fuel and feedstock production and distribution, from feedstock generation or extraction through the distribution and delivery and use of the finished fuel to the ultimate consumer, where the mass values for all greenhouse gases are adjusted to account for their relative global warming potential."²

² *Energy Independence and Security Act of 2007*, Title II-Energy Security Through Increased Production of Biofuels; Subtitle A Section 201 (H)

There are four general classifications of renewable fuels defined in RFS2: renewable fuels, advanced biofuels, cellulosic biofuels, and biomass-based diesel.

3. Renewable Biomass Definition

The RFS2 defines renewable fuel as fuel that is produced from renewable biomass. Renewable biomass is then defined as each of the following:

- planted crops and crop residue harvested from agricultural land cleared or cultivated and is either actively managed or fallow, and nonforested, or
- planted trees and tree residue from actively managed tree plantations on nonfederal land cleared, including land belonging to an Indian tribe or an Indian individual, that is held in trust by the United States or subject to a restriction against alienation imposed by the United States, or
- animal waste material and animal byproducts, or
- slash and pre-commercial thinning from non-federal forestlands, but not forests or forestlands that are ecological communities with a global or State ranking of critically imperiled, imperiled, or rare pursuant to a State Natural Heritage Program, old growth forest, or late successional forest, or
- biomass obtained from the immediate vicinity of buildings, camps, or public infrastructure facilities (including roads), at risk from wildfire, or
- algae, or
- separated yard waste or food waste, including recycled cooking and trap grease; and street tree and urban park trimmings.

One aspect of the definition of renewable biomass is that there are significant federal incentive funds for producing advanced biofuels. To qualify for these incentives, the renewable fuels must be produced from renewable biomass. Additional discussion of the relationship between the federal definition of renewable biomass and the LCFS is presented in Chapter 6.

4. U.S. EPA Rulemakings Implementing the RFS2

U.S. EPA is responsible for implementing the volume requirements in the RFS2. Section 211(o) of the Clean Air Act (CAA or the Act), as amended, requires the U.S. EPA Administrator to annually determine a renewable fuel standard which is applicable to refiners, importers and certain blenders of gasoline, and publish the standard in the Federal Register. Based on this standard, each obligated party determines the volume of renewable fuel that it must ensure is consumed as motor vehicle fuel. This standard is calculated as a percentage, by dividing the amount of renewable fuel that the Act requires to be blended into gasoline for a given year by the amount of gasoline expected to be used during that year, including certain adjustments specified by the Act.

U.S. EPA published a renewable fuel standard of 10.21 percent for 2009, which was intended to lead to the use of 11.1 billion gallons of renewable fuel in 2009. Note that

the 11.1 billion gallons of renewable fuel required in 2009 is projected to include approximately 0.5 billion gallons of biodiesel and renewable diesel.

In August 2013, U.S. EPA finalized the 2013 renewable fuel standards which established the 2013 annual percentage standards for cellulosic biofuel, biomass-based diesel, advanced biofuel, and total renewable fuel. To calculate the percentage standard for cellulosic biofuel for 2013, U.S. EPA used a volume of 6 million ethanol-equivalent gallons. The U.S. EPA also used the applicable volumes that are specified in the statute to set the percentage standards for advanced biofuel and total renewable fuel for 2013.³ The volumes are shown in Table 4.1 below.

Table 4.1: Volumes Used to Determine the Final 2013 Percentage Standards

Cellulosic Biofuel	6 mill gal
Biomass-based Diesel	1.28 bill gal
Advanced Biofuel	2.75 bill gal
Renewable Fuel	16.55 bill gal

The percentage standards required under the RFS program represent the ratio of renewable fuel volume to non-renewable gasoline and diesel volume. Thus, in 2013 about 10 percent of all fuel used will be from renewable sources. The standards for 2013 are shown in Table 4.2 below.

Table 4.2: Final Percentage Standards for 2013

Cellulosic Biofuel	0.004%
Biomass-based Diesel	1.13%
Advanced Biofuel	1.62%
Renewable Fuel	9.74%

D. Federal Trade Commission Labeling Requirements

The EISA of 2007 required Federal Trade Commission (FTC) to adopt regulations pertaining to the labeling of biodiesel and biomass-based diesel at retail dispensing outlets. This regulation was enacted under Title 16, Code of Federal Regulations, Part 306.12. The regulation requires labeling of biodiesel and biomass-based diesel if the blend level is above 5 percent.

³ U.S. Environmental Protection Agency, Office of Transportation and Quality. *EPA Finalizes 2013 Renewable Fuel Standards*, EPA-420-F-13-042. August 2013

CHAPTER 5. DESCRIPTION OF PROPOSED REGULATION

A. Overview of Proposed Regulation

The primary purpose of the proposed regulation is to control emissions from emerging ADFs in California. Additionally the proposed regulation will create a framework that allows for innovation and diversity in the California fuel pool, by setting up a staged process by which the introduction of ADFs is managed responsibly.

B. Applicability

The proposed regulation will apply to all producers, importers, and distributors of ADFs in the State of California. Fuel that meets a specification under the alternative fuels regulation 13 CCR 2292 are not considered ADFs and are thus not subject to this regulation. It is our intention that this regulation be in effect at all points of sale, offer, or supply in the California fuel distribution infrastructure.

C. Definitions

For the purposes of sections 2293 through 2293.9, the definitions in H&SC sections 39010 through 39060 shall apply, except as otherwise specified in this subarticle 1:

Section (a) covers the definitions in the regulation.

1. "Alternative diesel fuel" or "ADF" means any non-CARB diesel fuel used in a compression ignition engine that does not consist solely of hydrocarbons, and is not subject to a specification under title 13, CCR, section 2292. All ADFs that are substantially similar to an ADF subject to an approved Executive Order or MOU shall be deemed to fall within the class of ADFs subject to that same approved Executive Order or MOU.
2. "Biodiesel" means a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the specifications set forth by the ASTM International in the latest version of *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels* D6751 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5, as defined in 4 CCR 4140(a).
3. "Biodiesel Blend" means biodiesel blended with petroleum-based diesel fuel.
4. "Blend Level" means the ratio of an ADF to the CARB diesel it is blended with, expressed as a percent by volume. The blend level may also be expressed as "AXX," where "A" represents the particular ADF and "XX" represents the percent by volume that ADF is present in the blend with CARB diesel (e.g., a 50% by volume biodiesel/CARB diesel blend is denoted as "B50").

5. “Blendstock” means a component that is either used alone or is blended with another component(s) to produce a finished fuel used in a motor vehicle. A blendstock that is used directly as a transportation fuel in a vehicle is considered a finished fuel.
6. “B5” means a biodiesel blend containing no more than five percent biodiesel by volume.
7. “B20” means a biodiesel blend containing more than five and up to 20 percent biodiesel by volume.
8. “CARB Diesel fuel” means a light or middle distillate fuel which may be comingled with up to five (5) volume percent biodiesel, and meeting the definition and requirements for “diesel fuel” or “California nonvehicular diesel fuel” as specified in 13 CCR 2281 et seq. “CARB Diesel fuel” may include, renewable diesel; gas-to-liquid fuels; Fischer-Tropsch fuels; CARB diesel blended with additives specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel; and CARB diesel specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel.
9. “Criteria Pollutant” means any air pollutant for which a California ambient air quality standard (CAAQS) or a national ambient air quality standard (NAAQS) has been established. A list of air pollutants for which a CAAQS or NAAQS has been established can be found at <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>, which is incorporated herein by reference.
10. “Diesel Substitute” means any liquid fuel that is intended for use with CARB diesel or CARB diesel blends in a compression ignition engine. “Diesel substitute” includes, but is not limited to, renewable diesel; gas-to-liquid fuels; Fischer-Tropsch fuels; CARB diesel blended with additives specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel; and CARB diesel specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel.
11. “Effective ADF Blend Level” means the actual, statewide-average ADF blend level, adjusted to account for various air pollution mitigating considerations, which may include but are not limited to, the use of various diesel substitutes that reduce air emissions of the pollutant for which the significance threshold was identified (e.g., renewable diesel, which reduces NO_x emissions); the fleet penetration of new technology diesel engines; composition of the feedstocks used to produce the ADF; volumes of lower-emission CARB diesel fuel, including those with emissions-reducing additives; and other factors as deemed appropriate by the Executive Officer. The effective ADF blend level is compared to the significance threshold to determine when to apply mitigation strategies for those ADFs for which the Executive Officer has identified a significance threshold.

12. “Executive Officer” means the Executive Officer of the Air Resources Board, or his or her designee.
13. “Executive Order” means the document signed by the Executive Officer, or his or her designee, which specifies the stage at which a regulated party(ies) for an ADF is or will be operating under, as provided in this subarticle, and any enforceable terms, conditions, and requirements applicable to the regulated party(ies) must meet in order to sell, offer for sale, or supply that ADF for use in California.
14. “Finished Fuel” means a fuel that is used directly in a vehicle for transportation purposes without requiring additional chemical or physical processing.
15. “Hydrocarbon” means any chemical or mixture that is composed solely of hydrogen and carbon.
16. “Importer” has the same meaning as defined in the Low Carbon Fuel Standard (17 CCR 95481(a)).
17. “LCFS” means the Low Carbon Fuel Standard (17 CCR 95480—95490).
18. “Memorandum of Understanding (MOU)” means an enforceable agreement, executed between the Executive Officer and an applicant(s), which meets the requirements of this subarticle and specifies the terms and conditions by which the ADF at issue will be sold and used in California. MOUs issued under this subarticle are not subject to the Board’s reservation of powers pursuant to Board Resolution 78-10⁴ (February 23, 1978) or Resolution 05-40⁵ (July 21, 2005).
19. “Multimedia Evaluation” has the same meaning as defined in H&SC section 43830.8(b).
20. “Multimedia Evaluation Guidance Document” means the procedure governing the Executive Officer’s multimedia evaluation conducted prior to establishing a motor vehicle fuel specification. The multimedia evaluation guidance document (“Guidance Document and Recommendations on the Types of Scientific Information Submitted by Applicants for California Fuels Environmental Multimedia Evaluations”) is available at www.arb.ca.gov/fuels/multimedia/guidancedoc.pdf, which is incorporated herein by reference.
21. “New Technology Diesel Engine (NTDE)” means a diesel engine that meets at least one of the following criteria:

⁴ California Air Resources Board, *Board Resolution 78-10, 1978*

⁵ California Air Resources Board, *Board Resolution 05-10, 2005*

- (1) 2010 ARB emission standards for on-road heavy duty diesel engines under 13 CCR 1956.8,
 - (2) Tier 4 emission standards for non-road compression ignition engines under 13 CCR 2421, 2423, 2424, 2425, 2425.1, 2426, and 2427, or
 - (3) equipped with or employs a Diesel Emissions Control Strategy (DECS), verified by ARB pursuant to 13 CCR 2700 et seq., which uses selective catalytic reduction to control NOx.
22. “Non-ester renewable diesel” means a diesel fuel that is produced from nonpetroleum renewable resources but is not a mono-alkyl ester and which is registered as a motor vehicle fuel or fuel additive under 40 CFR Part 79, as amended by Pub. L. 91-604.
23. “Non-ester renewable diesel blend” means non-ester renewable diesel blended with petroleum-based diesel fuel.
24. “Non-petroleum renewable resources” means non-fossil fuel resources including but not limited to biomass, waste materials, and renewable crude.
25. “Performance Criteria” means a list of indicators, including but not limited to the total volume and volume percent represented by an ADF’s sales in California, that are specified by the Executive Officer for use in determining whether the significance level for a pollutant has been reached or will be reached.
26. “Person” has the same meaning as defined in Health and Safety Code section 39047 and includes, but is not limited to, alternative diesel fuel producers, importers, marketers and blenders. “Person” includes the plural when two or more persons are subject to an Executive Order or MOU executed or an interim or final fuel specification issued pursuant to the requirements of this subarticle.
27. “Producer” has the same meaning as defined in the Low Carbon Fuel Standard (17 CCR 94581(a)).
28. “Reference CARB Diesel” has the same meaning as “reference fuel” as that term is defined in 13 CCR 2282(g)(3).
29. “Significance Level” means, for a given air pollutant X, either of the following, whichever applies:
 - (1) For an ADF blended with CARB diesel, the significance level means the blend level of the ADF below which the combined effects of:
 - i. the use of the ADF in new technology diesel engines, and
 - ii. the use of diesel substitutes that reduce emissions of Xresult in no increase in the emissions of X.

- (2) For an ADF used as a neat fuel, the significance level means any use of the ADF below which there is no increase in the emissions of X.
30. “Toxic Air Contaminant” means any substance identified or designated by the Air Resources Board as a toxic air contaminant pursuant to Health and Safety Code sections 39655 or 39657, or is designated as a hazardous air pollutant under section 112 of the federal Clean Air Act (42 U.S.C 7412).
31. “Trade Secret” has the same meaning as defined in Government Code section 6254.7.

Section (b) is a glossary of acronyms used in the regulation.

D. Applicable Requirements for Alternative Diesel Fuels

As ADFs are introduced into California, it is the goal of this regulation to ensure that there are no detrimental impacts of those fuels to the environment. This regulation relies on a 3-stage introduction of ADFs to commerce, through which the environmental impacts will be determined in a way that minimizes potential risk to Californians.

1. Stage 1 (Pilot Program)

The first stage of this regulation is referred to as a pilot program. Any new ADF proponent may apply for a pilot program in order to begin testing of their fuel in California. The pilot program will limit the amount of a new ADF not to exceed the energy equivalent of one million gallons of diesel fuel used in well-defined fleets, and will last for one year, with three opportunities to renew for six months each. The application for a pilot program includes public disclosure of a multitude of properties of the fuel that may affect its impact to the environment. The EO will use this information to conduct a preliminary review of the fuel to determine whether it is appropriate for use and if risks due to the use of the fuel in a pilot program are outweighed by the potential benefits of the fuel.

If the EO finds that the pilot program is appropriate he or she will then enter into a Memorandum of Understanding (MOU) with the applicant. The MOU will contain terms and conditions of additional testing that the EO finds to be necessary based on the properties of the fuel. Completion of the terms of the MOU will be required prior to advancing to Stage 2. Applicants under a Stage 1 MOU will also be required to submit quarterly reports on how much fuel is being used.

2. Stage 2 (Fuel Specification Development)

Once an ADF proponent completes the terms of a Stage 1 MOU, they may apply for an updated MOU to move to Stage 2. The MOU that establishes Stage 2 for that fuel proponent will include a limit on the amount of that fuel that may be sold in the state, to

be determined by the EO but not to exceed the energy equivalent of 30 million gallons of diesel.

During Stage 2, an ADF would be required to: (1) complete a multimedia evaluation, (2) achieve adoption of consensus standards, (3) obtain approval for use from 75 percent of engine manufacturers who produce engines in which the ADF is expected to be used, and (4) identify appropriate specifications for the fuel.

During Stage 2, the EO would complete analysis of the emissions data assembled during a multimedia evaluation to determine whether the fuel or fuel blends have a significance level which would contribute additional air pollution to California. If the EO determines that there is no significance level, the ADF would then be eligible to advance to Stage 3B. If, however, the EO determines a significance level for the ADF or ADF blends, the ADF would be eligible to advance to Stage 3A.

3. Stage 3 (Commercial Sales)

After completing the requirements of Stage 2, an ADF proponent may apply to the EO to move their fuel to Stage 3. If a significance level was found under Stage 2, the EO may advance the fuel to Stage 3A. If the fuel was found to have no adverse emissions impacts the EO may advance the ADF to Stage 3B. In Stage 3B, there are no limits on the fuel volumes a proponent may sale or supply for use in California.

Stage 3A consists of monitoring a fuel to see if its effective blend level has reached its significance level. Its effective blend level is calculated by an equation determined during stage 2 considering both the volume of the fuel used, and any mitigating factors found to be used concurrently. Once the effective blend level of an ADF is found to be 95 percent of the significance level, mitigation measures for that ADF are triggered.

Stage 3B consists of reporting and recordkeeping for an ADF after it has been determined that the ADF or specific blends of the ADF do not have a significance level.

E. Biodiesel as an Alternative Diesel Fuel

Biodiesel will have completed all of the relevant steps that are outlined in Stage 2 of the proposed regulation by the time this regulation is in full effect, and thus will be regulated at Stage 3. There are two distinct blend levels relative to biodiesel that have been identified as important for this analysis. Based on our analysis to date, we have found that diesel blends with less than 10 percent biodiesel by volume (<B10) have no significant increase in any of the pollutants of concern and therefore will be regulated at Stage 3B (Commercial Sales not Subject to Mitigation). However, we have found that biodiesel blends of 10 percent and above (≥B10) have potentially significant increases in NO_x emissions, in the absence of any mitigating factors, and therefore those higher blend levels will be regulated under Stage 3A (Commercial Sales Subject to Mitigation).

As noted elsewhere, there are a number of mitigating factors (e.g., increasing penetration of new technology diesel engines, renewable diesel, animal feedstock-derived biodiesel, etc.) that are already occurring in the market which, in the aggregate, negate the NOx effects in the unlikely event that higher biodiesel blends are used in legacy, heavy-duty diesel vehicles. We project these factors to continue and grow through the early 2020s, by which time the heavy-duty vehicle fleet will comprise nearly all new technology diesel engines that show no potential NOx increases from using biodiesel. Even with these already-occurring mitigating factors, it is nevertheless important that biodiesel is sold in California under the Stage 3A market requirements. This will ensure that the existing air quality protections are maintained in all reasonably foreseeable circumstances.

Under the proposal, ADFs that are regulated under Stage 3A are required to have emissions mitigation measures in place and ready to be triggered if and when the effective blend level for that ADF has nearly reached the significance threshold for a pollutant of concern for that ADF. For example, mitigation measures established in the proposal will automatically become effective for producers, importers, and other suppliers of biodiesel if and when the biodiesel effective blend level reaches a statewide average of 9.5 percent. This criterion is established on a statewide average basis for a number of reasons:

- The statewide average effective blend level is representative of the average effective blend levels at the regional (i.e., air basin) level;
- Because of economic, OEM warranty, and other reasons, biodiesel sales tend to occur at the lowest possible blend, which is currently no more than B5 (nominal) statewide. In 2012, the nominal statewide blend level was far below 10 percent; indeed, it was about 0.5 percent, and this does not even account for the already-occurring mitigating factors noted previously. Further, biodiesel blends above B10 are generally priced higher than conventional CARB diesel. Thus, it is highly unlikely that operators of legacy heavy-duty fleets will purchase high biodiesel blends that are generally more expensive than conventional CARB diesel (i.e., B5 and below) while potentially raising engine warranty issues;
- It would be impractical to determine the individual blend level for each gallon of biodiesel blend being sold across the State. To do so would require the retailers and marketers of biodiesel blends (i.e., the diesel dispensing facilities) to continuously test and determine the biodiesel blend level for each of the approximately 3 billion gallons of on-road diesel fuel sold in California each year;

By the same token, it would also be impractical to determine the individual blend level of fuels that mitigate NOx emissions, renewable diesel, low-NOx diesel, animal-based biodiesel, and NOx-reducing additives for each gallon of diesel fuel sold in California. For these reasons, any blend level other than a statewide average effective-blend level would be impractical and unnecessary, while the effective biodiesel blend level remains far below 9.5 percent, as it currently stands. However, the proposal strikes the proper

balance between imposing costly monitoring while the biodiesel effective blend level remains very low, and not having sufficient monitoring data to identify if and when the effective blend level reaches a level of concern. The proposal achieves this balance by requiring the calculation of the effective blend level on an annual statewide average basis until the effective blend level reaches 7.5 percent. At that point, the biodiesel producers, importers, blenders, and other suppliers are put on notice that the effective blend-level trigger of 9.5 percent is approaching and mitigation measures will be required once the trigger is reached. In addition, at that point the proposal would require each of those parties to begin enhanced monitoring and reporting on a monthly basis of specified information, including:

- The volume of ADF and ADF blend offered, supplied, or sold during each month;
- Fuel property test results for a specified number of representative samples;
- The volume/amount of each mitigation strategy being employed each month and the blend rate of each of those mitigation strategies used in each month.

As part of its ongoing fuels enforcement program, ARB also intends to conduct periodic sampling of diesel fuel sold in the State, including the South Coast, San Joaquin Valley, and other regions. This sampling will include testing and analysis not only of ADF blend levels such as the biodiesel content in the chosen samples, but also an analysis of the mitigating factors contained in the fuel samples and occurring in the fuels market. ARB staff intends to conduct this sampling and testing both before and after the effective blend level of 7.5 percent is reached. Altogether, these enhanced monitoring, reporting, and testing measures will further assure that the already-occurring mitigating factors and any imposed mitigation strategies are, in the aggregate, maintaining the existing air quality protections provided by the CARB diesel fuel regulations.

CHAPTER 6. TECHNOLOGY ASSESSMENT

In this chapter, we discuss the technological feasibility of the proposed regulation. Primarily the discussion will revolve around the ability of ADF producers to comply with the mitigation provisions and the enforcement provisions of the proposed regulation. Since biodiesel is the first commercial ADF, we will spend a majority of the chapter discussing the technological feasibility of the mitigation options as they pertain to biodiesel.

A. Emerging Diesel Fuel Substitutes

1. Biodiesel

Biodiesel is a fuel composed of a mixture of fatty acid alkyl esters, usually FAME, which can be made from almost any plant oil or animal fat. “Bio” refers to the biological source of the fuel in contrast to traditional hydrocarbon diesel fuel. Biodiesel is an ADF that can be blended with hydrocarbon diesel or used unblended as B100. Biodiesel fuel blends are designated as “BX” where “X” is the percent biodiesel by volume in the fuel. Biodiesel is registered as a fuel and fuel additive with the U.S. EPA.⁶ As staff will point out later, biodiesel is considered to be in Stage 3A of this proposed regulation.

2. Hydrocarbon Diesel Fuel Substitutes

Renewable diesel fuel can be produced from the same feedstocks as biodiesel; animal fats and vegetable oils. However, the processing and resultant products are different. The typical renewable diesel production process consists of hydrogenation of the animal fats and vegetable oils, as well as refining similar to petroleum refining. Renewable diesel fuel is chemically indistinguishable from conventional petroleum diesel fuel, and is not considered an ADF.

Renewable diesel has several advantages over biodiesel and conventional diesel. Renewable diesel has a superior emission profile. Usage of renewable diesel results in reduced particulates, NOx, hydrocarbons, and CO emissions compared to conventional diesel. Unlike FAME biodiesel, the production of renewable diesel through the fatty acids to hydrocarbon process does not produce a glycerin co-product. Renewable diesel can be produced using existing hydrotreatment process equipment in a petroleum refinery. There are several commercial renewable diesel ventures such as Amyris’ Biotane, Global Energy Resources’ renewable hydrocarbons, REEP Development’s cellulosic diesel and Sierra Energy’s biomass to liquid fuels.

⁶ California Air Resources Board, *Proposed Regulation to Implement the Low Carbon Fuel Standard, Volume II, Appendix B: Supporting Documentation for the Technology Assessment*, March 5, 2009

Neste has developed a plant to process vegetable and animal fats into renewable diesel by the hydrotreatment process in Singapore with a production capacity of 240 million gallons per year.⁷

Dynamic Fuels, a joint venture of Syntroleum and Tyson Foods, is currently producing renewable diesel and has a production capacity of 75 million gallons per year.⁸

Diamond Green Diesel, a joint venture between Darling and Valero, is currently producing renewable diesel and has a production capacity of 137 million gallons per year.⁹

Emerald Biofuels plans to build a renewable diesel facility using the Honeywell process, with a production capacity of 85 million gallons per year.¹⁰

3. Dimethyl Ether

Among the newer diesel fuel substitutes to enter California is dimethyl ether (DME). DME is a gaseous fuel that is stored as a liquid, and has properties similar to those of liquid petroleum gas, or propane as it is better known. DME is produced from methane by syngas formation and conversion to methanol followed by dehydration. DME has already started the Multimedia Evaluation process and is expected to be in Stage 2 by the time this regulation becomes effective.

B. Biodiesel as an ADF

1. Overview of Current Production Technology

The process used to convert virgin oils or animal fats into biodiesel is called transesterification and involves mixing the oil or fat with alcohol and a catalyst, usually lye. Transesterification can be used to convert either plant oil or animal fats to biodiesel.

Raw vegetable and animal oils consist primarily of triacylglycerides, commonly known as triglycerides. Structurally, triglycerides are composed of three fatty acids attached to a glycerol molecule. Though these oils can be directly used in diesel engines, engine manufacturers generally discourage this practice, as their use can cause engine

⁷ Biofuels Digest, December 3, 2010, *Neste Oil becomes Chief Monster as renewable diesel becomes biofuels monster*, <http://www.biofuelsdigest.com/bdigest/2010/12/03/neste-oil-becomes-chief-monster-as-renewable-diesel-becomes-biofuels-monster/> (accessed September 17, 2013)

⁸ Dynamic Fuels, <http://www.dynamicfuelsllc.com/about.aspx> (accessed June 28, 2013)

⁹ DAR PRO Diamond Green Diesel Renewable Fuel, *Thinking big: A partnership with Valero Energy Corporation for mass-scale green diesel production*, <http://www.darpro.com/diamond-green-diesel> (accessed June 28, 2013)

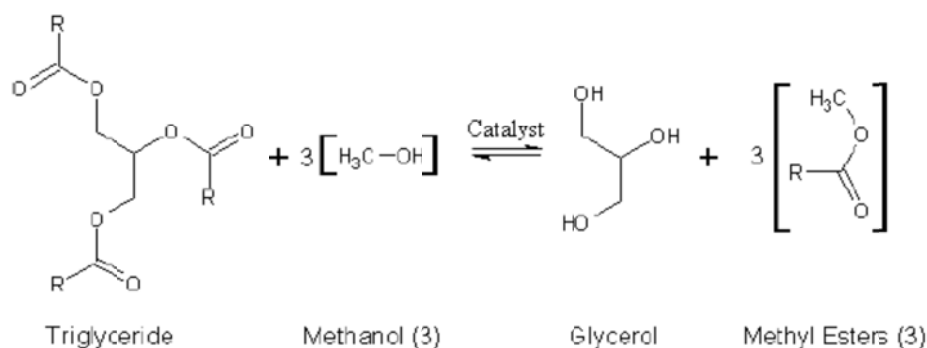
¹⁰ Emerald Biofuels News, *Emerald Biofuels Plans Renewable Diesel Refinery in Plaquemine, Louisiana*, May 8, 2012, <http://emeraldbiofuels.com/news.php> (accessed June 28, 2013)

problems. This is primarily because combustion of raw oils form engine deposits, with carbon residue and plugging in engine injector nozzles, piston rings, and lubricating oil. This happens due to polymerization of the triglycerides in the raw oils as the fuel is combusted. Converting the raw oils into a form of esters or biodiesel prevents these issues.

Before transesterification is conducted, the raw oils and fats are filtered and pretreated to remove water and contaminants. Water in the feedstock leads to the formation of soaps, which are an undesirable by-product, reduces the yield of biodiesel, and makes the separation of glycerin in the products more difficult.

As shown in Figure 6.1, transesterification involves reacting triglyceride oils with alcohol (usually methanol) in the presence of a catalyst (usually lye) in a simple closed reactor system at low temperature and pressure. The products of the transesterification reaction are FAME and glycerin as a co-product. After transesterification, a majority of the alcohol is removed from the glycerin and recycled back into the system to continue the process. The biodiesel from the process is purified and washed to remove any residual catalyst and soaps. The glycerin from transesterification can be purified and sold to the pharmaceutical or cosmetic industry to be processed into lotions and creams.

Figure 6.1: Transesterification Reaction



There are two basic conversion routes for FAME production, base and direct acid catalyzed transesterification. The base catalyzed option tends to be the most economical for virgin oil feedstocks and as such is most commonly used to produce esters on a commercial scale. The processing equipment operates at relatively lower temperatures and pressures. The process has high conversion rates (around 98%) to FAME with low reaction times without producing intermediate compounds.

Acid catalyzed transesterification is expected to be the preferred method for conversion of waste oils, since it is less sensitive to free fatty acids in the feedstock. This conversion method seems to be more economical than base catalyzed transesterification of waste oils, because an extra pretreatment step is required to remove fatty acid impurities before the base catalyzed process. For base transesterification the fatty acid content of feedstocks must generally be less than

four percent. Acid catalyzed transesterification has not been optimized for commercial scale production.

In base catalyzed transesterification, a strong base of sodium hydroxide or potassium hydroxide is usually used as the catalyst for the reaction. In the acid catalyzed process, sulfuric acid is usually used as the catalyst. For the base catalyzed process the molar ratio of methanol to oil is about 6:1, while for an acid catalyzed process the ratio is about 50:1.

The purity and the yield of biodiesel from transesterification is affected by the molar ratio of glycerides to alcohol, the type of catalyst, the reaction time, the reaction temperature, the amount of free fatty acids, and the amount of water present in the feedstock. Both purity and yield affect the amount of cleanup that must be performed on the finished product.

a. Feedstocks

In the U.S., there are many potential plant oil feedstocks that can be used including soybean, peanut, canola, cottonseed and corn oil. Most of the world's production of biodiesel comes from plant oils such as soybean, rapeseed (canola), and palm oil. About 55 percent of U.S. biodiesel was made from soybean oil feedstocks in 2012¹¹.

Biodiesel can also be made from waste feedstocks such as waste vegetable oil (WVO) and tallow. These feedstocks are wastes, so there are no GHG emissions due to land use change associated with these feedstocks. Biodiesel from wastes is sometimes referred to as advanced biodiesel in order to differentiate it from crop-based biodiesel because of its lower carbon intensity.

b. Fuel Quality

According to the Coordinating Research Council, Inc. (CRC) Report No. AVFL-17, *Investigation of Biodistillates as Potential Blendstocks for Transportation Fuels*, released in June 2009, "One of the biggest concerns of the biodiesel industry is the quality of finished fuels being used in the marketplace. The use of poor quality fuels can lead (and has led) to field problems and customer complaints, which reduce public confidence and jeopardize the future of the industry. Steps to address these concerns have been taken in recent years by adoption (or modification) of ASTM D 6751 (for B100) and D 7467 (for B6-B20), and by development of the BQ-9000 Quality Management System. Fuel quality surveys have indicated that problems with blending control and off-spec products were common in the past. However, it appears that with more stringent fuel specifications and increasing producer experience, the overall quality of biodiesel in the marketplace is improving."

Ensuring oxidative stability of biodiesel in the marketplace is a major product quality concern. Due to the complex degradation pathways involved, no single test method is

¹¹ U.S. Department of Energy, *Annual Energy Outlook 2012 with Projection to 2035*, June 2012

fully able to assess fuel stability in all circumstances. One of the most widely utilized test methods is the Rancimat oxidative stability test (EN 14112), which is based upon detection of volatile, secondary oxidation products that result from reaction of biodiesel with oxygen at elevated temperature. The Rancimat test was incorporated in 2007 in the ASTM standard specifications for B100. This test was originally developed as an indicator of vegetable oil storage stability, but is also regarded as a suitable means to assess storage stability of biodiesel and its blends. (Another oxidation stability test, prEN 15751, has been provisionally accepted.)

For many users, low temperature operability is the greatest biodiesel concern, particularly during cold seasons of the year. Just as with conventional diesel fuel, precautions must be taken to ensure satisfactory low temperature operability of biodiesel and its blends. These concerns are often greater with biodiesel, due to its higher cloud point and pour point compared to petroleum diesel. Poor low temperature operability may be exhibited in several ways, but principally by filter plugging due to wax formation, and engine starving due to reduced fuel flow.

As with fuel stability, there is no single best test to assess low temperature operability. U.S. fuel standards do not include explicit specifications for low temperature operability – either for conventional diesel or biodiesel (or blends of the two). However, the fuel seller is generally required to give an indication of low temperature operability by reporting the cloud point (CP) of the fuel. Also, a cold-soak filterability standard test method for B100 is under development by ASTM. Beginning in 2008, ASTM D 6751 required test method ‘Annex A1’ to assess cold soak filterability of B100 intended for blending with diesel.

Poor low temperature operability is usually caused by long-chain saturated fatty acid esters present in biodiesel. In general, the longer the carbon chain, the higher the melting point, and poorer the low temperature operability. The presence of carbon–carbon double bonds significantly lowers the melting point of a molecule (hydrocarbon or fatty acid alkyl ester). Therefore, to a certain degree, a trade-off exists between fuel stability and low temperature operability. With increasing degree of unsaturation, stability decreases but low temperature operability improves.

In large part, the fatty acid composition of the fats and oil precursors to biodiesel dictate the low temperature operability of the final fuels. Feedstocks with highly saturated fatty acid structures (such as palm oil and tallow) produce biodiesels with poor operability; whereas feedstocks with highly unsaturated fatty acid structures (such as rapeseed and safflower oil) have better operability. Proper choice of feedstocks is critical to providing a finished biodiesel fuel having acceptable low temperature operability.

Other approaches that are helpful in particular circumstances include the following:

- Blending with petroleum diesel;
- Use of commercial petroleum diesel additives;
- Use of new cold flow improver (CFI) additives for biodiesel;

- Use of higher alcohols (including ethanol) for transesterification; or
- Crystallization fractionation (wax removal).

Water solubility and water contamination are other issues of concern. At room temperature, water is very slightly soluble in conventional diesel fuel (<100 ppm), but has significant solubility in B100 (up to 1200 ppm). Water solubility in B20 is intermediate between these two extremes. The generally higher water levels in biodiesel can exacerbate problems with corrosion, wear, suspension of solids, and microbial growth. When dealing with biodiesel, extra 'housekeeping' precautions may be necessary to remove excess water and sediment. In particular, this is required when first introducing biodiesel into tanks previously used for conventional diesel, as accumulated water and sediment may become dispersed and plug filters under these conditions.¹²

c. Availability

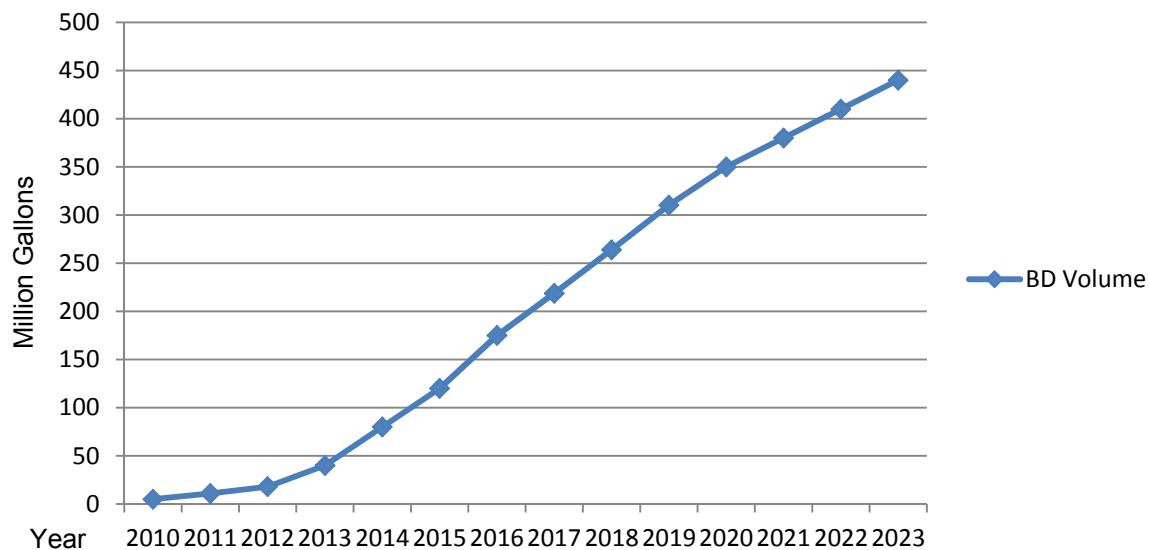
According to Biodiesel Magazine, as of June 2013 there were 193 operational commercial biodiesel production plants in the U.S. with a total production capacity of 2.9 billion gallons. There are about 20 major plants in California with annual production capacities varying between 350,000 gallons to 25 million gallons. The total biodiesel production capacity in California is nearly 78 million gallons per year. This compares to total conventional diesel production of about 3.5 billion gallons per year.

According to the Low Carbon Fuel Standard Reporting Tool (LRT), California biodiesel production facilities produced about 20 million gallons of biodiesel in 2012. Staff has communicated with many of the stations that sell biodiesel as well as the major terminal operators in the state, and has found that the vast majority of the biodiesel currently being sold in California and expected to be sold in the future is sold as blends of B5 or less.

Staff has projected how much biodiesel will be available in California from 2013 to 2023 based on current market penetration and potential for growth. The projection in Figure 6.2 below is lower than projections produced by the National Biodiesel Board (NBB), but higher than a linear interpolation of the data contained within the LRT, in other words staff expects the rate of biodiesel growth to increase in the coming years.

¹² Coordinating Research Council, Inc., Report No. AVFL-17, Alpharetta, Georgia, pp. 16-18, *Investigation of Biodistillates as Potential Blendstocks for Transportation Fuels*, June 2009

Figure 6.2: Statewide Biodiesel Volume



*2010 data from BOE, 2011-12 data from LRT, 2013-23 projected

d. Literature Search

Multiple studies have looked at the impact of biodiesel on heavy-duty diesel vehicle NOx emissions. The National Renewable Energy Lab (NREL) and the U.S. EPA have both examined the literature to determine these effects. Neither of these databases focused primarily on the effects of using CARB diesel as the base fuel. To fill this knowledge gap, ARB staff conducted a literature search that addresses the impacts of biodiesel use on NOx emissions in heavy duty engines using California diesel as the base fuel. The details of staff's literature review are included in Appendix B.

The literature search focused on biodiesel blends B20 and below and characterized studies by their baseline fuel properties. Studies that used either explicitly CARB diesel or a diesel fuel that was tested to have a cetane number of at least 49 were included in the analysis. The studies included in this analysis were all performed using an engine dynamometer with commercially available engines, and no engine modifications. Studies using test cycles based on a single speed and mode were excluded from this analysis.

Each set of tests in a study using the same engine and test cycle were considered to be an individual data point, and each of these data points were weighted equally. Table 6.1 shows the results of the analysis completed by staff.

It should be noted that this testing demonstrate the results only for a specific fuel formulation on specific engines in controlled laboratory conditions. To translate this to any potential real-world emission impact requires consideration of many factors (e.g., number of NTDE engines, amount of renewable and low-NOx diesel, amount of animal-based biodiesel, and any NOx-reducing additives). These factors are captured in an "effective blend" value that is discussed later in section 6.A.h

Table 6.1: Results of Literature Search Analysis

Biodiesel Blend level	NOx Difference	Standard Deviation
B5	0.3%	1.3%
B10*	2.7%	0.2%
B20	3.2%	2.3%

*Represents data using biodiesel from soy feedstocks.

Overall, the testing indicates different NOx impacts at different biodiesel percentages. Staff analysis shows there is a wide statistical variance in NOx emissions at biodiesel levels of B5, providing no demonstrable NOx emissions impact at this level and below. At biodiesel levels of B10 and above, multiple studies demonstrate statistically significant NOx increases, without additional mitigation. A worst-case analysis using soy feedstock biodiesel shows an emissions increase of about 2.7 percent at B10. (NOx emissions of soy biodiesel are 2.2 times greater than biodiesel from animal feedstocks at B10, see Appendix B, Tables B.2 and B.3). The region of biodiesel levels between B5 and B10 is currently untested, although staff has begun test programs to provide more information.

The complex mechanisms creating NOx increases at different biodiesel levels are not completely understood. The NOx emissions appear to be affected primarily through thermodynamic interactions, yet other factors have also been proposed. For example, Bunce et. al.¹³ looked at engine factors such as air to fuel ratio, EGR fraction, rail pressure and start of injection, as well as cetane number, soot radiation, bulk modulus, Engine Control Module feedback, and adiabatic flame temperature as factors that could serve to control engine NOx emissions. The complex interactions created by the fuel and engine system demonstrate the need for continued testing to create a robust dataset.

e. ARB Emissions Testing Program

In order to better understand emissions from biodiesel, ARB contracted with UC Riverside to conduct emissions testing, as well as performing in house emissions testing (Mitigation Study)¹⁴. Table 6.2 below summarizes the test matrix that was covered by the Mitigation Study.

¹³ Bunce et al, *Stock and Optimized Performance and Emissions with 5% and 20% Soy Biodiesel Blends in a Modern Common Rail Turbo-Diesel Engine*, Energy Fuels, 2010, 24 (2), pp 928-939

¹⁴ U.C. Riverside, *CARB Assessment of the Emissions from the Use of Biodiesel as a Motor Vehicle Fuel in California, "Biodiesel Characterization and NOx Mitigation Study"*, October 2011

Table 6.2: Summary of Testing Done by ARB and UC Riverside

Application	Engine	Feedstocks	Test Cycles
On-road chassis	Caterpillar C15	Animal	UDDS
	Cummins ISM	Soy	FTP
	DDC MBE4000	Renewable diesel	40mph Cruise
	Cummins ISX	GTL	50mph Cruise
On-road HD engine	Cummins ISM	Animal	UDDS
	DDC MBE4000	Soy	FTP
Non-road engine	John Deere 4084	Animal	ISO 8178-4
	Kubota TRU	Soy	

This study found that most of the emissions from biodiesel are reduced from the CARB diesel baseline, including PM, CO, HC, and most toxic species. However, NOx was found to increase at certain biodiesel blend levels. The results of this study apply specifically to heavy-duty vehicles that do not use post-exhaust NOx emissions control, therefore the results of this study should not be extended to NTDEs or Light-duty and Medium-duty vehicles. More detail on the specific findings of this study is available in the environmental impacts chapter.

ARB staff will continue to analyze available data and conduct additional testing if the information would change conclusions. Staff will return to the Board with any necessary revisions.

f. Biodiesel in New Technology and Light Duty Diesel Engines

Engines that meet the latest emission standards through the use of Selective Catalytic Reduction (SCR) have been shown to have no significant difference in NOx emissions based on the fuel used. A study conducted by the NREL looked at two Cummins ISL engines that were equipped with SCR, and found that NOx emissions control eliminates fuel effects on NOx, even for B100 and even in fuels compared against a CARB diesel baseline.¹⁵

Light-duty and medium-duty vehicles have similarly been found not to experience increases in NOx due to the use of biodiesel. For example, a study performed on three

¹⁵ Lammert et al, *Effect of B20 and Low Aromatic Diesel on transit Bus NOx emissions Over Driving Cycles with a Range of Kinetic Intensity*, SAE Int. J Fuels Lubr., 5(3):2012

light-duty vehicles using different biodiesel blends found no significant and consistent pattern in NOx emissions based on blend levels across the different engines, blends and cycles¹⁶.

g. NOx Mitigation Options

As a result of the Mitigation Study completed by UC Riverside and ARB, several technically feasible mitigation options were identified that would ensure no NOx increase as a result of biodiesel use. The mitigation options that were identified reduce NOx to parity with conventional CARB diesel by: using additives, altering the baseline fuel, or by undergoing a certification program designed to allow innovate new strategies.

The Mitigation study found that a blend of 1 percent di-tert butyl peroxide in B20 yielded NOx emissions that were equivalent to the CARB diesel baseline. Additionally the Mitigation Study found that a blend of 55 percent renewable diesel, 25 percent CARB diesel and 20 percent biodiesel was equivalent to the CARB diesel baseline. Additionally, 2-ethylhexyl nitrate (2-EHN) was tested to determine whether it would also be able to mitigate the NOx from biodiesel blends since it is also a cetane improver. However the fuels containing 2-EHN had essentially the same NOx emissions as those without additives. The difference between the NOx emissions of these blends compared to baseline CARB diesel is shown in the Table 6.3 below.

Table 6.3: NOx Emissions of Mitigation Measures

Fuel Blend	NOx Diff % from CARB diesel	p-value
B20 1%DTBP	0.0 %	0.959
C25 R55 B20	-0.8 %	0.029
B20 1% 2-EHN	6.3 %	0.000

Taking the mixture of renewable diesel and CARB diesel that successfully mitigated NOx from B20, staff determined specifications of a fuel termed “Low-NOx diesel” that would be capable of mitigating the increase in NOx from a blend of biodiesel up to B20 if mixed in a ratio of at least 4 gallons Low-NOx diesel to 1 gallon biodiesel. The B20 test fuel consisted of 55 percent renewable diesel fuel, 25 percent California diesel fuel, and 20 percent biodiesel; so the hydrocarbon portion was 68.75 percent renewable diesel and 31.25 percent California diesel, by volume, or 67.28 percent renewable diesel and 32.72 percent California diesel, by weight. The properties were estimated by linear interpolation between the measured properties of the renewable and CARB diesel fuels. The cetane number of the Low-NOx diesel is to be determined as natural cetane number, since some cetane improvers were not shown to have a mitigating effect on biodiesel NOx emissions. Table 6.4 shows the calculation of the properties of this Low-NOx diesel. Each property listed for renewable diesel was multiplied by 0.6728, and added to the property of CA diesel multiplied by 0.3272.

¹⁶ Nikanjam et al, *Performance and Emissions of Diesel and Alternative Diesel Fuels in Modern Light-Duty Vehicles*, SAE 2011-24-0198, 2011

Table 6.4: Derivation of Low NOx Diesel Specifications

<i>Properties</i>	Renewable		CA Diesel		Blend
Factor	0.6728 x		0.3272 x		
Aromatic HC Content (% by wt.)	0.4	+	18.7	=	(≤) 6.4
PAH Content (% by wt.)	0.1	+	1.5	=	(≤) 0.6
Specific Gravity (60 °F/60 °F)	0.774	+	0.828	=	0.791
API Gravity	51.3	+	39.3	=	(≥) 47.4
Cetane Number	72.3	+	55.8	=	(≥) 67

In addition to these two options for mitigation, staff is including certification procedures to allow for innovation and to allow the market to determine the best option for mitigation while ensuring no increase in NOx from the use of biodiesel. The certification option is based on the CARB diesel certification procedures under title 13 CCR section 2282(g). The certification requires a minimum of 20 tests each on a CARB diesel reference fuel and a candidate fuel. This number of replicates ensures that any emissions differences between the candidate fuel and the reference diesel are detected if they exist.

h. Effective Biodiesel Blend Level

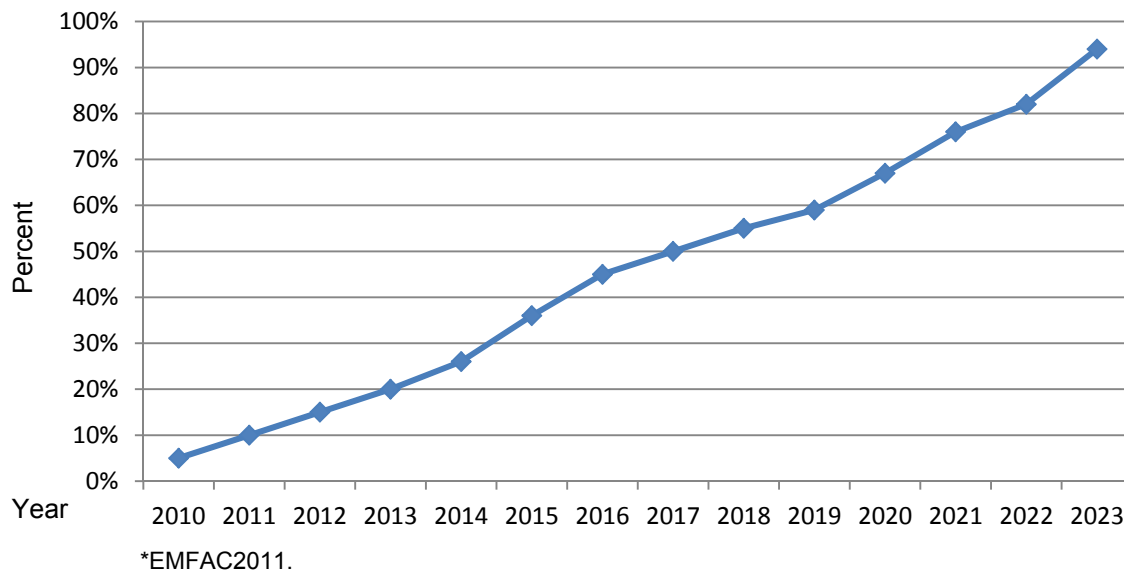
Staff has identified multiple strategies that are capable of reducing the NOx increase from biodiesel, and many of these strategies may exist in the California market prior to triggering of mitigation for biodiesel. In order to account for the use of these mitigating strategies staff has developed the concept of an effective biodiesel blend level, that is, the blend level of biodiesel statewide that would result in the same NOx emissions as the combination of the actual blend level of biodiesel statewide taking into account any NOx mitigating strategies currently in use. Staff has identified four essential parameters that are used when calculating an effective biodiesel blend level: net biodiesel volume, Low-NOx diesel, renewable diesel and animal biodiesel.

Net biodiesel volume is total biodiesel volume, excluding that portion of the total biodiesel volume used in fuel blends at B5 or less. Diesel fuels containing B5 or less (i.e., CARB diesel) are not subject to this regulation. Low-NOx diesel offsets increases in NOx from biodiesel with a decrease in NOx. Renewable diesel is also known to offset NOx emissions. Animal biodiesel tends to emit about half as much NOx as soy biodiesel or other biodiesel feedstocks. When these mitigation strategies are taken together, staff has found that as long as the effective blend level is below 10 percent of the total compression ignition fuels volume in the State there are no excess NOx emissions occurring compared to a CARB diesel baseline.

Figure 6.3 below shows the anticipated portion of the California heavy-duty diesel fleet that is expected to be NTDEs from 2010-2023. The data are from EMFAC2011¹⁷. Any NOx emissions that would occur from biodiesel use will be reduced proportionally with the portion of the fleet that is NTDE, for example in 2023 the fleet is projected to consist of 94 percent NTDEs and as such excess biodiesel NOx emissions would not occur in that portion of the fleet.

¹⁷ California Air Resources Board, EMFAC2011 Emissions Database, 2011, <http://www.arb.ca.gov/EMFAC/>

Figure 6.3: Portion of Fleet that is NTDE



Staff also conducted an analysis to determine if there is any potential for NO_x increases based solely on projections of biodiesel usage and renewable diesel usage. For example, could NO_x increase due to the use of individual gallons of biodiesel that are B10 or above that are used in non-NTDE vehicles? NO_x increases from biodiesel blends B10 or above are completely offset by the consumption of at least 1.375 gallons of renewable diesel for each gallon of biodiesel consumed. Additionally, it is relatively easy to separate out the gallons of biodiesel that are used as B5, and these gallons of biodiesel have been found to have no impact on NO_x emissions. Using these factors and staff's projections of total biodiesel use, biodiesel used as less than B5 and total renewable diesel use, staff developed Figure 6.4. As the graph shows, as long as the ratio of biodiesel not used as B5 to renewable diesel is above the 1.375 threshold indicated by the dashed line, there would be no expected increase in NO_x. Note that this is a conservative analysis as the analysis does not account for mitigating factors other than renewable diesel. Staff intends to monitor this ratio as time goes by in order to ensure that no local impacts are experienced.

Figure 6.4: Renewable Diesel to Biodiesel Ratio Forecast

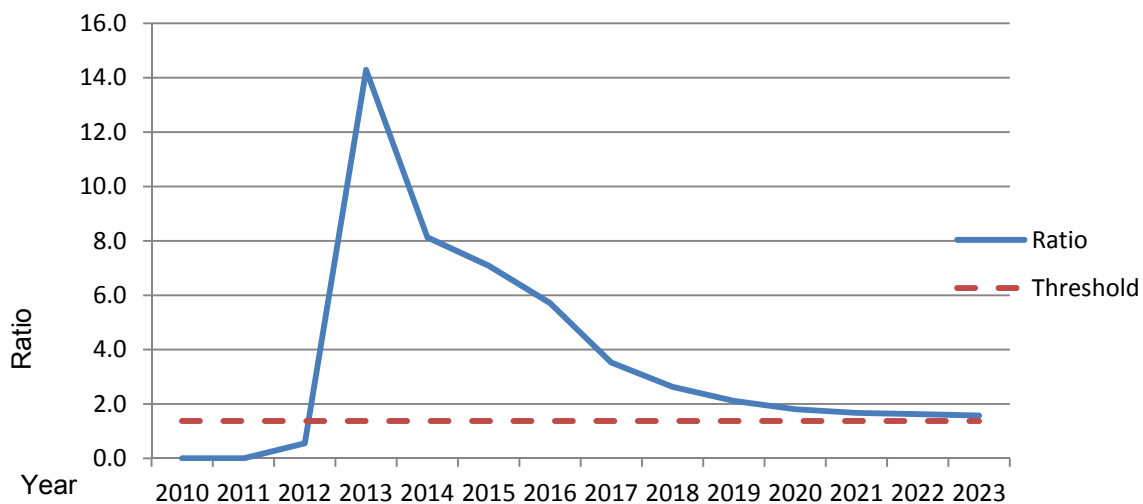
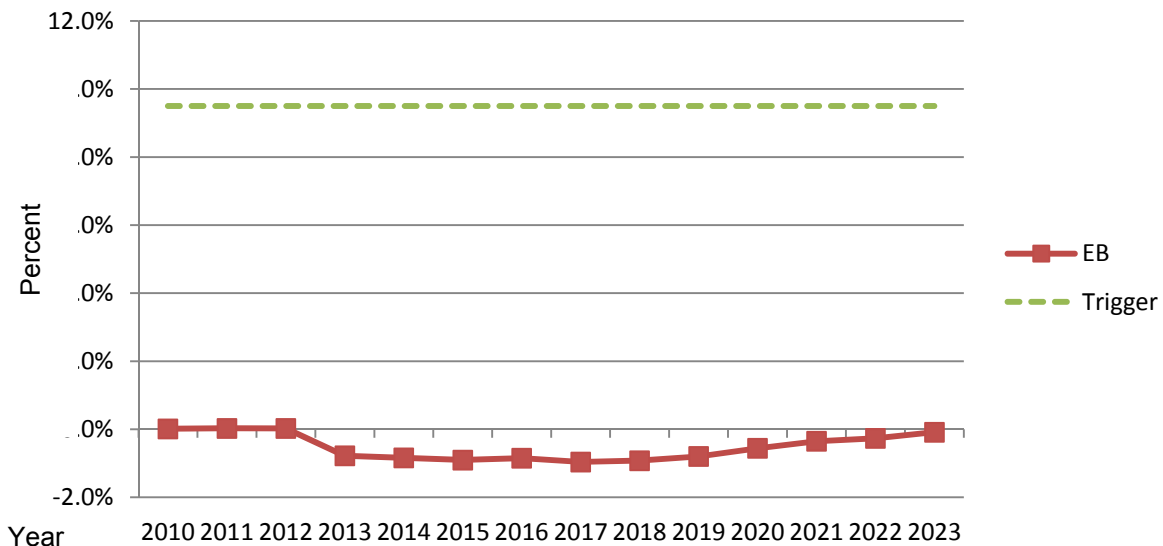


Figure 6.5 below, is a graph that shows the projected effective biodiesel blend level from 2010-2023 along with the mitigation trigger of 95 percent of B10 Statewide. As this graph shows, staff projects that the effective blend level will not reach the mitigation trigger, and as such no statewide NOx emission increases from biodiesel are projected to occur.

Figure 6.5: Effective Biodiesel Blend Level Forecast



i. Engine Performance

Generally, heavy-duty diesel engine manufacturers in the United States approve the use of B5 in their engines. Under consensus standards, the biodiesel component must meet ASTM D 6751, the petroleum diesel component must meet ASTM D975.

According to the Coordinating Research Council report, “A variety of other fuel issues are occasionally of interest with respect to in-use handling and performance of biodistillates.” One example is surface tension, which can affect spray atomization, droplet size, and other functions of fuel injection. Although the surface tension of biodiesel is somewhat higher than that of typical No. 2 diesel fuel, this does not seem to be an important determinant in causing noticeable performance effects. Much more important is fuel viscosity, which generally correlates with surface tension, and is responsible for numerous effects as described above.”

Although the viscosity of biodiesel is much lower than that of its triglyceride feedstock, it is typically higher than that of petroleum diesel – often by a factor of two. Viscosity can have significant effects on the injection quality of distillate fuels. In general, higher viscosity leads to poorer fuel injection and atomization. Biodiesel users have very few options to improve the viscosity of the fuel. The only practical approaches involve heating the fuel or diluting it with petroleum diesel (or renewable diesel). Low concentration blends of biodiesel (B20 and below) generally have acceptable viscosity, and do not cause significant field problems.

Fuel economy of biodiesel is another in-use operational issue, since biodiesel typically has 10 percent lower mass energy content than No. 2 diesel fuel (expressed as BTU/lb, or kJ/kg). However, due to its somewhat higher fuel density, the fuel economy of biodiesel expressed on a volumetric basis (i.e., miles/gallon) is only lower than that of conventional diesel by a few percent. In actual use, B20 is unlikely to result in any noticeable decrease of volumetric fuel efficiency.

Another in-use operational issue with biodiesel is its effect on injection timing. Fuel is injected into a diesel engine as a consequence of a pressure wave that propagates from the fuel pump (or common rail reservoir) to the injector nozzle. The speed of this propagation is influenced by a fuel property called the bulk modulus of elasticity, which is determined by the fuel density and the speed of sound through the fuel. (Bulk modulus is the product of fuel density and the square of the sound velocity.) Compared to conventional diesel, biodiesel has slightly higher density and sound velocity. Consequently, the pressure wave propagation is slightly faster in B100, resulting in injection timing that is advanced by 1-2°. The consequences of this slight timing change on engine performance and emissions are unclear, with conflicting reports appearing in the literature. However, it is likely that with low concentration blends (B20 and below), any injection timing effects would be too small to be noticeable.”

In the U.S., lubricity specifications apply to both conventional diesel and B6-B20 blends of biodiesel. B100 does not have a lubricity specification. In fact, the natural lubricity of neat B100 is so high that a 1-2 percent blend of it with ULSD is generally sufficient to meet the lubricity specification of ASTM D975. In part, biodiesel’s good lubricity can be attributed to the ester group within the FAME molecules, but a higher degree of lubricity is due to trace impurities in the biodiesel. In particular, free fatty acids and monoglycerides are highly effective lubricants. It has been noted that purification of biodiesel by means of distillation reduces its lubricity because these high-lubricity impurities are removed. The effect of unsaturation upon lubricity is unclear, with some

researchers reporting positive effects of carbon-carbon double bonds while others report no effect.

j. Storage and Dispensing

Due to its different physical and chemical properties, introducing biodiesel into systems designed for petroleum diesel raises questions about materials compatibility and other potentially adverse impacts on fuel or engine systems. Materials compatibility pertains to the impacts of biodiesel upon seals, gaskets, hoses, metal surfaces, and other materials that the fuels contact. It is well known from laboratory studies and in-use experience that changes in fuel composition can affect the integrity of elastomeric materials.¹⁸ In particular, changes in swelling, shrinkage, embrittlement, and tensile strength are of concern, as extreme changes in these properties can lead to seal failures, leaks, and subsequent problems. Materials compatibility issues are of greatest concern with use of B100. Limiting biodiesel blends to B20 and below, and ensuring that only on-spec fuel is used, greatly reduces these concerns.

The current ASTM D 975, *Standard Specification for Diesel Fuel Oils*, is applicable to diesel fuel oil containing up to 5 percent by volume biodiesel fuel, but the biodiesel fuel must meet the requirements of ASTM D 6751, *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels*.^{19, 20} Underwriters Laboratories Inc. (UL) has announced that products intended to use biodiesel blends up to B5 that are compliant with applicable ASTM International fuel standards will not require special investigation by UL.²¹ The SWRCB regards UL's decision as a compatibility determination for the storage of biodiesel blends up to B5 in USTs approved for petroleum diesel. However, leak detection functionality testing with biodiesel blends B6 to B100 is not yet complete. Such testing is necessary for USTs that rely on liquid sensors, automatic tank gauges, and line leak detection systems for methods of leak detection.²² The SWRCB has adopted an emergency regulation, effective June 1, 2009, which provides a variance from the applicable certification requirements for the storage of biodiesel blends up to B20 in USTs until a determination by the applicable certification organization can be made, but for no longer than 36 months.²³

¹⁸ National Renewable Energy Lab, *Impact of Biodiesel Fuels on Air Quality and Human Health: Task 2 Report The Impact of Biodiesel Fuels on Ozone Concentrations*, May 2003

¹⁹ ASTM, 2009. *Standard Specification for Diesel Fuel Oils*, D 975, ASTM International, West Conshohocken, Pennsylvania

²⁰ ASTM, 2009. *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels*, D 6751, ASTM International, West Conshohocken, Pennsylvania

²¹ Underwriters Laboratories Inc., *Underwriters Laboratories Announces Position on Use of B5 Biodiesel Blends*,
<http://www.ul.com/global/eng/pages/offerings/industries/appliancesandhvac/gasolsolidfuel/release>, 2009 (accessed September 17, 2013)

²² California State Water Resources Control Board, *Biodiesel Update: UL Position on B5*, Letter to Local Implementing Agencies and Interested Parties from J. G. Giannopoulos, Chief, Groundwater Quality Branch, Division of Water Quality, January 9, 2009

²³ State of California Office of Administration Law, *Notice of Approval of Emergency Action, In re: State Water Resources Control Board*, OAL File No. 2009-0521-02 E, June 1, 2009

C. Summary of Findings

Overall ARB Staff find that the proposed regulation can be achieved using current technology, which may be improved as future technological innovations evolve.

CHAPTER 7. ENVIRONMENTAL IMPACTS

A. Introduction

This chapter provides an environmental analysis of the proposed regulation. Based on ARB's review, staff has determined that adoption of the proposed ADF regulation would not result in any potentially significant adverse impacts on the environment. This analysis provides the basis for reaching this conclusion. This section of the staff report also discusses environmental benefits expected from implementing the proposed regulation.

B. Environmental Review Process

ARB is the lead agency for the proposed regulation and has prepared this environmental analysis pursuant to its regulatory program certified by the Secretary of the Natural Resources Agency (14 CCR 15251(d); 17 CCR 60000-60008). In accordance with Public Resources Code section 21080.5 of the California Environmental Quality Act (CEQA), public agencies with certified regulatory programs are exempt from certain CEQA requirements, including but not limited to preparing environmental impact reports, negative declarations, and initial studies (14 CCR 15250). ARB has prepared this environmental analysis (EA) to assess the potential for significant adverse and beneficial environmental impacts associated with the proposed regulation, as required by ARB's certified regulatory program (17 CCR 60005(b)). The resource areas from the CEQA Guidelines Environmental Checklist were used as a framework for assessing the potential for significant impacts (17 CCR 60005(b)).

If comments received during the public review period raise significant environmental issues, staff will summarize and respond to the comments in the Final Statement of Reasons (FSOR) prepared for the regulation. The written responses to environmental comments will be approved prior to taking final action on the proposed regulation (17 CCR 60007(a)). If the regulation is adopted, a Notice of Decision will be posted on ARB's website and filed with the Secretary of the Natural Resources Agency for public inspection (17 CCR 60007(b)).

C. Proposed Regulation

1. Description

The ADF regulation establishes comprehensive multi-stage requirements governing the commercialization of future alternative diesel fuels in California. The proposed regulation establishes fuel quality specifications for both Low-NOx diesel fuel and biodiesel. The purpose of the regulation is to ensure the quality of the fuels introduced in the California market has no significant adverse impacts on public health or environment. The proposed regulation is described in more detail in Chapter 5, *Description of Proposed Regulation*.

2. Method of Compliance

The proposed ADF regulation applies to all producers, importers, and distributors of ADFs in the State of California. To introduce an ADF to California fuel market, a producer, importer, or distributors of an ADF must complete the requirements specified in three stages of evaluations required by the regulation as briefly described below:

- 1) Stage 1 (*Pilot Program*) requirements involve an initial screening process based on an application to determine whether there will be unreasonable potential impacts on air quality, the environment, and vehicular performance. An ADF fuel applicant must submit a Stage 1 application outlined in Section 2293.5, including any additional information required. An MOU will be issued upon the completion of the initial screening process. The MOU will specify terms and conditions that must be met for the duration of the MOU, including: fuel quality information, operational parameters, a volume sales cap and reporting requirements.
- 2) Stage 2 (*Development of Fuel Specification*) requires additional information that must be submitted by the ADF fuel proponent. Additional data, such as emissions and vehicle performance testing must be developed to better characterize potential impacts to the environment. A multimedia evaluation must be conducted by an ADF fuel proponent to determine whether the ADF has an associated significance threshold for any criteria, toxic, or other air pollutant. Key components of the evaluation process are the identification and evaluation of any significant adverse impacts on public health or the environment and the use of best available scientific data. A multimedia process is further discussed in Chapter 8. Upon submittal of a completed application, an approved Stage 2 MOU will be issued if approved. The Stage 2 MOU will specify terms and conditions that must be met for the duration of the MOU. An interim fuel specification will be required and the conditions will be designed to safeguard against adverse environmental impacts caused by complying with Stage 2 requirements. During this stage, the ADF proponent would be required to conduct a multimedia evaluation including the identification of a “significance threshold” for the ADF based on the evaluation.
- 3) Stage 3:
 - a. 3A (*Commercial Sales Subject to Mitigation*) status will be granted to those ADFs with a significance threshold level established as a result of the multimedia evaluation process. The significance threshold level will be monitored through reporting and recordkeeping requirements required of the ADF fuel applicant. Identified mitigation measure(s) from Stage 2 will be put in place if and when the identified significance threshold level is reached.
 - b. 3B (*Commercial Sales Subject to No Mitigation*) status will be granted to those ADFs that are proven to have no environmental impacts. No

mitigation measure or sales restrictions are required for those ADFs. These ADF fuel providers must comply with reporting and recordkeeping requirements only.

D. Environmental Impacts

Staff determined that adoption of the proposed ADF regulation would not result in any potentially significant adverse impacts on the environment, and the proposed ADF regulation may result in environmental benefits.

1. Beneficial Impacts

The proposed regulation provides a market pathway for emerging innovative drop-in substitute alternative diesel fuels such as biodiesel, renewable diesel, gas-to-liquid (GTL) diesel and other synthetic diesels in California. As stated earlier, the proposed regulation is intended to ensure the introduction and use of these innovative ADFs in California result in no significant adverse impacts to public health or to the environment.

The use of ADFs in the California fuel market that meet the regulation's requirements can lead to benefits in public health and air quality if the ADFs are used in place of diesel fuel. Diesel exhaust, produced when an engine burns diesel fuel, is a complex mixture of thousands of gases and fine particles that contain more than 40 toxic air contaminants. These include many known or suspected cancer-causing substances, such as benzene, arsenic and formaldehyde. It also contains other harmful pollutants, including nitrogen oxides which come from ground level ozone, a criteria pollutant.²⁴

Although the proposed ADF regulation addresses all future alternative diesel fuels, the regulation includes biodiesel as the first recognized commercialized alternative diesel fuel. Different ADFs may present varying degrees and areas of beneficial impacts associated with its use. For biodiesel, studies have found environmental benefits associated with biodiesel use as compared to use of conventional diesel fuel. Biodiesel is considered a low carbon fuel and supports GHG emission reductions. Biodiesel emits less CO, PM, HC, and air toxics than conventional diesel. A biodiesel exhaust emission study conducted by U.S. EPA²⁵ found beneficial impacts associated with biodiesel use. Tailpipe emissions from heavy-duty engines were compiled and analyzed. The data shows that approximately 10 to 20 percent range emission reductions of PM, CO and HC at biodiesel blend of B20 blend and approximately 45 to 65 percent range reductions in neat biodiesel, B100, as compared to federal diesel.

²⁴ Office of Environmental Health Hazard Assessment and the American Lung Association, Factsheet, *Health Effects of Diesel Exhaust*

²⁵ U.S. Environmental Protection Agency, *A Comprehensive Analysis of Biodiesel Impacts on Exhaust Emissions*, EPA420-P-02-001, October 2002

ARB sponsored study in 2011²⁶ also supports the PM, CO and HC emission reductions compared to CARB diesel as a base comparison fuel in the engine tested which represents the current fleet. When tested on the FTP cycle, soy-biodiesel blends resulted in emission reductions of up to 58, 4 and 63 percent in PM, CO and HC levels, respectively.

Therefore, to the extent that ADF producers, importers, and distributors of ADFs take advantage of the proposed regulation's legal pathway for commercialization of these fuels in California, and these fuels are used in lieu of conventional diesel, benefits to public health, air quality and GHG emissions would occur.

2. Resource Areas with No Impacts

Compliance with the proposed ADF regulation would not result in any adverse impacts because the proposed regulation does not require any physical change to the existing environment. The proposed regulation requires suppliers of ADFs in the California fuel market to meet set fuel specifications and undergo an evaluation process to commercialize the sale of that fuel in California. The purpose of the evaluation process is to require appropriate mitigation measures as necessary to avoid any adverse impacts to the environment from ADF use in California.

Compliance with the proposed regulation does not involve or result in any adverse physical changes to the existing environment, such as new development, modifications to existing buildings or facilities, or new land designations. ARB staff finds that it is not reasonably foreseeable that there would be any adverse impacts on aesthetics, air quality, agricultural and forestry resources, biological resources, cultural resources, geology and soils, greenhouse gases, hazardous materials, hydrology and water quality, land use planning, mineral resources, noise, population and housing, public services, recreation, or traffic and transportation because the proposed regulation does not require any action by the regulated parties that could affect these resources.

Alternatives or mitigation measures to address significant adverse environmental impacts are not discussed in this chapter because no significant adverse environmental impacts would result from implementation of the regulatory proposal.

²⁶ UC Riverside, *CARB Assessment of the Emissions from the Use of Biodiesel as a Motor Vehicle Fuel in California, "Biodiesel Characterization and NOx Mitigation Study"*, October 2011

CHAPTER 8. MULTIMEDIA EVALUATION

H&SC section 43830.8 prohibits ARB from adopting any regulation that establishes motor vehicle fuel specifications unless that regulation is subject to a multimedia evaluation and reviewed by the CEPC. Pursuant to Public Resources Code section 71017(b), the CEPC was established as a seven-member body comprised of the Secretary for Environmental Protection; the Chairpersons of the ARB and SWRCB; and the Directors of the Office of Environmental Health Hazard Assessment (OEHHA), the Department of Toxic Substances Control (DTSC), the Department of Pesticide Regulation (DPR), and the Department of Resources Recycling and Recovery (CalRecycle). Key components of the evaluation process are the identification and evaluation of significant adverse impacts on public health or the environment and the use of best available scientific data.

A. General Overview

“Multimedia evaluation” means the identification and evaluation of any significant adverse impact in public health or the environment, including air, water, and soil, that may result from the production, use, and disposal of a motor vehicle fuel that may be used to meet the state board’s motor vehicle fuel specifications (H&SC §43830.8(b)).

1. Multimedia Working Group

The California Environmental Protection Agency (Cal/EPA) formed the interagency MMWG to oversee the multimedia evaluation process. The MMWG includes representatives from the ARB, SWRCB, OEHHA, and DTSC. The MMWG also consults with other Cal/EPA agencies and experts as needed.

During a multimedia evaluation, ARB staff are responsible for the air quality impact assessment and overall coordination of the MMWG. SWRCB staff are responsible for the evaluation of surface water and groundwater quality and potential impacts. OEHHA staff are responsible for evaluating potential public health impacts. DTSC staff are responsible for evaluating potential hazardous waste and soil impacts.

2. California Environmental Policy Council

Before ARB adopts a regulation that establishes new fuel specifications, the CEPC must determine if the proposed fuel specification poses a significant adverse impact on public health or the environment. In making its determination, the CEPC must consider the following:

- emissions of air pollutants, including ozone-forming compounds, particulate matter, toxic air contaminants, and greenhouse gases,
- contamination of surface water, groundwater, and soil,
- disposal of waste materials, including agricultural residue, forest biomass, and municipal solid waste, and

- MMWG staff report and peer review comments.

The CEPC must complete its review of the evaluation within 90 calendar days following notice from ARB that it intends to adopt the regulation. If the CPEC determines that the proposed regulation will cause a significant adverse impact on public health or the environment, or that alternatives exist that would be less adverse, the CEPC shall recommend alternative measures to reduce the impact.

3. External Scientific Peer Review

H&SC section 43830.8(d) requires an external scientific peer review to be conducted on the multimedia evaluation in accordance with H&SC section 57004. The purpose of the peer review is to determine whether the scientific portions of the staff report are based upon “sound scientific knowledge, methods, and practices (HSC section 57004(d)(2)).”

B. Summary of the Biodiesel and Renewable Diesel Multimedia Evaluation

As part of the ADF regulation, staff intends to establish fuel quality specifications for biodiesel and renewable diesel fuel. Therefore, a multimedia evaluation of biodiesel and renewable diesel fuel was conducted pursuant to H&SC section 43830.8 and the *Guidance Document and Recommendations on the Types of Scientific Information Submitted by Applicants for California Fuels Environmental Multimedia Evaluations*, (“Multimedia Evaluation Guidance Document”).²⁷

The MMWG prepared two staff reports entitled, “*Draft Staff Report: Multimedia Evaluation of Biodiesel*” (Biodiesel Staff Report) and “*Draft Staff Report: Multimedia Evaluation of Renewable Diesel*” (Renewable Diesel Staff Report). The draft staff reports consist of the MMWG’s assessment of the biodiesel and renewable diesel multimedia evaluations conducted by the UC Berkeley and UC Davis, and the MMWG’s analysis of potential significant adverse impacts on public health and the environment.

The MMWG’s conclusions and recommendations are based on the results of the multimedia evaluation and the information provided in the UC final reports entitled, “*California Biodiesel Multimedia Evaluation Final Tier III Report*” (Biodiesel Final Report)²⁸ and “*California Renewable Diesel Multimedia Evaluation Final Tier III Report*” (Renewable Diesel Final Report).²⁹

1. Biodiesel Multimedia Evaluation

²⁷ U.C. Berkeley, U.C. Davis, Lawrence Livermore National Laboratory, *Guidance Document and Recommendations on the Types of Scientific Information Submitted by Applicants for California Fuels Environmental Multimedia Evaluations*, June 2008

²⁸ U.C. Berkeley, U.C. Davis, *California Biodiesel Multimedia Evaluation Final Tier III Report*, May 2013

²⁹ U.C. Berkeley, U.C. Davis, *California Renewable Diesel Multimedia Evaluation Final Tier III Report*, April 2012

The MMWG completed their assessment of the biodiesel multimedia evaluation and potential impacts on public health and the environment. The evaluation is a relative comparison between biodiesel and CARB diesel.

The MMWG concludes that the use of biodiesel fuel in California, as specified in the biodiesel multimedia evaluation, does not pose a significant adverse impact on public health or the environment relative to CARB diesel.

Each agency's individual assessments and conclusions are summarized below:

- *Air Emissions Evaluation.* ARB staff assessed potential air quality impacts and made conclusions based on their assessment of various emissions test results and air quality data, including criteria pollutants, toxic air contaminants, and greenhouse gas emissions data. ARB staff concludes that biodiesel reduces PM, CO, and HC emissions and may increase NO_x emissions for biodiesel blends greater than B10, especially for biodiesel produced from soy feedstocks. Biodiesel blends produced from animal tallow feedstocks resulted in about half the NO_x increase as biodiesel made from soy feedstocks. Based on the biodiesel NO_x impact results from exhaust emissions testing, staff determined the significance threshold for biodiesel is B10.
- *Water Evaluation.* SWRCB staff assessed potential surface water and groundwater impacts and made conclusions based on their assessment of potential water impacts and materials compatibility, functionality, and fate and transport information. SWRCB staff concludes that there are minimal additional risks to beneficial uses of California waters posed by biodiesel than that posed by CARB diesel.
- *Public Health Evaluation.* OEHHA staff assessed potential public health impacts and made conclusions based on their assessment of potential impacts on atmospheric carbon dioxide and combustion emissions results. OEHHA staff concludes that the substitution of biodiesel for CARB diesel reduces the rate of addition of carbon dioxide to the atmosphere and reduces the amount of PM, benzene, ethyl benzene, and polycyclic aromatic hydrocarbons (PAHs) released into the atmosphere, but may increase emissions of NO_x for certain blends. Limited emission testing resulted in a non-statistical increase in acrolein for a higher B50 biodiesel blend level (i.e., confidence interval less than 95%). Furthermore, the statistical analysis for acrolein emission results were compared to only one data point for the control sample.
- *Soil and Hazardous Waste Evaluation.* DTSC staff assessed soil and hazardous waste impacts and made conclusions based on their evaluation of hazardous waste generation and potential impacts on the fate and transport of biodiesel fuel in the subsurface soil from unauthorized spills or releases. DTSC concludes that biodiesel aerobically biodegrades more readily than CARB diesel, has potentially

higher aquatic toxicity for a small subset of tested species, and generally has no significant difference in vadose zone infiltration rates.

2. Renewable Diesel Multimedia Evaluation

The MMWG completed their assessment of the renewable diesel multimedia evaluation in support of low NOx standard. The evaluation is a relative comparison between renewable diesel and CARB diesel.

The MMWG concludes that the use of renewable diesel fuel in California, as specified in the renewable diesel multimedia evaluation, does not pose a significant adverse impact on public health or the environment relative to CARB diesel.

Each agency's individual assessments and conclusions are summarized below:

- *Air Emissions Evaluation.* ARB staff assessed potential air quality impacts and made conclusions based on their assessment of various emissions test results and air quality data, including criteria pollutants, toxic air contaminants, and greenhouse gas emissions data. ARB staff concludes that renewable diesel does not pose a significant adverse impact on public health or the environment from potential air quality impacts.
- *Water Evaluation.* SWRCB staff assessed potential surface water and groundwater impacts and made conclusions based on their assessment of potential water impacts and materials compatibility, functionality, and fate and transport information. SWRCB staff concludes that there are minimal additional risks to beneficial uses of California waters posed by renewable diesel than that posed by CARB diesel.
- *Public Health Evaluation.* OEHHA staff assessed potential public health impacts and made conclusions based on their analysis of toxicity testing data and combustion emissions results. OEHHA staff concludes that PM, benzene, ethyl benzene, and toluene in combustion emissions from diesel engines using hydrotreated vegetable oil renewable diesel are significantly lower than CARB diesel.
- *Soil and Hazardous Waste Evaluation.* DTSC staff assessed soil and hazardous waste impacts and made conclusions based on their evaluation of hazardous waste generation and potential impacts on the fate and transport of biodiesel fuel in the subsurface soil from unauthorized spills or releases. DTSC concludes that renewable diesel is free of ester compounds and has low aromatic content. The chemical compositions of renewable diesel are almost identical to that of CARB diesel. Therefore, the impacts on human health and the environment in case of a spill to soil, groundwater, and surface waters would be expected to be similar to those of CARB diesel.

CHAPTER 9. ENVIRONMENTAL JUSTICE AND LOCAL COMMUNITIES

Government Code section 65040.12(e) defines environmental justice as the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies. ARB is committed to supporting the achievement of environmental justice. In 2001, the Board adopted a framework for incorporating environmental justice into the ARB's programs consistent with the directives of State law³⁰. Although ARB's environmental justice policies apply to all communities in California, they recognize that environmental justice issues have been raised more often in the context of low-income and minority communities.

As a result of ARB's work with the public, the business sector, local government, and air districts, California's ambient air is the cleanest since air quality measurements have been recorded³¹. Whereas the Los Angeles area experienced 148 smog alerts in 1970, by the year 2000, there was not a single smog alert³². However, large numbers of Californians live in areas that continue to experience episodes of unhealthy concentrations of ozone and PM2.5.

For this analysis, we note as an initial matter that any community in proximity to operations involving diesel fueled vehicles is already experiencing incremental risks from exposure to diesel particulate matter (PM). In 1998, ARB identified diesel PM as a toxic air contaminant with no safe threshold of exposure, which means that any diesel PM exposure may increase lifetime cancer risk for affected communities. Consequently, ARB embarked on a comprehensive diesel risk reduction program in the early 2000s, implementing a number of stationary, mobile, and portable diesel engine standards; fleet emission controls; and diesel fuel requirements designed to address such risks.

The proposed rulemaking was designed to maintain the air quality protections already in place under ARB's existing diesel fuel regulations. This includes, but is not limited to, maintaining protections in the only two areas nationwide whose air quality nonattainment status has been classified as "extreme," namely the San Joaquin Valley Air Basin and the South Coast Air Basin. Both areas have strong environmental justice groups that have lobbied ARB to take aggressive action in pursuit of reduced toxic emission releases and attainment of ambient standards to ease air quality-related health burdens on their communities.

³⁰ California Air Resources Board, Report, *Policies and Actions for Environmental Justice*, 2001

³¹ California Air Resources Board, *History of Air Resources Board*, Website, <http://www.arb.ca.gov/knowzone/history.htm>, November 16, 20120 (accessed October 4, 2013)

³² California Air Resources Board, Video file, *Clearing California Skies Updated*, <http://www.arb.ca.gov/videos/clskies.htm> (accessed October 4, 2013)

The air quality impacts of this regulatory proposal promote environmental justice by maintaining current protections for California's air quality in areas that are simultaneously the most adversely affected with respect to ground level ozone and home to many minority and low-income groups. At the same time, the proposed rulemaking provides a clear legal pathway to the commercialization of innovative, lower carbon diesel fuel substitutes. These innovative substitutes will reduce GHG emissions, and many of them also provide benefits in the form of additional reductions in PM, CO, NOx, toxic air contaminants, and other air pollutants.

As noted in Chapter 6, ADFs have the potential to reduce exposure to pollutants when used as a replacement for conventional diesel. To the extent that the proposed regulation expedites the introduction of ADFs as replacements for conventional diesel, all communities will benefit from improved air quality. In general, staff anticipates that any impacts resulting from the proposed regulation will be beneficial in nature, as a result of introducing new, lower-emitting ADFs.

To further ensure maintenance of air quality protections at the community level, the proposed regulation contains provisions that require a new ADF proponent to disclose comprehensive information about the ADF and the proponent's plan for limited fleet testing of that fuel. This comprehensive and detailed level of information required to be submitted before testing begins will permit ARB staff to assess the potential impacts such vehicle fleet studies could have on the most sensitive communities. Pertinent to the sensitive communities is a provision in the proposal that requires disclosure, in the Stage 1 and Stage 2 phases, of the ZIP codes in which the applicant proposes to conduct the limited vehicle fleet testing. The ARB staff will consider the proposed ZIP codes, along with the feasibility of conducting the fleet tests in alternative locations, as part of the Stage 1 and Stage 2 approval process. Depending on a number of factors, including the nature of the candidate ADFs and the extent of the fleet test, ARB staff may suggest or require a different location for the study as appropriate and feasible.

Based on staff's assessment of current and future ADFs, such as biodiesel and dimethyl ether, it is likely that new ADFs will exhibit less PM emissions relative to conventional diesel. In such cases, communities will benefit from lower cancer risk associated with the replacement of diesel fuel with ADFs. Likewise, communities will also benefit from any reductions in other criteria and toxic air pollutants associated with ADF use. The State mandated multimedia assessment will determine whether future ADFs will exhibit any increases in other toxic compounds, which may warrant additional controls. Moreover, since the proposed regulation provides for a more orderly process than currently exists towards commercialization, ARB would have more oversight over the approval of any ADF use in local communities and can ascertain whether additional requirements should apply to safeguard against any adverse impacts.

In addition to governing the approval and use of future ADFs, the proposed regulation would also explicitly identify biodiesel as the first ADF commercialized under this regulation. Biodiesel has an extensive history of environmental evaluation and consensus standard development. Indeed, much of the proposed regulation is modeled

on ARB staff's experience in evaluating biodiesel over the years. As a result, the proposed regulation would explicitly identify biodiesel as a Stage 3A ADF, "*Commercial Sales Subject to Mitigation*," in recognition of the fact that biodiesel already has effectively undergone the requirements in Stage 1 and 2.

As discussed in Chapter 6 and the multimedia evaluation, biodiesel has been shown to reduce PM, HC, CO and greenhouse gases from diesel engines. Therefore, replacing diesel with biodiesel provides an immediate reduction in toxic cancer risk that is proportional to the percent reduction in PM emissions. Likewise, reductions in HC and CO also help communities by lowering near source and regional concentrations of ozone and CO.

Being the first commercially recognized ADF under the proposed regulation, biodiesel will have positive air quality impacts and benefits for all communities. In Chapter 6, we projected no need for NOx-mitigation measures to be applied to higher biodiesel blends because of ongoing mitigation effects already occurring in the diesel substitute fuels and heavy duty diesel engine markets. In the unlikely event that the effective biodiesel blend level closely approaches the B10 level, the structure and provisions of the proposed regulation will ensure that NOx emissions are maintained within the levels achieved by our current diesel fuels regulations. Moreover, section 211(v) of the Clean Air Act requires U.S. EPA to mitigate any adverse effects that may occur from the increasing volumes of biodiesel and other biofuels mandated under the RFS2 program to the greatest extent achievable, further assuring that the benefits of our existing diesel fuel regulations will be maintained.³³

Given the significant price premium for higher biodiesel blends such as B20 or B100, it is highly unlikely that operators of heavy-duty, legacy diesel fleets would opt to use the more expensive, higher biodiesel blends when comparable, lower cost conventional CARB diesel or B5 blends are readily available. Moreover, some original equipment manufacturers do not provide warranty coverage for engines operating on either B20 or B100 (or intermediate blends), or they have not provided the same assurances of compatibility with their engines as they have with B5. Therefore, it is unlikely that fleet operators of legacy diesel vehicles would opt to incur an additional potential risk or cost

³³ As part of its recent RFS2 rulemaking in 2011, EPA analyzed the projected increase in VOC, CO, PM, NOx, and other pollutants from biodiesel due to the increased volume mandate relative to the base case. EPA concluded that a 0.43 billion gallon national increase in biodiesel use would have minimal impacts, as follows:

"Given the small emissions impact of a 0.43 bill gal increase in biodiesel on the total U.S. emissions inventory (the basis for our air quality modeling scenarios), we would expect the portion of air quality impacts attributable to a move from 1.0 to 1.28 bill gal (a 0.28 bill gal biodiesel increase) to be small enough that on a nationwide basis the air quality impact would likely not be noticeable."

We note that Clean Air Act section 211(v) requires EPA to analyze and mitigate, to the greatest extent achievable, adverse air quality impacts of the renewable fuels required by the RFS2 rule. We intend to address any potential adverse impacts from increased renewable fuel use through that study and will promulgate appropriate mitigation measures separate from today's NPRM." [emphasis added.] [Table IV.C.4-1 at 76 FR 38870.]

with using the higher biodiesel blends since such engines have not been recommended for use with the higher biodiesel blends.

In conclusion, the proposed ADF regulation is designed to ensure that the introduction and use of new innovative ADFs in California, including biodiesel, will have no significant adverse environmental or public health impacts. This conclusion applies at the State level as a whole, at the various air basin and regional levels, and at the local community level. As a result, the proposed regulation maintains the environmental and human health protections that are already provided under the existing diesel fuel regulations.

CHAPTER 10. ECONOMIC IMPACTS ASSESSMENT

ARB staff has evaluated the potential economic impacts associated with the proposed ADF regulation. For the reasons described in the analysis below, staff concludes that the proposed regulation will have only minimal economic costs to ADF producers and no cost to consumers, government agencies and private businesses.

A. Summary of the Economic Impacts

In preparing this economic analysis, staff considered the costs of complying with the general provisions prescribed for Stage 1, Stage 2, and Stage 3 (as described in Chapter 5), as well as the cost for biodiesel suppliers to comply with the regulation, since biodiesel will be the first commercialized ADF to be regulated under this proposal.

Since the full cost of the proposed regulation will be borne upon successful completion of all stages, and the vast majority of the provisions in those stages are already required under other existing State and federal programs, staff estimates that the overall cost of the regulation to commercialize a future ADF will be minimal at about \$1600 annually for an ADF producer to account for additional or “enhanced” recordkeeping. We did not estimate potential mitigation costs for a generic ADF because mitigation measures, to the extent they are required and applied, are highly specific to each individual ADF. No potential ADF we are aware of, except for biodiesel, has undergone more than a preliminary analysis akin to Stage 1 of this proposal.

As noted elsewhere in this report, biodiesel has already undergone the equivalent of the proposal’s Stages 1 and 2, and the proposal identifies a significance threshold for biodiesel. Accordingly, it will be sold in the California market under Stage 3A upon this proposed regulation becoming effective. Although we have identified a significance threshold and mitigation measures to be applied in the unlikely event the threshold is nearly reached, we do not project the biodiesel market will reach that threshold. We, therefore, project minimal costs for biodiesel compliance with the identified mitigation measures. The proposal provides for enhanced recordkeeping for biodiesel, which we estimated to be an additional \$1,600 annually for each biodiesel producer, for a total cost of \$35,200 for all 22 biodiesel producers currently supplying California. Thus, the overall cost of the regulation is estimated to be \$35,200, which represents the cost of biodiesel compliance. We anticipate similar ADFs that are approved for commercialization under this regulation would incur similar compliance costs if a significance threshold is identified. For ADFs with no significance thresholds identified, there will be no costs attributable to the proposed regulation because those ADFs would be subject to the same reporting requirements as all other commercial motor vehicle fuels.

The proposed regulation is not expected to have a significant adverse economic impact on California businesses or their competitiveness. Furthermore, because future ADFs

are expected to be price competitive with CARB diesel, we anticipate no significant adverse fiscal impacts on consumers or any local and State agencies.

B. Legal Requirements

Section 11346.3 of the Government Code requires State agencies to assess the potential for adverse economic impacts on California business enterprises and individuals when proposing to adopt or amend any administrative regulation. The assessment shall include a consideration of the impact of the proposed regulation on California jobs, business expansion, elimination or creation, and the ability of California businesses to compete with businesses in other states.

Also, State agencies are required to estimate the cost or savings to any State or local agency and school district in accordance with instructions adopted by the Department of Finance. The estimate shall include any non-discretionary cost or savings to local agencies and the cost or savings in federal funding to the State.

Finally, H&SC section 57005 requires the ARB to perform an economic impact analysis of submitted alternatives to a proposed regulation before adopting any major regulation. A major regulation is defined as a regulation that will have a potential cost to California business enterprises in an amount exceeding ten million dollars in any single year. While the cost of the proposed regulation is not expected to exceed ten million dollars, staff has prepared an analysis of alternatives for completeness.

C. Methodology for Estimating Costs

The full cost of complying with the proposed regulation will depend on whether a new ADF achieves full commercial development and successfully completes all three stages. Full commercialization of new ADFs in California will depend on successful resolution to myriad technical issues including, but not limited to, vehicle performance, fuel infrastructure compatibility, public health and environmental issues. However, if a new ADF successfully completes all of the three prescribed stages, then only minimal recordkeeping and reporting costs will ultimately be attributable to the proposed regulation. In general, most of the proposed regulation requirements are already required under other State and federal mandates.

The only actual cost of implementing the regulation will be the cost to recognize biodiesel as the first commercial ADF. However, given the fact that biodiesel currently has consensus standards, is completing a multimedia assessment, and has identified both a NOx significance threshold and mitigation options, staff proposes to recognize biodiesel as a Stage 3A commercial ADF subject to mitigation under specified conditions. Since future biodiesel sales in California are not anticipated to reach the significance threshold (as described in Chapter 5) for triggering mitigation measures, regulatory costs for biodiesel only focus on the need for enhanced recordkeeping by ADF producers. In addition, staff also presents the estimated cost of implementing the mitigation measures for general information purposes.

1. Costs Attributable to Other State and Federal Mandates

A main objective of the proposed ADF regulation is to consolidate existing requirements, supplemented with minor additional data requirements and enhanced recordkeeping provisions, to provide a clear, legal pathway to commercialization for new ADFs. As noted, many of the proposed regulatory requirements already exist in various State and federal programs.

Table 10.1: Applicable Requirements from Various State and Federal Mandates

	Proposed Regulation	FTC ¹ Labeling	DMS Fuels ² Authority	DMS Fuel ³ Variance	H&S Code 43830.8 ⁴	USEPA ⁵ Registration
Test Program Application	x			x		
- Test Plan (vehicle ID, fuels, duration, etc.)	x			x		
- ADF Commercialization Plan	x					
- Fuel Chemical Properties	x			x		
- USEPA Registration	x					x
- Reporting & Recordkeeping	x	x	x	x		
Consensus Fuel Specification Development	x			x		
Enforcement of ASTM Stds.			x			
Fuel Quality Testing	x		x	x		
Pump Labeling (biodiesel blends)		x				
Multimedia Evaluation ⁶	x				x	
Determination of Significance Level	x				x	
Enhanced Reporting	x					

1. Federal Trade Commission regulation on biodiesel pump labeling under 16 CFR Part 306.

2. CA Dept. of Food & Ag.-Div. of Measurement Stds. authority to enforce ASTM fuel quality stds. under title 4 CCR sec 4140, 4148, 4200, 4202-4205.

3. CDFA-DMS administration of developmental fuel variance program under title 4 CCR sec 4144, 4147-4148.

4. Multimedia evaluation requirements under Health & Safety Code sec 43830.8.

5. USEPA fuels and additives registration program under 40CFR Part 79.

6. Also requires lifecycle analysis, release scenarios & emissions testing.

Table 10.1 shows the existing applicable mandates, which require the same information required under the proposed regulation. However, under the proposed regulation, information generally would be required early in the phase in process and before the ADF is commercialized in California to allow for screening of environmental and public health impacts. For purposes of this cost analysis, staff did not consider the costs of meeting the existing applicable mandates that overlap with the requirements under the proposal.

For example, H&SC 43830.8 currently requires a multimedia evaluation to be conducted for any fuel before the ARB can establish motor vehicle fuel specifications for any

particular fuel. Thus, while a multimedia evaluation is required under Stage 2 of the proposed regulation, the cost of that evaluation is not attributable to this rulemaking.

Another set of State mandates affecting the enforcement of potential ADFs pertains to regulatory requirements promulgated by the California Department of Food and Agriculture, Division of Measurement Standards (DMS). Under Title 4, California Code of Regulations (CCR), Sections 4140-4149 and 4200-4205, DMS has the responsibility to enforce the consensus (ASTM) standards for the fuels listed therein, including biodiesel. Therefore, costs for meeting the ASTM standards or developing consensus standards for future ADFs are attributable to the DMS regulations.

The DMS also administers a program that is similar to the proposed Stage 1 requirements. Known as the developmental fuel variance (DFV), this program is authorized under Title 4 CCR, Sections 4144, 4147 and 4148. The DFV program allows unconventional motor vehicle fuels to be used in limited quantities to develop data in support of the development of consensus standards for those fuels. Stage 1 of the proposed regulation requires the same information as that required under the DFV, but the proposal also requires additional information. Thus, staff's analysis for the proposal does not consider the portion of the costs that would already be incurred under the DFV program.

A couple of federal programs also apply to ADFs that would be subject to the proposal. First, U.S. EPA requires a supplier of gasoline or diesel fuel or an additive to be registered with them under 40 CFR 79 prior to the sale, offer for sale, or supply for use of such fuel products in California. Similarly, the proposed regulation would require U.S. EPA registration before an ADF could be sold or supplied in California under Stage 1. Second, the FTC specifies particular labeling requirements on individual pumps that dispense B6-B20 and blends above B20 (no labeling requirements for B5 and below). For enforcement purposes, fuel marketers are required to maintain volume sales and other fuel content records for these labeled pumps. The proposed regulation contains recordkeeping, testing, and reporting requirements that would piggyback on these existing federal requirements.

The shaded rows in Table 10.1 represent two new requirements attributable to the proposed regulation, namely an ADF commercialization plan and the need for enhanced reporting for ADFs under Stage 3A. Although the proposed regulation does not require that fuel producers fully commercialize their ADFs, they presumably intend to do so at the successful conclusion of the proposal's phased in testing program, so we have included a provision that requires submittal of such commercialization plans to enhance our own ADF market monitoring and enforcement planning.

In commercializing its ADF, a fuel producer would likely follow normal business practices by developing a detailed business plan that establishes major milestones and timelines. The proposal simply requires that ADF producers submit such business plans to the ARB.

Alternative diesel fuels that meet the criterion for a Stage 3A (Commercial ADFs subject to Mitigation) will be required to conduct enhanced recordkeeping to monitor progress towards meeting any significance threshold. The level of enhanced recordkeeping will be a case by case determination since ADFs employ different chemistries relative to one another. Therefore, the cost attributable to this regulation will solely consist of enhanced recordkeeping costs; we are basing our estimates on such costs with the costs associated with biodiesel as a Stage 3A commercial ADF.

2. Regulatory Cost of Biodiesel as an Alternative Diesel Fuel

As discussed in Chapter 5, biodiesel would be the first alternative diesel fuel subject to the proposed regulation. As shown below, only nominal costs will apply in the foreseeable future since biodiesel and biodiesel blends are already subject to consensus standards under ASTM D6751 and ASTM D7467. Likewise, the ARB sponsored a multimedia assessment which is near completion. Information from the multimedia assessment resulted in the identification of a NO_x significance threshold.

This places biodiesel in Stage 3A, and therefore only the cost of Stage 3A compliance would be attributable to the proposed regulation. This means that the cost of biodiesel as the first commercial ADF will be primarily the cost of enhanced monitoring. As staff discussed in Chapter 6, additional mitigation is highly unlikely. In the remote possibility that the significance threshold trigger level is reached in the future, the cost of NO_x mitigation would also be attributable to the proposed regulation. Mitigation costs are presented below for informational purposes.

a. Current Biodiesel Market

Biodiesel has been a commonly traded commodity for several years throughout the United States and California. Biodiesel is selling today at a premium compared to diesel sold throughout the West Coast³⁴. However, when used as a blendstock, some biodiesel blends can be competitive in price to diesel sold in California. As shown in Table 10.2, biodiesel blends are priced similarly to CARB diesel and some B20 and B100 blends are more expensive, according to the Oil Pricing Information Service (OPIS). As with any other ADF, biodiesel must presumably remain cost competitive with respect to CARB diesel to provide a viable economic alternative. As discussed below, the overall cost of biodiesel and biodiesel blends will not be significantly impacted by the cost of the proposed regulation.

³⁴ California Department of Energy, *Clean Cities Alternative Fuel Price Report*, April 2013

Table 10.2: OPIS gross wholesale price for Biodiesel, Biodiesel blends and CARB ULSD (8/29/2013), in price/gal

Region	City	Feedstock*	B100	B20	B05	CARB Diesel
Northern	Oakland	Multi	\$4.38	\$3.57	\$3.45	
	Oakland	Soy	\$5.03	\$3.72	\$3.60	
	Oakland	YG	\$4.37	\$3.60	\$3.46	
	Oakland	Comb	\$4.59	\$3.65	\$3.52	
	Richmond	Multi	\$4.83	\$3.40	\$3.32	
	Richmond	Soy	\$5.16	\$3.74	\$3.60	
	Richmond	YG	\$4.71	\$3.48	\$3.41	
	Richmond	Comb	\$4.94	\$3.56	\$3.46	
	San Francisco	Multi	\$4.83	\$3.40	\$3.32	
	San Francisco	Soy	\$5.16	\$3.70	\$3.61	
	San Francisco	YG	\$4.71	\$3.48	\$3.41	
	San Francisco	Comb	\$4.93	\$3.54	\$3.46	
	San Jose	Multi	\$4.87	\$3.61	\$3.49	
	San Jose	Soy	\$5.20	\$3.75	\$3.58	
	San Jose	YG	\$4.94	\$3.67	\$3.50	
	San Jose	Comb	\$5.04	\$3.70	\$3.54	
Central CA.	Bakersfield	CARB Diesel/SME				\$3.39
Southern CA	Coachella	YG	\$4.73			
	Los Angeles	Multi	\$4.77			
	Los Angeles	Soy	\$5.40			
	Los Angeles	Comb	\$5.08			
* SME-Soy methyl ester; YG-Yellow Grease; Multi-Multiple feedstocks; Comb- Combined biodiesel produced from different feedstocks; Multi-Multiple feedstocks for biodiesel production						

b. Cost of Enhanced Recordkeeping

Since staff is proposing to allow commercialization of biodiesel under Stage 3A with a significance threshold, staff must monitor the statewide effective biodiesel blend level to determine the rate at which the significance threshold is approached and also to be ready to implement appropriate mitigation strategies well before that significance threshold is reached. To this end, detailed market sales and related information would be required from biodiesel producers.

The primary costs involved will be the cost of recording and reporting essential information, including but not limited to: monthly biodiesel sales volumes by blend (B5, B10, B20, B100); geographic location of biodiesel marketers along with their specific blend sales; fleet-specific information (which fleets are using what blends, are

such fleets using new technology diesel engines, etc.); volume of renewable diesel and other low-NOx fuel sales by geographic location; and, sales of biodiesel produced from animal tallow feedstocks.

As shown in Table 10.3, staff estimates that a typical cost for enhanced recordkeeping for each producer will be about \$1,600 annually. For the 22 producers we are aware of, we estimate the total cost for recordkeeping to be \$35,200 per year.

Table 10.3: Estimate of Annual Cost of Enhanced Recordkeeping*

Number of Producers	Annual Recordkeeping Hrs. per Producer	Cost/Hr**	Annual Cost/Producer	Total Annual Cost for all Producers
22	40	\$40.00	\$1,600	\$35,200
<p>* Enhanced monitoring consists of: monthly biodiesel sales volumes by blend (B5, B10, B20, B100); geographic location of respective biodiesel blend sales; fleet information from downstream distributors; volume of renewable diesel and other Low-Nox fuel sales by geographic location; Sales of biodiesel produced from animal tallow feedstocks</p> <p>** Prevailing wage for environmental engineer (source: http://www.bls.gov/ooh/architecture-and-engineering/environmental-engineers.htm)</p>				

b. Cost of NOx Mitigation if Significance Level is Reached

Despite the very low likelihood of reaching the NOx significance threshold, staff estimated the cost of complying with the NOx mitigation measures. A detailed analysis of the cost of mitigation can be found in Appendix C and is summarized in Table 10.4. However, based on the analysis presented in Chapter 6, staff concludes that mitigation is highly unlikely to be needed and therefore, not included in the overall cost of the proposed regulation.

Table 10.4: Cost of Mitigating Biodiesel NOx Emissions

Mitigation Option	Cost per Biodiesel Gallon	Total Cost/Formulation
NOx Additives	\$0.25/gal	
ADF Certification		\$100,000-\$200,000
Low NOx Diesel	\$1.20/gal	

Expressed in 2013 dollars.

c. Total Cost of Biodiesel Under Proposed Regulation

Based on the estimates above, we expect the total cost of biodiesel as the first commercial ADF regulation to reflect primarily the cost of enhanced monitoring at \$1,600 per year per producer, or \$35,200 total cost per year for all producers. Upon implementation of the ADF regulation in 2015, the annual biodiesel production is projected to be 120 million gallons (see Appendix B, Table B1) for an incremental biodiesel cost of less than \$0.001 per gallon.

D. Economic Impacts Analysis on California Businesses

Generally speaking, the ADF market consists of those that produce, distribute and sell to end users. In California, biodiesel serves as a good model for future ADFs in that the production and use of an ADF will generally require an integrated distribution system.

Table 10.5 lists several businesses that support biodiesel use in California, including 22 biodiesel producers and 22 biodiesel distributor/blenders operating in the State. Thirty-three of these are small businesses, based on the North American Industry Classification System's (NAICS) definition for small businesses. The list of producers and distributors was derived from Dun & Bradstreet and the NBB's lists of biodiesel producers³⁵ and distributors³⁶. We expect that since the regulatory costs are predominately borne by ADF producers and those costs are low, there will be no little or minimal fiscal impacts to distributors, retailers, or end users. This includes the over 70 retail stations throughout California that sell biodiesel and biodiesel blends.

Table 10.5: List of Biodiesel Producers and Distributors in California

Biodiesel Producers	Small Business	NAICS
Accu Chem Conversion, Inc	unknown	424690
American Biodiesel, Inc.	yes	424720
Baker Commodities, Inc.	no	311613
Bay Biodiesel, LLC	yes	325199
Biodiesel Industries of Ventura, LLC	yes	333243
Biota Corporation	yes	115112
Crimson Renewable Energy, L.P.	yes	325110
Eco Energy Biodiesel, A California Corporation	yes	999990
Energy Alternative Solutions, Incorporated	no	324110
Footprint Recycling	yes	424720
Geogreen Biofuels, Inc.	yes	424720
Imperial Western Products, Inc., A California Corporation	yes	424590
New Leaf Biofuel, LLC	no	324110
Noil Energy Group, Inc.	yes	484121
North Star Biofuels, LLC	unknown	325110
Promethean Biofuels Cooperative Corporation	yes	311613
R Power Biofuels LLC	yes	325998
Simple Fuels Biodiesel	yes	454310
Sky Blue Bio-Fuels Inc	yes	325110
Socal Biofuel, Inc.	yes	325199
Wright Biofuels	yes	325414
Yokayo Biofuels	yes	445120

³⁵ National Biodiesel Board, *Biodiesel Plants Listing*, <http://www.biodiesel.org/production/plants/plants-listing> (accessed September 17, 2013)

³⁶ National Biodiesel Board, *Biodiesel Distributor Listings*, <http://www.biodiesel.org/using-biodiesel/finding-biodiesel/locate-distributors-in-the-us/biodiesel-distributor-listings> (accessed September 17, 2013)

Biodiesel Distributors		
Downs Energy	yes	447190
Eel River Fuels, Inc.	yes	424720
General Petroleum Corporation	no	424720
Goodspeed Auto-Fuel Systems, Inc.	no	454310
Inter-State Oil Co.	no	424720
Interstate Oil Company	yes	447190
NAPA Valley Petroleum, Inc.	no	424720
People's Fuel Cooperative	yes	325110
Propel Fuels	unknown	325110
Ramos Oil Company Inc.	yes	424720
Royal Petroleum Company	yes	424720
RTC Fuels, LLC	yes	445110
Southern Counties Oil Co.	yes	424710
Supreme Oil Co.	yes	454310
Tom Lopes Distributing, Inc.	yes	424720
W. H. Breshears, Inc.	yes	424710
Waterbrook Community Church	yes	813110
Lee Escher Oil Co	yes	424720
New West Petroleum	yes	424720
Pearson Fuels	yes	454319
Sirona Fuels	no	324110
SC Fuels	yes	424720

Since biodiesel will be the first ADF subject to this proposal, staff's analysis focused on the expected impacts to the biodiesel industry and primarily to biodiesel producers. Because we estimated the total cost impacts for the 22 biodiesel producers in aggregate are about \$35,200 annually, primarily in monitoring and recordkeeping costs. Based on the approximate 30 million gallons of biodiesel sold in California each year, we anticipate these minimal costs would not represent a significant adverse economic impact to businesses, even if these costs are passed along per gallon to businesses and consumers that purchase biodiesel blends.

E. Potential Economic Impacts to Consumers

As noted, we expect individual consumers would incur minimal or no costs as a result of the proposed regulation. Fuel suppliers already blend up to five volume percent biodiesel by volume in CARB diesel that is offered throughout the state. Higher blends of biodiesel are currently sold at a price premium relative to CARB diesel, but such premiums exist in the absence of the proposed regulation. Therefore, the proposal should not adversely affect retail prices for biodiesel blends based on the anticipated minimal costs discussed above.

F. Impacts to California State or Local Agencies

Several State agencies operate large fleets, often with many alternative fuel vehicles included in their fleet. According to the California Department of General Services (DGS) report, “2012 Progress Report for Reducing or Displacing Consumption of Petroleum Products by the State Fleet,” the State’s government fleet is using increasing amounts of alternative fuels, including biodiesel. However, as is the case with individual consumers and businesses that purchase biodiesel, we expect this regulation to have no significant cost impacts on purchasers of biodiesel fuel, including the State, due to the minimal costs of compliance for the biodiesel producers.

Staff also contacted municipalities that are well known for their use and promotion of biodiesel use. These cities included San Francisco, Los Angeles, Santa Monica, San Jose, San Diego, and Berkeley. Anecdotal evidence suggests most biodiesel sold in the State is sold near the production plants that are close to these municipalities. We are unaware of smaller municipalities in the Central Valley or mountainous regions of the State that are using biodiesel in significant quantities. Accordingly, the staff’s analysis focused on economic impacts to local agencies within the aforementioned areas. As shown in Table 10.2, we found that B5 and B20 are generally cost competitive with conventional CARB diesel, and based on the minimal compliance costs for the producers; we do not expect local agencies that purchase biodiesel for their fleets to be significantly affected by the proposed regulation.

G. Analysis of Cost Effectiveness on Cost per Gallon

Cost effectiveness is typically defined as the dollars spent to reduce a unit mass of a specified pollutant. Because the proposal is designed to maintain current environmental protections rather than achieve additional air pollution reductions, the concept of cost-effectiveness does not apply to the proposal. Nevertheless, upon implementation of the proposed ADF regulation in 2015, the regulatory costs of compliance (up to the low tens of thousands of dollars per year), if passed on to the consumer, would yield a per-gallon impact that is small (e.g., \$35,200 per year / 120 million gallons per year = \$0.0003 per gallon increase).

H. Analysis of Alternatives

During the development of this regulation, staff considered alternatives to the proposal. We determined that the proposal represents the least-burdensome approach that best achieves the objectives at the least cost. Specifically for biodiesel, we considered two alternatives to the proposal: business as usual (i.e., no proposed regulation), and requiring implementation of the mitigation measures for all biodiesel blends above B10 immediately without the proposed phase in process.

Regarding the business-as-usual alternative, we deemed this option as infeasible because it would leave in place the ad-hoc approach and separate regulatory and administrative procedures ARB staff currently uses when developing a motor vehicle fuel specification. By contrast, the proposal encourages the development and

commercialization of innovative, lower-carbon alternative diesel fuels by providing a single unified and comprehensive set of clear rules that ADF producers and importers would need to follow. This, in turn, would provide certainty to investors and producers of alternative diesel fuels.

We deemed the second alternative as infeasible because its costs would be substantially greater than the proposal and would not achieve more benefits. Indeed, this option has the potential to disrupt or even collapse the burgeoning ADF market by unnecessarily placing overly restrictive requirements that are not warranted by emissions testing. For example, ARB's testing program identified not only a significance threshold for biodiesel but also a number of factors that have the effect of reducing or eliminating the impacts on NOx emissions from higher blend levels of biodiesel (e.g., the use of new technology diesel engines, increasing use of renewable diesel and low-NOx diesel, the use of low-NOx additives). Immediately requiring NOx mitigation for any blend above B10 without the phase-in process set forth in the proposal would effectively ignore the aggregate benefits of these mitigating factors. By contrast, the proposal recognizes that mitigation, and its concomitant costs, may not even be needed for biodiesel if, for example, the trajectories for NTDE fleet penetration and use of renewable diesel proceed as we have projected. However, if mitigation was required for blends above B10 in 2015 (date of regulation implementation), the anticipated cost is about \$3 to \$14 million. This accounts for a mitigation cost of \$0.25/gal to \$1.20/gal for a biodiesel volume of 12 million gallons (10 percent of total biodiesel volume as shown in Table B.1)

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CHAPTER 11. SUMMARY AND RATIONALE

The Proposed ADF regulation is designed to allow a streamlined path to commercialization for new diesel substitutes, while ensuring no increase in air pollution from those fuels. This section discusses the requirements and rationale for each provision of the proposed regulation.

Subarticle 2. Commercialization of New Alternative Diesel Fuels

Section 2293 Purpose

Summary of section 2293

Section 2293 states the purpose of this regulation is to establish a comprehensive, multi-stage process governing the commercialization of new alternative diesel fuels (ADF) in California, ranging from the initial limited sales of an ADF, while it undergoes a screening evaluation, through expanded sales governed by enhanced monitoring, testing, and multimedia evaluations; and ending with full-scale commercial sales as warranted.

Rationale for section 2293

This section is needed to inform the regulated public and other market participants of this regulation's intent to foster the introduction and use of innovative ADFs in California, while ensuring no significant adverse impacts overall on public health or the environment, relative to conventional petroleum-based CARB diesel.

Section 2293.1 Applicability

Summary of section 2293.1(a)

Subsection(a) establishes January 1, 2015, as the effective date of this regulation, as well lays out general requirements that must be met in order to legally sell, or supply alternative diesel fuels (ADFs) in California.

Rationale for section 2293.1(a)

This section is needed to establish the implementation date, after which ADF sales will need to be either under an MOU with CARB, or meeting applicable requirements of the regulation, to be considered legal motor vehicle fuels in California.

Summary of section 2293.1(b)

Subsection(b) explicitly states specific actions that would constitute the intent of using an ADF for use in motor vehicles.

Rationale for section 2293.1(b)

This subsection provides clarity in defining when an ADF is intended to be used as a motor vehicle fuel for purposes of this regulation.

Summary of section 2293.1(b)(1)

Subsection (b)(1) states that ADFs stored at a facilities equipped and used to dispense ADFs into motor vehicles, will be considered to be intended for motor vehicle use.

Rationale for section 2293.1(b)(1)

This subsection establishes one of the criteria that would define intent to use an ADF as a motor vehicle fuel, thus subject to this regulation.

Summary of section 2293.1(b)(2)

Subsection (b)(2) states that ADFs delivered or intended for delivery to a facility equipped and used to dispense said ADFs into motor vehicles, as intended for motor vehicle use.

Rationale for section 2293.1(b)(2)

This subsection establishes one of the criteria that would define intent to use an ADF as a motor vehicle fuel, thus subject to this regulation.

Summary of section 2293.1(b)(3)

Subsection (b)(3) states that any ADF sold or supplied to a person engaged in the distribution of motor vehicle fuels to motor vehicle fueling facilities, is considered an ADF for motor vehicle use, unless said person takes reasonable prudent precautions to ensure the ADF is not used for motor vehicles.

Rationale for section 2293.1(b)(3)

This subsection establishes one of the criteria that would define intent to use an ADF as a motor vehicle fuel, thus subject to this regulation.

Summary of section 2293.1(c)

Subsection (c) states that each retail sale or supply of an ADF into a motor vehicle, shall be considered as such in the event this fuel is sold in violation of this article.

Rationale for section 2293.1(c)

This section is needed to establish the chain of strict liability for ADF sales. In other words, the ADF supplier or seller is not free of the responsibility for their part in the chain of custody for the ADF.

Section 2293.2 Definitions

Summary of section 2293.2 and subsections (a) through (ee)

This section proposes definitions to the terms used in the regulation.

Rationale for section 2293.2

It is necessary that ARB defines its terms as they apply to the Alternative Diesel Fuels regulation. Several of these terms are used in the same manner as other articles and titles in the California Code of Regulations, Government Code sections or statutes. It is necessary for ARB to be consistent with existing definitions to the extent that they apply to this regulation.

Section 2293.3 Exemptions

Summary of section 2293.3

Section 2293.3 introduces the list of exemptions that apply to this proposed regulation.

Rationale for section 2293.3

This section provides a general statement which introduces a list of exemptions applicable to this regulation.

Summary of section 2293.3(a)

The subsection clarifies that alternative diesel fuels with specifications under sections 2292-2297.7 of Sub article 1 are not subject to this regulation.

Rationale for section 2293.3(a)

Subsection (a) is needed to clarify that non ADFs with existing specifications are exempt from this regulation. Alternatively, ADFs without current specifications are subject to regulation.

Summary of section 2293.3(b)

Subsection (b) explains that CARB diesel additives are not considered ADFs when blended at less than 1 percent with CARB diesel.

Rationale for section 2293.3(b)

This section is needed to clarify that CARB diesel additives are not subject to this regulation when blended at less than 1 volume percent with CARB diesel, even if the additive is an ADF blended with 99 percent conventional CARB diesel. Likewise, this section clarifies that the proposed mitigation options requiring the use of additives are not subject to this requirement.

Summary of section 2293.3(c)

This section stipulates that ADFs intended to be used in fleets comprised of 95 percent or more new technology diesel engines are exempt from this regulation, provided they do not contribute to greater emissions of known pollutants relative to CARB diesel. The section also specifies that the ARB Executive Officer, may factor the volumes of ADFs used in NTDEs when determining if the significance threshold is being reached.

Rationale for section 2293.3(c)

The section provides an exemption to account for the fact that NTDEs equipped with mechanical devices can mitigate NOx emissions from biodiesel use, the only commercial ADF currently recognized by the regulation. As new ADFs emerge, this subsection allows the ARB Executive Officer to restrict volumes of the new ADF while determining if NTDEs also mitigate any pollutants of concern in future ADFs. The section also specifies that the ARB Executive Officer consider the ADF volumes being used in NTDEs when determining if the significance threshold is being reached for any particular ADF and also to determine the extent mitigation is required.

Summary of section 2293.3(d)

Subsection (d) explains that CARB diesel (under title 13 CCR section 2281, et. seq.) may contain up to 5 volume percent biodiesel and is exempt from this regulation. The section also stipulates that the ARB Executive Officer may factor the ADF volumes being used to make CARB diesel (and its emission reduction potential) when determining if the significance threshold is being reached for any particular ADF.

Rationale for section 2293.3(d)

The subsection is necessary to acknowledge that CARB diesel, which may contain less than 5 volume percent biodiesel, has not been shown to increase NOx emissions in the technical literature and therefore is not subject to the regulation. The section also specifies that the ARB Executive Officer may factor the volume of ADF being blended with conventional CARB diesel when determining any significance thresholds or the extent that mitigation would be required.

Section 2293.4 General Requirements Applicable to All ADFs

Summary of section 2293.4(a)

Subsection (a) states that an ADF must be registered with the U.S. EPA under 40 CFR part 79 prior to sale or supply for use in California.

Rationale for section 2293.4(a)

This section is necessary to ensure that future ADFs undergo the comprehensive federal registration program as a screening step to preclude any potential adverse public health impacts associated with ADF use before they are introduced into California. Future ADFs are already subject to the U.S. EPA registration program, thus inclusion of this requirement reaffirms the legal requirement for prospective ADF producers.

Summary of section 2293.4(b)

Subsection (b) states that effective January 1, 2015, no person shall sell or supply for use in California, and ADF, that does not meet all applicable California Department of Food and Agriculture (CDFA) regulatory requirements.

Rationale for section 2293.4(b)

Subsection (b) is necessary to reaffirm that ADF producers would be subject to current CDFA legal requirements and that these regulations are not superseded by this proposed regulation.

Summary of section 2293.4(c)

Subsection (c) states that upon implementation of the proposed regulation, no person shall sell or supply for use in California any ADF that does not meet all other applicable local, State, and Federal requirements.

Rationale for section 2293.4(c)

Subsection (c) is necessary for consistency to reaffirm that current local, State, and Federal requirements for ADFs remain in effect and will also require compliance.

Section 2293.5 Phase-In Requirements

Summary of section 2293.5

Section 2293.5 states that ADFs intended for use in motor vehicles that do not meet the requirements of this regulation by having a fuel specification or approved MOU in place cannot be sold without being in violation of this regulation.

Rationale for section 2293.5

This section is necessary to introduce the different stages of the regulation and the MOU requirements in Stage 1.

Summary of section 2293.5(a)

Subsection (a) explains the purpose of Stage 1 of the regulation.

Rationale for section 2293.5(a)

Subsection (a) is needed to provide context for the subsequent subsections regarding the Stage 1 requirements.

Summary of section 2293.5(a)(1)

Subsection (a)(1) states that ADFs subject to this regulation, may not be sold or supplied in California after the effective date of the regulation, unless the ADF producer enters into a MOU with CARB, or if the ADF fuel is already in subsequent stage of the regulation. The section also contains the lead sentence for a list of requirements to obtain an MOU, in subsections 2293.5(a)(1)(A) through 2293.5(a)(1)(R).

Rationale for section 2293.5(a)(1)

Subsection (a)(1) is needed to assert that an MOU with CARB is required prior to legal sale or supply for use of ADFs in California, unless said ADF is already in subsequent stage of the regulation.

Summary of section 2293.5(a)(1)(A)

Subsection (a)(1)(A) states that an estimate of expected program duration must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(A)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of candidate ADFs during the Stage 1 pilot program. This information will be included in the MOU and will be used calculate any ADF emissions effects over the program duration time period.

Summary of section 2293.5(a)(1)(B)

Subsections (a)(1)(B) states that an estimate of maximum number of vehicles or engines involved in the Stage 1 pilot program must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(B)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of candidate ADFs during the Stage 1 pilot program. This information will be included in the MOU and will allow staff to develop comprehensive understanding of pilot program parameters.

Summary of section 2293.5(a)(1)(C)

Subsections (a)(1)(C) states that the mileage duration per vehicle involved in the Stage 1 pilot program must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(C)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of candidate ADFs during the Stage 1 pilot program. This information will be included in the MOU and will allow staff to replicate any pilot program parameters if needed for future testing as well as facilitate the calculation of ADF emissions on a per mile basis.

Summary of section 2293.5(a)(1)(D)

Subsections (a)(1)(D) states that the quantity of fuel expected to be used in the pilot program must be submitted to ARB by the ADF producer when applying for a MOU. This volume is not to exceed the energy equivalent of one million gallons of diesel fuel per year, per ADF total vehicle involved in the Stage 1 pilot program.

Rationale for section 2293.5(a)(1)(D)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of candidate ADFs during the Stage 1 pilot program. This section is also needed to limit the volumes of emerging ADF volumes entering commerce, until comprehensive data regarding potential impacts or lack thereof are learned.

Summary of section 2293.5(a)(1)(E)

Subsections (a)(1)(E) states that information about the site(s) in which the testing during the Stage 1 Pilot Program will be conducted (including the street address, city, county, and zip code) must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(E)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of candidate ADFs during the Stage 1 pilot program. This information will be included in the MOU and will be used to evaluate the program site

location for potential conflicts with local or state government policies for any geographic areas in the State.

Summary of section 2293.5(a)(1)(F)

Subsections (a)(1)(F) states that the manner in which the distribution pumps will be labeled to ensure proper use of the test fuel in the pilot program must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(F)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of candidate ADFs during the Stage 1 pilot program. This information will be used to ensure that candidate ADFs are adhering to FTC labeling requirements as well as to assure staff candidate ADFs do not get mixed with other diesel fuels during the testing program.

Summary of section 2293.5(a)(1)(G)

Subsections (a)(1)(G) states that the name, address, telephone number, title of the person(s) and the name of the company or organization requesting entry into a Stage 1 pilot program must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(G)

This subsection is needed to establish contact information for the responsible party for dealings with CARB relative to the Stage 1 Pilot program.

Summary of section 2293.5(a)(1)(H)

Subsections (a)(1)(H) states that the name, address, telephone number, title of the person(s) and the name of the company or organization preparing the information needed for an MOU, if different from the information requested in subsection (a)(1)(G), must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(H)

This subsection is needed to establish who's the responsible party for the information submitted to CARB as part of the MOU application data requirements, if different from the information submitted as part of subsection (a)(1)(G). These responsible parties may include testing labs, or third parties.

Summary of section 2293.5(a)(1)(I)

Subsections (a)(1)(I) states that the chemical and physical properties of the candidate ADF including complete chemical speciation, Chemical Abstract Services (CAS) numbers (if available), density, energy content, vapor pressure, oxidative potential, distillation curve, log K_{ow} (water-octanol partition coefficient), and Henry's law coefficient must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(I)

This subsection is needed to request and obtain data to be used by staff for their evaluation of potential adverse emissions impacts resulting from use of the ADF in Stage 1. Some of this information will be included in the MOU as fuel parameters for the candidate ADF to ensure consistency of the fuel being evaluated in Stage 1.

Summary of section 2293.5(a)(1)(J)

Subsections (a)(1)(J) states that environmental information about the ADF including Material Safety Data Sheet(s) (MSDS) for all components of the candidate ADF, production process diagram, identification of potential human health effects, lifecycle flow diagram (including all stages of the process-raw material extraction, manufacturing, distribution, use and disposal including all intervening transportation steps), and potential release scenarios during production (including by-products), transportation and use, must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(J)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of potential adverse health impacts resulting from use of the ADF in Stage 1. This section is also needed because ADFs are generally cutting edge products with little data available for them. By requesting the information in subsection (a)(1)(J), staff can develop a comprehensive understanding of the ADF distribution infrastructure.

Summary of section 2293.5(a)(1)(K)

Subsections (a)(1)(K) states that the ADF producer applying for an MOU must identify whether the fuel is intended to be blended with diesel, whether it can be used as a neat fuel, or whether it can be used either way, must be submitted to ARB by the ADF producer when applying for a MOU.

Rationale for section 2293.5(a)(1)(K)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of the ADF in the pilot program. This section is also needed because ADFs are generally cutting edge products with little data available for them. By requesting the information in subsection (a)(1)(K), staff can evaluate an ADFs feasibility by verifying compatibility with existing conventional CARB Diesel infrastructure.

Summary of section 2293.5(a)(1)(L)

Subsections (a)(1)(L) states that the ADF producer applying for an MOU must identify the plan for commercialization of the ADF under this regulation and submit the information to ARB.

Rationale for section 2293.5(a)(1)(L)

This subsection is needed to request and obtain data to be used by staff for their evaluation and monitoring of the ADF in the pilot program. This section is also needed

because ADFs are generally cutting edge products with little data available for them. The requested information will allow staff to keep pace with emerging industry practices.

Summary of section 2293.5(a)(1)(M)

Subsections (a)(1)(M) states that the ADF producer applying for an MOU must provide the results of emissions testing completed on criteria pollutants and submit the information to ARB.

Rationale for section 2293.5(a)(1)(M)

This subsection is needed to request and obtain emissions testing results of ADFs to be used by staff in their evaluation of the ADF for potential increases of pollutants of concern such as PAH's or TAC's.

Summary of section 2293.5(a)(1)(N)

Subsections (a)(1)(N) states that the ADF producer applying for an MOU must provide attestation that the vehicles to be used in the pilot program are owned by the applicant or the applicant has received written consent from their owners to ARB.

Rationale for section 2293.5(a)(1)(N)

This subsection is needed to ensure ARB is not held responsible for damage to vehicles used as part of the ADF pilot program.

Summary of section 2293.5(a)(1)(O)

Subsections (a)(1)(O) states that the ADF producer applying for an MOU must provide the vehicle identification number (VIN) of each vehicle participating in the pilot program to ARB.

Rationale for section 2293.5(a)(1)(O)

This subsection is needed to ensure ARB staff obtain information that will allow them to verify the vehicle information submitted as part of the application for the MOU is accurate.

Summary of section 2293.5(a)(1)(P)

Subsections (a)(1)(P) states that the ADF producer applying for an MOU must provide an affirmative statement that the owner(s) of all vehicles to be used in the applicant's pilot program are aware of any possible warranty issues that may arise from the use of the candidate ADF or candidate ADF/CARB diesel blend in their engines.

Rationale for section 2293.5(a)(1)(P)

This subsection is needed as a protection for ARB against responsibility for any engine or vehicle damage incurred by using a Stage 1 ADF, under an MOU with CARB.

Summary of section 2293.5(a)(1)(Q)

Subsections (a)(1)(Q) is the lead sentence to a list of subsequent subsections indicating the declarations an ADF producer must make when applying for an MOU.

Rationale for section 2293.5(a)(1)(Q)

This subsection is needed as it introduces a list of requirements under subsections (a)(1)(Q) through (a)(1)(Q)(iii).

Summary of section 2293.5(a)(1)(Q)1.

Subsections (a)(1)(Q)(i.) states that an ADF producer must declare there is an existing fuel standard for the ADF as required by Business and Professions Code Chapter 14, sections 13400 to 13460 when applying for an MOU.

Rationale for section 2293.5(a)(1)(Q)1.

This subsection is needed to assure ADF producers applying for an MOU are adhering to other existing laws governing the use of ADFs.

Summary of section 2293.5(a)(1)(Q)2.

Subsections (a)(1)(Q)(ii.) states that an ADF producer must provide a copy of the developmental fuel variance the applicant has submitted to the California Department of Food and Agriculture pursuant to Business and Professions Code section 13405 and proof of its approval when applying for an MOU, if the information requested in subsection (a)(1)(Q)(i.) is not provided.

Rationale for section 2293.5(a)(1)(Q)2

This subsection is needed to ensure ADF producers applying for an MOU are adhering to existing laws governing the use of ADFs.

Summary of section 2293.5(a)(1)(Q)3

Subsections (a)(1)(Q)(iii.) states that an ADF producer must provide proof that the requirements of Business and Profession Code Section 12001– 13800 other than fuel quality have been met when applying for an MOU.

Rationale for section 2293.5(a)(1)(Q)3

This subsection is needed to ensure ADF producers applying for an MOU are aware of and adhering to existing laws governing the use of ADFs.

Summary of section 2293.5(a)(1)(R)

Subsections (a)(1)(R) states that an ADF producer must provide proof that the candidate ADF has been registered with the U.S. Environmental Protection Agency under 40 CFR 79.

Rationale for section 2293.5(a)(1)(R)

This subsection is needed to ensure ADF producers applying for an MOU are aware of and adhering to existing laws governing the use of ADFs.

Summary of section 2293.5(a)(2)

Subsection (a)(2) is the front part of a sentence that is completed in the subsequent subsections listing the steps in the application process once an MOU application is received by CARB.

Rationale for section 2293.5(a)(2)

This subsection is needed to initiate a chronological list of steps that ARB will take while reviewing an application for an MOU.

Summary of section 2293.5(a)(2)(A)

Subsections (a)(2)(A) states that the CARB executive Officer after receiving a pilot program application, shall advise the applicant in writing within 20 business days either that the application is provisionally complete or that specified additional information is required to make it provisionally complete.

Rationale for section 2293.5(a)(2)(A)

This subsection is needed to inform the ADF provider of the timely fashion in which their application for an MOU will be handled, consistent with ARB policy for application response times.

Summary of section 2293.5(a)(2)(B)

Subsections (a)(2)(B) states that the CARB Executive Officer after receiving the specified additional information required under subsection (A), will inform the applicant in writing within 15 business days either that the application is now provisionally complete or that specified additional information is still required to make it complete.

Rationale for section 2293.5(a)(2)(B)

This subsection is needed to inform the ADF provider of the timely fashion in which their subsequent submittal of information for an MOU will be handled, consistent with ARB policy for application response times.

Summary of section 2293.5(a)(2)(C)

Subsections (a)(2)(C) states that the CARB Executive Officer will deem the MOU application as incomplete if the additional information requested under subsections (A) or (B) are not received within 60 days of the request.

Rationale for section 2293.5(a)(2)(C)

This subsection is needed to inform the ADF provider of the consequences of not providing the additional information requested under subsection (A) or (B).

Summary of section 2293.5(a)(3)

Subsection (a)(3) is front part of a sentence that is completed in subsequent subsections through (a)(3)(D)(4.) that lists the procedure for public comment and final

action on a Stage 1 MOU application.

Rationale for section 2293.5(a)(3)

This subsection is needed to initiate a chronological list of steps that ARB will take on a MOU application that's has been deemed complete, but not yet approved.

Summary of section 2293.5(a)(3)(A)

Subsection (a)(3)(A) states that after deeming an application provisionally complete, the application will be posted on an ARB's web site at for 15 days for public comments related to potential factual or methodological errors. The applicant shall then make revisions to their application or submit a detailed written response to the Executive Officer explaining why no revisions are necessary within 30 days of the application being posted.

Rationale for section 2293.5(a)(3)(A)

This subsection is needed to inform the ADF provider of their obligation to address any factual or methodological errors in their MOU application within 30 days.

Summary of section 2293.5(a)(3)(B)

Subsection (a)(3)(B) states the Executive Officer shall either approve or disapprove the pilot program and notify the applicant of his/her decision in writing within 20 business days of receiving the applicant's response to the public comments under (A). If an application is disapproved, the Executive Officer will inform the applicant of the reasons for their application being disapproved.

Rationale for section 2293.5(a)(3)(B)

This subsection is needed to inform the ADF provider of the timely fashion in which a decision will made whether to approve or disapprove their complete application for an MOU, and their right to know the reasons if disapproved, consistent with ARB policy for application response procedures/protocols.

Summary of section 2293.5(a)(3)(C)

Subsection (a)(3)(C) states the Executive Officer shall disapprove a proposed pilot program if a determination is made that the candidate ADF poses an unacceptable risk to the community in which the pilot program is proposed to be conducted, or its risks substantially outweigh its benefits.

Rationale for section 2293.5(a)(3)(C)

This subsection is needed to provide ARB with the authority to disapprove a pilot program application if neccesary to protect the public health.

Summary of section 2293.5(a)(3)(D)

Subsection (a)(3)(C) states that no approval of a pilot program shall be effective without an approved Memorandum of Understanding between CARB and the applicant(s), with terms and conditions based on information provided pursuant to subsections (1)(A)--(R).

Subsection (a)(3)(C) also contains the front part of a sentence that is completed in the subsequent subsections listing information that will be used to determine the terms and conditions of the MOU.

Rationale for section 2293.5(a)(3)(D)

This subsection is needed to reassert the requirement to have an approved MOU before commencing an ADF pilot program as well as to initiate a the list of additional information that ARB will take into account when determining the Terms and conditions of an approved MOU for a pilot program.

Summary of section 2293.5(a)(3)(D)(1.)

Subsection (a)(3)(D)(1.) states the Executive Officer may request any additional information deemed necessary to fill in data gaps that may have been identified during the application process.

Rationale for section 2293.5(a)(3)(D)(1.)

This subsection is needed because many ADF's are on the cutting edge of motor vehicle fuels and additional information not already required pursuant to subsections (1)(A)--(R), may be needed to develop a pilot program that is comprehensive and protective of the public health.

Summary of section 2293.5(a)(3)(D)(2.)

Subsection (a)(3)(D)(2.) states that the Executive Officer may request additional toxicity testing and other testing if necessary and appropriate to better characterize any substance in the candidate ADF.

Rationale for section 2293.5(a)(3)(D)(2.)

This subsection is needed to provide ARB staff with authority to request follow up tests in the current testing required under subsection (M) does not provide assurances of no adverse emission or health impacts.

Summary of section 2293.5(a)(3)(D)(3.)

Subsection (a)(3)(D)(3.) states that applicants for an MOU must provide evidence of substantial progress in working in good faith with the original equipment/engine manufacturers of the engines involved in the MOU, consensus standards organizations, regulatory agencies, and other interested parties toward developing a consensus set of fuel specifications for the candidate ADF

Rationale for section 2293.5(a)(3)(D)(3.)

This subsection is needed to provide ARB staff assurance that the candidate ADF is being evaluated by agencies other the CARB in areas of their expertise such as motor vehicle engine compatibility, and performance standards.

Summary of section 2293.5(a)(3)(D)(4.)

Subsection (a)(3)(D)(4.) states that applicants for an MOU must use adequate controls to ensure appropriate fuel quality and performance in consideration of vehicle performance, impact on the environment and fuel production.

Rationale for section 2293.5(a)(3)(D)(4.)

This subsection is needed to provide ARB staff assurance that the applicant is taking prudent precautions to ensure the candidate ADF does not create unforeseen adverse impacts on the environment or vehicle performance.

Summary of section 2293.5(a)(4)

Subsection (a)(4) is an introductory sentence to frame how the applicant will operate under a Stage 1 approved MOU.

Rationale for section 2293.5(a)(4)

This subsection is needed to frame the information provided in subsections (a)(4)(A) through (a)(4)(E).

Summary of section 2293.5(a)(4)(A)

Subsection (a)(4)(A) is front part of a sentence that is completed in subsequent subsections through (a)(4)(B) through (a)(4)(E) that lists the operating guidelines of a stage 1 pilot program.

Rationale for section 2293.5(a)(4)(A)

This subsection is needed to initiate a list of operating parameters explained in subsequent subsections through (a)(4)(E).

Summary of section 2293.5(a)(4)(B)

Subsection (a)(4)(B) states that the Executive Officer may terminate or modify a MOU, with 30 days written notice to the applicant(s), for failure of the applicant(s) to comply with any of the terms and conditions of the MOU, failure to comply with any other applicable provision in this subarticle, or for good cause, which may include unacceptable risks to the community in which the pilot program is being conducted, or risks substantially outweighing the putative benefits of the candidate ADF.

Rationale for section 2293.5(a)(4)(B)

This subsection is needed to provide CARB with the authority to terminate a pilot program if necessary to protect the public health.

Summary of section 2293.5(a)(4)(C)

Subsection (a)(4)(C) states that the Executive Officer shall not revoke or modify an approved Stage 1 MOU without first affording the applicant an opportunity for a hearing in accordance with 17 CCR 60040 et seq.

Rationale for section 2293.5(a)(4)(C)

This subsection is needed to inform the applicant of their rights to a hearing before their MOU can be revoked or modified by ARB.

Summary of section 2293.5(a)(4)(D)

Subsection (a)(4)(D) informs the applicant that they may request a six month extension, renewable up to three times for their pilot program.

Rationale for section 2293.5(a)(4)(D)

This subsection is needed to inform the applicant of their rights to request up to three, six month extensions if their pilot program is not completed within the time specified under 2293.5(a)(1)(B).

Summary of section 2293.5(a)(4)(E)

Subsection (a)(4)(E) states that upon successful completion of the pilot program, the applicant(s) may submit an application for a Stage 2 MOU, as specified in section 2293.5(b).

Rationale for section 2293.5(a)(4)(E)

This subsection is needed to inform the applicant of their rights to request a Stage 2 MOU, upon completing the Stage 1 Pilot Program of their existing MOU.

Summary of section 2293.5(b)

Subsection (b) states the purpose of Stage 2, which is to allow limited but expanded fleet use of an ADF that has successfully undergone the Stage 1 pilot program and the overall requirements of Stage 2 including additional emissions and performance testing, conducted pursuant to a formal multimedia evaluation leading to the development of a fuel specification, as appropriate. Subsection (b) also defines the role of the multimedia evaluation in Stage 2, including its basis for determining whether the candidate ADF has an associated significance threshold for any criteria, toxic, or other air pollutant and how the establishment of a significance threshold will determine whether the candidate ADF can proceed to mitigated sales under Stage 3A or unmitigated sales under Stage 3B.]

Rationale for section 2293.5(b)

Subsection (b) is needed to provide context for the subsequent subsections through 2293.5(d)(3) regarding the Stage 2 requirements.

Summary of section 2293.5(b)(1)

Subsection (b)(1) states that a person who successfully completes a pilot program for a candidate ADF under section 2293.5(a) may apply for entrance into a Stage 2 for said ADF. Subsection (b) also states that the applicant must submit an application to the CARB to enter Stage 2 and provides a lead sentence to be completed in subsections (b)(1)(A) through (b)(1)(G) which list the information required by CARB to deem a Stage 2 application as complete.

Rationale for section 2293.5(b)(1)

This subsection is needed to inform the applicant of the option to increase their allowed ADF commercial volumes under the Stage 1 MOU, by applying for a Stage 2 MOU. This subsection also provides a lead sentence that initiates a list of operating protocols explained in subsequent subsections through (a)(4)(E).

Summary of section 2293.5(b)(1)(A)

Subsection (b)(1)(A) states that an application for a Stage 2 MOU must include an estimate of the planned duration for this stage, not to exceed one year, renewable up to four times or as otherwise provided in section 2293.5(b)(4).

Rationale for section 2293.5(b)(1)(A)

This subsection is needed to inform the applicant of the option to increase the length of duration of Stage 2 for their ADF.

Summary of section 2293.5(b)(1)(B)

Subsection (b)(1)(B) states that an application for a Stage 2 MOU must include an estimate of the maximum number of vehicles or engines involved in this stage along with a description of the emissions control technology.

Rationale for section 2293.5(b)(1)(B)

This subsection is needed to provide the applicant with one of the items needed to evaluate how comprehensive the ADF emissions studies for an ADF in Stage 2 will be, as well as to account for mechanical mitigation used in NTDEs when evaluating emissions characteristics of ADFs.

Summary of section 2293.5(b)(1)(C)

Subsection (b)(1)(C) states that the mileage duration per vehicle involved in Stage 2 must be provided to CARB as part of the Stage MOU application.

Rationale for section 2293.5(b)(1)(C)

This subsection is needed to request data that will be used by staff to evaluate and monitoring of candidate ADFs during Stage 2 of the regulation. This information will be included in the Stage 2 MOU and will allow staff to replicate any multimedia parameters if needed as well facilitate the calculation of ADF emissions on a per mile basis.

Summary of section 2293.5(b)(1)(D)

Subsection (b)(1)(D) states that the quantity of the candidate ADF fuel expected to be used in Stage 2, not to exceed the energy equivalent of 30 million gallons of diesel fuel per year, must be provided to CARB as part of the Stage 2 MOU application.

Rationale for section 2293.5(b)(1)(D)

This section is also needed to limit the volumes of emerging ADF volumes to 30 million gallons, until comprehensive data regarding potential impacts or lack thereof are learned.

Summary of section 2293.5(b)(1)(E)

Subsection (b)(1)(E) states that the site(s) in which the testing during this stage will be conducted (including the street address, city, county, and zip code) must be provided to CARB as part of the Stage 2 application.

Rationale for section 2293.5(b)(1)(E)

This subsection is necessary as this information will be included in the MOU and will be used to evaluate the program site location for potential conflicts with local or State government policies as they pertain to any geographic areas within the State.

Summary of section 2293.5(b)(1)(F)

Subsection (b)(1)(F) states that any changes or updates to the information submitted under 2293.5(a)(1)(F)—(R) to reflect the expanded scope of vehicles, locations, fuel volume, timeframe, and other aspects of operation under Stage 2 must be provided to CARB as part of the Stage 2 application.

Rationale for section 2293.5(b)(1)(F)

This subsection is necessary as this information will be used by staff to assess the progress of the ADF towards full commercialization as well as to account for potential increases in adverse or positive emissions impacts during Stage 2.

Summary of section 2293.5(b)(1)(G)

Subsection (b)(1)(G) states that the applicant must identify the test lab and principal investigator, including his/her curriculum vitae, who will be conducting the multimedia evaluation for the candidate ADF. This section also informs the applicant of their responsibility to identify and trade secret or confidential information in their application.

Rationale for section 2293.5(b)(1)(G)

This subsection is necessary for staff to determine the credentials and experience of the person(s) conducting the testing that will be used to generate the data for candidate ADFs, which will be used to determine for significance levels for any pollutants of concern and informs applicant of their responsibility to identify confidential information.

Summary of section 2293.5(b)(2)

Subsection (b)(2) is a framing sentence for subsequent subsections (A) and (B) related to the Stage 2 application completeness determination.

Rationale for section 2293.5(b)(2)

This section is necessary to inform the applicant of the following subsections content.

Summary of section 2293.5(b)(2)(A)

Subsection (b)(2)(A) states the Executive Officer shall advise the applicant in writing within 20 business days either that the application is complete or that additional information is required to make it complete.

Rationale for section 2293.5(b)(2)(A)

This subsection is necessary to inform the applicant of the time frame within which they can expect a response from CARB, to their initial Stage 2 application submittal.

Summary of section 2293.5(b)(2)(B)

Subsection (b)(2)(B) states that the Executive Officer, after receiving the information requested under subsection(b)(2)(A), will inform the applicant in writing within 15 business days if their application is complete or if additional information is still required.

Rationale for section 2293.5(b)(2)(B)

This subsection is needed to inform the applicant of the time frame within which they can expect a response from CARB, regarding their Stage 2 supplemental information submitted under subsections (b)(2)(A) or (b)(2)(B).

Summary of section 2293.5(b)(3)

Subsection (b)(3) is a framing sentence for subsequent subsections (b)(3)(A) through (b)(3)(D)(1.) relating to the Stage 2 public comments period and final actions on the application.

Rationale for section 2293.5(b)(3)

This section is necessary to inform the applicant of the following subsections content.

Summary of section 2293.5(b)(3)(A)

Subsection (b)(3)(A) states that after deeming an application provisionally complete, the application will be posted on an ARB's web site at for 30 days for public comments related to potential factual or methodological errors or vehicle performance information and that the applicant shall make revisions to their application or submit a response to the Executive Officer explaining why no revisions are necessary within 30 days of the application's posting.

Rationale for section 2293.5(b)(3)(A)

This section is necessary to inform the applicant of the public comment period on their application and of their responsibility to address any comments pertaining to potential factual or methodological errors or vehicle performance that may arise during the comment period.

Summary of section 2293.5(b)(3)(B)

Subsection (b)(3)(B) states that the Executive Officer shall either approve or disapprove the Stage 2 application within 20 business days of receiving the applicant's response to

the public comments and provide the applicant, if the application is denied, the reasons for the denial.

Rationale for section 2293.5(b)(3)(B)

This section is necessary to inform the applicant of time frame for the Executive Officer to reach a decision whether to approve or disapprove the Stage 2 application, and that the reasons for a decision to not approve the application, will be provided to them if that is the decision.

Summary of section 2293.5(b)(3)(C)

Subsection (b)(3)(C) states that the Executive Officer shall disapprove a proposed pilot program if he/she determines the use of the ADF poses an unacceptable risk to the community(ies) in which the program is proposed to be conducted, or its risks substantially outweigh the benefits.

Rationale for section 2293.5(b)(3)(C)

This subsection is needed to provide CARB with the authority to terminate a Stage 2 pilot program if necessary to protect the public health.

Summary of section 2293.5(b)(3)(D)

Subsection (b)(3)(D) states that approval of a Stage 2 program shall be effective only with an approved MOU executed between CARB and the applicant(s) that includes the terms and conditions the applicant must meet in order to provide the ADF fuel in California. The terms and conditions shall be based on the information specified in the Stage 2 MOU application. This subsection also provides an introductory sentence for a list of subsequent requirements in subsections (b)(3)(D)(1.) through (b)(3)(D)(3.).

Rationale for section 2293.5(b)(3)(D)

This subsection is needed to provide clarity that a Stage 2 pilot program is not CARB approved or legal, without an existing MOU between CARB and the applicant in place and to introduce the next three subsections listing additional information requirements of a Stage 2 MOU application.

Summary of section 2293.5(b)(3)(D)(1.)

Subsection (b)(3)(D)(1.) states the Executive Officer may request any additional information deemed necessary to fill in data gaps that may have been identified during the application process.

Rationale for section 2293.5(b)(3)(D)(1.)

This subsection is needed in the event information provided by the applicant pursuant to subsections (1)(A)--(G) results in the need for a closer look at the ADF, which may result in requests for additional information. The section is needed to authorize ARB to request this additional information beyond subsections (1)(A)--(G).

Summary of section 2293.5(b)(3)(D)(2.)

Subsection (b)(3)(D)(2.) states that the Executive Officer may request additional toxicity testing and other testing if necessary and appropriate to better characterize any substance in the candidate ADF.

Rationale for section 2293.5(b)(3)(D)(2.)

This subsection is needed to provide ARB staff with authority to request follow up tests if the testing conducted as part of the Stage 2 program does not provide adequate assurances of no adverse emission or health impacts resulting from use of the candidate ADF. The section is needed to authorize ARB to request these additional tests to obtain data on the candidate ADF.

Summary of section 2293.5(b)(3)(D)(3.)

Subsection (b)(3)(D)(3.) states that the applicant must provide evidence of substantial progress in working in good faith with the original equipment/engine manufacturers of the engines involved in the MOU, consensus standards organizations, regulatory agencies, and other interested parties, culminating in adoption of consensus standards by the end of Stage 2.

Rationale for section 2293.5(b)(3)(D)(3.)

This subsection is needed to provide ARB staff with assurances that the candidate ADF will be evaluated by all affected agencies during a multimedia evaluation in setting consensus standards for an ADF.

Summary of section 2293.5(b)(4)

Subsection (b)(4) is a framing sentence for subsequent subsections (b)(4)(A) through (b)(4)(D) relating to how the applicant must operate under a Stage 2 MOU

Rationale for section 2293.5(b)(4)

This section is necessary to apprise the applicant of the content of the subsequent subsections relating to operating under a Stage 2 MOU.

Summary of section 2293.5(b)(4)(A)

Subsection (b)(4)(A) states that the applicant must meet all the terms and conditions specified in the MOU.

Rationale for section 2293.5(b)(4)(A)

This section is needed to inform the applicant of their responsibility to adhere to the MOU terms and conditions.

Summary of section 2293.5(b)(4)(B)

Subsection (b)(4)(B) states that the Executive Officer may terminate or modify a MOU, with 30 days written notice to the applicant(s), for failure of the applicant(s) to comply with any of the terms and conditions of the MOU, failure to comply with any other applicable provision in this regulation, or for good cause, which may include

unacceptable risks to the community in which the pilot program is being conducted, or risks substantially outweighing the putative benefits of the candidate ADF.

Rationale for section 2293.5(b)(4)(B)

This subsection is needed to provide CARB with the authority to terminate a pilot program if necessary to protect the public health, or if the applicant is not meeting the terms and conditions of the MOU.

Summary of section 2293.5(b)(4)(C)

Subsection (b)(4)(C) informs the applicant that they may request a one year extension, renewable up to four times to complete their Stage 2 program; and that the Executive Officer may also extend their program duration for good cause, including completion of a multimedia evaluation.

Rationale for section 2293.5(b)(4)(C)

This subsection is needed to inform the applicant of their right to request up to four, one year extensions to complete their Stage 2 program. This section is also needed to provide CARB with the authority to extend the Stage 2 program for good cause, including completion of a multimedia evaluation.

Summary of section 2293.5(b)(4)(D)

Subsection (b)(4)(D) informs the applicant that they may sell, offer for sale, or supply an ADF intended for use in motor vehicles in California pursuant to either Stage 3A or 3B, whichever applies, as specified in section 2293.5(c) or (d), upon successful completion of the Stage 2 program.

Rationale for section 2293.5(b)(4)(D)

This subsection is needed to inform the applicant that successful completion the Stage 2 program allows full commercialization of their ADF under a Stage 3A or 3B program, whichever applies.

Summary of section 2293.5(b)(5)

Subsection (b)(5) is a framing sentence for subsequent subsections (b)(5)(A) through (b)(5)(E) relating to the multimedia evaluation and determination of significance threshold.

Rationale for section 2293.5(b)(5)

This subsection is needed to apprise the applicant of the content of the subsequent subsections relating to the multimedia evaluation and determination of significance threshold.

Summary of section 2293.5(b)(5)(A)

Subsection (b)(5)(A) states that the applicant shall conduct a prescribed multimedia evaluation under direction from ARB staff, pursuant to Health and Safety Code section 43830.8, the Multimedia Evaluation Guidance Document, and the approved Stage 2 MOU.

Rationale for section 2293.5(b)(5)(A)

This subsection is needed to inform the applicant of the requirement to conduct a multimedia evaluation pursuant to existing as well part of the Stage 2 MOU terms and conditions.

Summary of section 2293.5(b)(5)(B)

Subsection (b)(5)(B) states that the multimedia evaluation shall identify and evaluate any significant adverse impact on public health or the environment, including air, water, or soil, that may result from the production, use, or disposal of the ADF, relative to conventional CARB diesel, under Stage 2, 3A, and 3B.

Rationale for section 2293.5(b)(5)(B)

This section is needed to clearly identify the purpose of the multimedia evaluation conducted during Stage 2 of the regulation; the results of the multimedia evaluation will determine if the ADF proceeds to Stage 3A or 3B under 2293.5(b)(5)(C).

Summary of section 2293.5(b)(5)(C)

Subsection (b)(5)(C) states that the multimedia assessment shall also include an evaluation of potential mitigation measures for any significant impacts identified.

Rationale for section 2293.5(b)(5)(C)

This section is needed to provide the applicant with mitigation options, if needed, that would allow for further commercialization of their ADF while addressing any significant impacts identified during the multimedia evaluation.

Summary of section 2293.5(b)(5)(D)

Subsection (b)(5)(D) states that approval of a multimedia evaluation shall be subject to the provisions of Health and Safety Code section 43830.8.

Rationale for section 2293.5(b)(5)(D)

This section is needed to indicate the superseding statute governing the multimedia evaluation process conducted during Stage 2 of this regulation.

Summary of section 2293.5(b)(5)(E)

Subsection (b)(5)(E) states that the Executive Officer shall identify a significance threshold based on the multimedia evaluation conducted pursuant to this subsection. Approved significance thresholds shall be listed in Table 1 of section 2293.6

Rationale for section 2293.5(b)(5)(E)

This section is needed to direct the ARB to identify a significance threshold for the candidate ADF based on information learned during the multimedia evaluation and to identify where the significance thresholds shall be listed.

Summary of section 2293.5(b)(6)

Subsection (b)(6) is a framing sentence for subsequent subsections (b)(6)(A) through (b)(6)(F) which lists requirements to successfully complete the Stage 2 program, as well as disallowing the sale of the candidate ADF under Stage 3 without written approval from ARB.

Rationale for section 2293.5(b)(6)

This subsection is needed to introduce a list that will apprise the applicant of the requirements to successfully complete the Stage 2 program.

Summary of section 2293.5(b)(6)(A)

Subsection (b)(6)(A) states that the applicant must comply with all requirements specified in the approved Stage 2 MOU.

Rationale for section 2293.5(b)(6)(A)

This subsection is needed to inform the applicant that they must comply with the Stage 2 MOU requirements to successfully complete the Stage 2 program.

Summary of section 2293.5(b)(6)(B)

Subsection (b)(6)(B) states that the applicant must achieve adoption of all consensus standards applicable to the ADF.

Rationale for section 2293.5(b)(6)(B)

This subsection is needed to affirm the final goal of Stage 2 and the multimedia evaluation's purpose.

Summary of section 2293.5(b)(6)(C)

Subsection (b)(6)(C) states that the applicant must obtain approval of at least 75% of compression ignition engine original equipment manufacturers for which the ADF is expected or intended to be used for the ADF blend levels expected or intended to be used in those engines.

Rationale for section 2293.5(b)(6)(C)

This subsection is needed to protect the public from engine malfunctions or the voiding of the warranties for their vehicles, resulting from the commercialization of an ADF as a result of this regulation.

Summary of section 2293.5(b)(6)(D)

Subsection (b)(6)(D) states that the applicant must identify appropriate fuel specifications for the ADF and obtain written approval of those specifications by the Executive Officer.

Rationale for section 2293.5(b)(6)(D)

This subsection is needed to ensure ADF specifications remain consistent, thus providing certainty of fuel quality as well as establishing documented fuel parameters for testing, reporting, and enforcement purposes.

Summary of section 2293.5(b)(6)(E)

Subsection (b)(6)(E) states that the applicant must identify appropriate mitigation strategies for the ADF to be applied in the event the significance threshold identified by the Executive Officer is reached.

Rationale for section 2293.5(b)(6)(E)

This subsection is needed for ARB staff to request and obtain information needed as part of the monitoring for significance thresholds.

Summary of section 2293.5(b)(6)(F)

Subsection (b)(6)(F) states that the applicant must obtain a written determination by the Executive Officer that all the requirements of 2293.5(b)(6)(A) through 2293.5(b)(6)(E) have been met.

Rationale for section 2293.5(b)(6)(F)

This subsection is needed to reiterate the requirements of 2293.5(b)(6)(A) through 2293.5(b)(6)(E) as being necessary to a successful completion of the Stage 2 program.

Summary of section 2293.5(c)

Subsection 2293.5(c) introduces the reader to Stage 3A and begins a list of procedures, completed in subsequent subsections that shall apply to ADFs subject to mitigation before full commercial sale of the ADF is allowed.

Rationale for section 2293.5(c)

Subsection (c) is needed to provide context for subsequent subsections 2293.5(c)(1) through 2293.5(c)(5).

Summary of section 2293.5(c)(1)

Subsection 2293.5(c)(1) states that the Executive Officer shall determine the current ADF blend level and the blend level trajectory based on an analysis of ADF sales in recent year.

Rationale for section 2293.5(c)(1)

Subsection (c)(1) is needed to establish the first step CARB will take to determine significance thresholds for ADFs entering Stage 3.

Summary of section 2293.5(c)(2)

Subsection 2293.5(c)(2) states that the Executive Officer shall estimate the year(s) in which the effective ADF blend level is projected to reach 25%, 50%, 75%, and 95% of the significance threshold.

Rationale for section 2293.5(c)(2)

Subsection (c)(2) is needed to provide the ADF market with estimates of when mitigation may be needed allowing them to plan accordingly for costs attributable to mitigation if necessary.

Summary of section 2293.5(c)(2)(A)

Subsection 2293.5(c)(2)(A) states that the Executive Officer shall consider mitigating effects from a wide variety of factors when developing the estimates required in subsection (c)(2), using the methodology for calculating the effective ADF blend level in section 2293.6.

Rationale for section 2293.5(c)(2)(A)

Subsection (c)(2)(A) is needed to make clear that CARB will conduct a comprehensive review of information when determining for the significance levels described in subsection (c)(2).

Summary of section 2293.5(c)(2)(B)

Subsection 2293.5(c)(2)(B) states that the Executive Officer shall post the results of and basis for the estimates under (c)(2) on the ARB's website.

Rationale for section 2293.5(c)(2)(B)

This subsection is needed to inform the applicant that the ADF blend level estimates under (c)(2) will be made available, with explanation.

Summary of section 2293.5(c)(3)

Subsection 2293.5(c)(3) states that when the effective ADF blend level reaches 75% of the significance threshold, all suppliers of an affected ADF shall provide monthly reports to the Executive Officer; and that CARB post the mitigation strategies to be implemented once 95 percent of the significance threshold is reached.

Rationale for section 2293.5(c)(3)

This section is needed to inform the applicant of a potential change in reporting requirements and how the ADF blend level estimates will be made available to the public.

Summary of section 2293.5(c)(4)

Subsection 2293.5(c)(4) states that once the effective ADF blend level reaches 95% of the significance threshold, mitigation becomes mandatory and any ADF sold in the State must employ at least one of the mitigation strategies specified for that ADF.

Rationale for section 2293.5(c)(4)

This section is needed to inform the applicant of when the requirement to use a mitigation option would take effect.

Summary of section 2293.5(c)(5)

Subsection 2293.5(c)(5) states that individual producers of an ADF, may as a group, apply to the Executive Officer for an aggregate average mitigation plan. This subsection also informs the applicant of what is required for the this application as well as the Executive Officer's responsibility to advise the applicant in writing within 20 business days if the application is complete or not, and within 15 business if additional

information is submitted to make an application complete. This subsection also informs the applicant of information that will be considered by the executive officer when deciding to approve or disapprove the application and the process after a decision is made.

Rationale for section 2293.5(c)(5)

This section is needed to inform the applicant of an alternative option for mitigation requirements of Stage 3A, and the procedure for using said option.

Summary of section 2293.5(d)

Subsection 2293.5(d) states that if the Executive Officer determines that no significance threshold exists for an ADF, no mitigation measures or sales restrictions are required for that ADF. This section also states the applicant's new reporting requirements under Stage 3B, and the conduit for submitting them (LRT).

Rationale for section 2293.5(d)

This section is needed to inform the applicant of their new reporting requirements and authorization to pursue unlimited commercial sales of their ADF.

Summary of section 2293.5(d)(1)

Subsection 2293.5(d)(1) states that the applicant must report their sales volumes of ADF (A100) blendstock, if applicable.

Rationale for section 2293.5(d)(1)

This section is needed to inform the applicant of their reporting requirements under Stage 3B.

Summary of section 2293.5(d)(2)

Subsection 2293.5(d)(2) states that the applicant must report their sales volumes of ADF (A100) neat fuel, if applicable.

Rationale for section 2293.5(d)(2)

This section is needed to inform the applicant of their reporting requirements under Stage 3B.

Summary of section 2293.5(d)(3)

Subsection 2293.5(d)(3) states that the applicant must report their sales volumes of ADF/CARB diesel blend, if applicable.

Rationale for section 2293.5(d)(3)

This section is needed to inform the applicant of their reporting requirements under Stage 3B.

Section 2293.6 Significance Thresholds and Effective ADF Blend Levels

Summary of section 2293.6

Section 2293.6 states that an ADF for which a significance threshold has been determined, shall be subject to the Stage 3A provisions including mitigation requirements when the Executive Officer determines the effective ADF blend level will be at least 95% of the significance threshold. This section also provides a table as a reference tool demonstrating the significance thresholds and effective ADF blend levels for ADFs in Stage 3A.

Rationale for section 2293.6

This section is needed to provide a framework of the following subsections and to present the significance thresholds and effective ADF blend levels in a clear, easy to understand table.

Summary of section 2293.6(a)

Subsection 2293.6 (a) presents the formula that will be used to calculate the significance thresholds and effective ADF blend levels for biodiesel along with definitions for each of the variables used in the formula, including the specifications for Low NOx Diesel (one of the variables). This subsection also presents information regarding the effect of NTDE fleet penetration.

Rationale for section 2293.6(a)

This section is needed to inform the applicant of the methodology used to determine their candidate ADFs significance thresholds and effective ADF blend levels.

Summary of section 2293.6(b)

Subsection 2293.6 (b) states that “The effective ADF blend level for other ADFs is calculated as follows.”

Rationale for section 2293.6(b)

This section is needed as a placeholder for formulas to calculate significance thresholds and effective ADF blend levels of emerging ADFs that may arise in the future.

Section 2293.7 Specifications for Alternative Diesel Fuels

Summary of section 2293.7

Section 2293.7 is a lead sentence to be completed in subsections 2293.7(a) and (b) that provide the specifications that must be met by ADFs, if not under a mitigation strategy in effect.

Rationale for section 2293.7

This section is needed to provide a framework for subsequent subsections.

Summary of section 2293.7(a)

Section 2293.7(a) is a title line for biodiesel the specification subsection.

Rationale for section 2293.7(a)

This section is needed to provide a framework for subsequent subsections.

Summary of section 2293.7(a)(1)

Subsection 2293.7(a)(1) provides the specification for biodiesel blendstock or neat fuel (B100).

Rationale for section 2293.7(a)(1)

This section is needed to legally establish the legal biodiesel blendstock or neat fuel specifications under this regulation.

Summary of section 2293.7(a)(2)

Subsection 2293.7(a)(2) that the fuel specifications promulgated by the California Department of Food and Agriculture for biodiesel are applicable to ADFs must be met for biodiesel.

Rationale for section 2293.7(a)(2)

This section is needed to ensure this regulation does not conflict with existing statutes.

Summary of section 2293.7(b)

Subsection 2293.7(b) is a placeholder for specifications for ADFs other than biodiesel.

Rationale for section 2293.7(b)

This section is needed as a placeholder for specifications of emerging ADFs that may arise in the future.

Section 2293.8 Reporting and Recordkeeping

Summary of section 2293.8(a)

Section 2293.8 (a) states that the applicable sampling methodology set forth in 13 CCR section 2296 shall be used for sampling of fuel properties as required by the MOU.

Rationale for section 2293.8(a)

This subsection is needed to provide the applicant with guidance regarding their sampling requirements.

Summary of section 2293.8(b)

Section 2293.8(b) identifies this subsection as pertinent to reporting requirements.

Rationale for section 2293.8(b)

This subsection is needed to provide a framework for subsequent subsections.

Summary of section 2293.8(b)(1)

Section 2293.8(b)(1) states that any person operating under a Stage 1 or Stage 2 MOU must submit quarterly reports to the Executive Officer and shall include information specified in subsequent subsections.

Rationale for section 2293.8(b)(1)

This subsection is needed to provide information regarding reporting requirements and as a lead sentence to be completed in with the specific reporting requirements in subsequent subsections.

Summary of section 2293.8(b)(1)(A)

Section 2293.8(b)(1)(A) states that applicant shall provide the volume of ADF and ADF blend offered, supplied, or sold during each quarter.

Rationale for section 2293.8(b)(1)(A)

This subsection is needed to provide the applicant with their reporting requirements.

Summary of section 2293.8(b)(1)(B)

Section 2293.8(b)(1)(B) states that applicant shall provide the results of a specified number of representative samples, for fuel properties by test methods specified in the MOU.

Rationale for section 2293.8(b)(1)(B)

This subsection is needed to provide the applicant with their reporting requirements.

Summary of section 2293.8(b)(1)(C)

Section 2293.8(b)(1)(C) states that applicant shall provide information regarding the progress made toward completing the terms of the MOU.

Rationale for section 2293.8(b)(1)(C)

This subsection is needed to provide the applicant with their reporting requirements.

Summary of section 2293.8(b)(1)(D)

Section 2293.8(b)(1)(D) states that applicant shall provide the information regarding any changes or updates to information submitted during the application process regarding the beneficial or adverse impacts of the ADF in California.

Rationale for section 2293.8(b)(1)(D)

This subsection is needed to provide the applicant with their reporting requirements.

Summary of section 2293.8(b)(2)

Section 2293.8(b)(2) states that except as a person operating within Stage 3A must submit monthly reports to the Executive Officer.

Rationale for section 2293.8(b)(2)

This subsection is needed to provide information regarding reporting requirements for Stage 3A and as a lead sentence to be completed in with the specific reporting requirements in subsequent subsections.

Summary of section 2293.8(b)(2)(A)

Section 2293.8(b)(2) states that applicant shall provide the information regarding the volume of ADF and ADF blend offered, supplied, or sold during each month.

Rationale for section 2293.8(b)(2)(A)

This subsection is needed to inform the applicant with their reporting requirements.

Summary of section 2293.8(b)(2)(B)

Section 2293.8(b)(2)(B) states that applicant shall provide the information regarding results of a specified number of representative samples, for fuel properties by test methods specified in the MOU.

Rationale for section 2293.8(b)(2)(B)

This subsection is needed to inform the applicant with their reporting requirements.

Summary of section 2293.8(b)(2)(C)

Section 2293.8(b)(2)(C) states that applicant shall provide the information regarding the volume of other applicable quantity of the mitigation strategy used during each month.

Rationale for section 2293.8(b)(2)(C)

This subsection is needed to inform the applicant with their reporting requirements.

Summary of section 2293.8(b)(2)(D)

Section 2293.8(b)(2)(D) states that applicant shall provide the information regarding the blend rate of the mitigation survey during each month, if applicable. And that items submitted under subsections 2293.8(b)(2)(A)- 2293.8(b)(2)(C) shall be submitted each month pursuant to a determination by the EO that the effective blend rate has reached 75 percent.

Rationale for section 2293.8(b)(2)(D)

This subsection is needed to inform the applicant with their reporting requirements.

Summary of section 2293.8(b)(3)

Section 2293.8(b)(3) states that except as a person operating within Stage 3B must submit monthly reports to the Executive Officer.

Rationale for section 2293.8(b)(3)

This subsection is needed to provide information regarding reporting requirements for Stage 3B and as a lead sentence to be completed in subsequent subsections, with specific reporting requirements.

Summary of section 2293.8(c)

Section 2293.8(c) identifies this subsection as pertinent to recordkeeping requirements.

Rationale for section 2293.8(c)

This subsection is needed to provide a framework for subsequent subsections.

Summary of section 2293.8(c)(1)

Section 2293.8(c)(1) states that the ADF producer shall maintain, for two years from the date of each sampling, records showing the sample date, product sampled, container or other vessel sampled, final blend volume, and the results of the fuel properties by the proscribed test methods.

Rationale for section 2293.8(c)(1)

This subsection is needed to inform the applicant with their recordkeeping requirements.

Section 2293.9 Severability

Summary of section 2293.9

Section 2293.8 states that each part of this subarticle shall be deemed severable, and in the event that any part of this subarticle is held to be invalid, the remainder of this subarticle shall continue in full force and effect.

Rationale for section 2293.9

This subsection is needed to inform the applicant of their responsibility to adhere to all applicable requirements of this regulation, in the event that any part of this subarticle shall be deemed severable.

Subarticle 3. Ancillary Provisions

Section 2294. Equivalent Test Methods

Summary of and Rationale for section 2294

This is former section 2293 renumbered to section 2294 and grouped under new subarticle 3 for consistency and ease of reading.

Section 2295. Exemptions for Alternative Motor Vehicle Used in Test Programs

Summary of and Rationale for section 2295

This is former section 2293.5 renumbered to section 2295 and grouped under new subarticle 3 for consistency and ease of reading.

Appendix 1 Mitigation Measures

Summary of Appendix 1

This appendix includes various mitigation measures that apply when the effective blend level of a particular ADF reaches 95% of the specified significance threshold, as provided in the regulation.

Rationale for Appendix 1

This appendix is needed to identify the mitigation measures that ensure the State does not reach the specific significance threshold identified for an air pollutant of concern.

Summary of Appendix 1 (a)(1)

This section includes all of the mitigation options that are currently available to mitigate NOx emissions from biodiesel using additives.

Rationale for Appendix 1 (a)(1)

This section is needed to help consolidate all additive based NOx emissions mitigation options for biodiesel in one place.

Summary of Appendix 1 (a)(1)(A)

This section details the mitigation option of using Di-tertbutyl peroxide (DTBP) to mitigate NOx emissions from biodiesel.

Rationale for Appendix 1 (a)(1)(A)

This section is needed to ensure that the right ratios of DTBP to biodiesel are used in order to achieve NOx mitigation.

Summary of Appendix 1 (a)(1)(B)

This section is reserved in case more additives that can mitigate NOx increases from biodiesel are found in the future and may be added to this regulation.

Rationale for Appendix 1 (a)(1)(B)

This section is needed in case additional additives are added as biodiesel mitigation strategies in the future.

Summary of Appendix 1 (a)(2)

This section contains specifications for a low-NOx diesel base fuel that when blended with biodiesel, mitigates any increases in NOx.

Rationale for Appendix 1 (a)(2)

This section is needed to specify which fuels are considered low-NOx diesel.

Summary of Appendix 1 (a)(3)

This section details an option for certifying alternative diesel fuels and additives that can mitigate any NOx increases from biodiesel.

Rationale for Appendix 1 (a)(3)

This section is needed to allow for the regulated industry to develop innovative methods of mitigating NOx.

Summary of Appendix 1 (a)(3)(A)

This section details the requirements for applying for a certified ADF that is emissions equivalent to CARB diesel.

Rationale for Appendix 1 (a)(3)(A)

This section is needed so that applicants have a clear idea of what ARB is asking for them and how long ARB will take to respond to their applications.

Summary of Appendix 1 (a)(3)(B)

This section details the requirements of the candidate fuel for any certification testing.

Rationale for Appendix 1 (a)(3)(B)

This section is needed to make it clear what the requirements are for any candidate fuel that is undergoing certification.

Summary of Appendix 1 (a)(3)(B)(i)

This section specifies what the makeup of the candidate fuel is required to be for certification of biodiesel formulations.

Rationale for Appendix 1 (a)(3)(B)(i)

This section is needed to make it specifically clear to the applicant what the candidate fuel must be for biodiesel formulations.

Summary of Appendix 1 (a)(3)(B)(ii)

This section specifies what the makeup of the candidate fuel is required to be for certification of biodiesel additives.

Rationale for Appendix 1 (a)(3)(B)(ii)

This section is needed to make it specifically clear to the applicant what the candidate fuel must be for biodiesel additives.

Summary of Appendix 1 (a)(3)(C)

This section specifies what properties the applicant must test for in their candidate fuel.

Rationale for Appendix 1 (a)(3)(C)

This section is needed to ensure that all of the most important properties for determining whether the candidate fuel is acceptable are tested for.

Summary of Appendix 1 (a)(3)(D)

This section lists the properties of the additive certification blendstock.

Rationale for Appendix 1 (a)(3)(D)

This section is needed to ensure that all additives are tested on an equal basis to each other.

Summary of Appendix 1 (a)(3)(E)

This section lists the properties of the reference fuel.

Rationale for Appendix 1 (a)(3)(E)

This section is needed to ensure that each certification is compared to the same baseline as any other diesel fuel or alternative diesel fuel formulation.

Summary of Appendix 1 (a)(3)(F)

This section details the requirements of the certification testing program.

Rationale for Appendix 1 (a)(3)(F)

This section is needed to ensure that all certification tests are done in an equivalent manner.

Summary of Appendix 1 (a)(3)(F)(i)

This section lists the acceptable engines for testing of each certification.

Rationale for Appendix 1 (a)(3)(F)(i)

This section is needed to ensure that each certification test is done on an equivalent engine to the others and therefore are comparable.

Summary of Appendix 1 (a)(3)(F)(ii)

This section specifies that the party doing certification testing must be agreeable to both the applicant and ARB, and that the applicant must bear any costs for testing.

Rationale for Appendix 1 (a)(3)(F)(ii)

This section is needed to ensure that testing is done at laboratories that meet ARBs standards of quality.

Summary of Appendix 1 (a)(3)(F)(iii)

This section covers the specific requirements of testing protocols.

Rationale for Appendix 1 (a)(3)(F)(iii)

This section is needed to ensure that each applicant is able to develop a test protocol that is uniform and meets the needs of staffs analysis.

Summary of Appendix 1 (a)(3)(F)(iii)1.

This section outlines the different cold start and hot start cycles that are available to the applicant and the acceptable order of testing.

Rationale for Appendix 1 (a)(3)(F)(iii)1.

This section is needed to ensure that the tests are done in a way that eliminates diurnal and other non-random influences on the data.

Summary of Appendix 1 (a)(3)(F)(iii)2.

This section specifies provisions for testing including observation and schedule.

Rationale for Appendix 1 (a)(3)(F)(iii)2.

This section is needed to ensure that staff is able to observe the testing if necessary.

Summary of Appendix 1 (a)(3)(F)(iv)

This section specifies which emissions must be measured with each test.

Rationale for Appendix 1 (a)(3)(F)(iv)

This section is needed to ensure that each applicant is aware of the emissions that are required to be tested.

Summary of Appendix 1 (a)(3)(G)

This section sets forth the criteria for passing a certification test.

Rationale for Appendix 1 (a)(3)(G)

This section is needed to set specific, uniform criteria by which a fuel passes or fails a certification test.

Summary of Appendix 1 (a)(3)(G)(i)

This section sets for the criteria that NO_x and PM may not be higher for a candidate fuel than the reference fuel.

Rationale for Appendix 1 (a)(3)(G)(i)

This section is needed to ensure that passing fuels do not increase emissions.

Summary of Appendix 1 (a)(3)(G)(ii)

This section addresses the use of additives and additional criteria for fuels containing additives.

Rationale for Appendix 1 (a)(3)(G)(ii)

This section is needed to avoid unexpected emissions due to the use of additives.

Summary of Appendix 1 (a)(3)(G)(iii)

This section lays out the statistical calculation used to determine whether a fuel passes certification.

Rationale for Appendix 1 (a)(3)(G)(iii)

This section is needed to ensure fuels do not fail to pass based solely on reasonable random error.

Summary of Appendix 1 (a)(3)(H)

This section lays out what must be included in any MOU issued for fuels that pass certification.

Rationale for Appendix 1 (a)(3)(H)

This section is needed to ensure that MOUs issued to successful applicant are uniform and contain sufficient information as to be enforceable.

Summary of Appendix 1 (a)(3)(I)

This section covers requirements for in-use testing.

Rationale for Appendix 1 (a)(3)(I)

This section is needed to allow the use of in-use testing as an enforcement tool.

Summary of Appendix 1 (a)(3)(I)(i)

This section outlines what powers the executive officer has with regard to modifying executive orders issued to successful certifications, based on differences in emissions between the fuel tested and the fuel that is being sold.

Rationale for Appendix 1 (a)(3)(I)(i)

This section is needed to ensure that if applicants are selling a fuel that differs in emissions that what was tested, that can be accounted for in order to ensure no increase in emissions.

Summary of Appendix 1 (a)(3)(I)(ii)

This section details the rights of an applicant in the case that modifications to an Executive Order are needed.

Rationale for Appendix 1 (a)(3)(I)(ii)

This section is needed to let the applicant know their rights in case of a situation where an Executive Order needs to be modified.

Summary of Appendix 1 (b)

This section is a placeholder for mitigation measures for future ADFs.

Rationale for Appendix 1 (b)

This section is needed in case future ADFs go through the staged process and are found to need mitigation.

CHAPTER 12. REFERENCES

Note: The references are listed according to the footnote they correspond to in the ISOR. Not all footnotes are references and are only listed here to maintain the numbering system used for the ISOR footnotes. The footnotes that are not references are listed as “Explanatory Footnote.”

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Appendix C

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Appendix A

Proposed Regulation Order

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Appendix A PROPOSED REGULATION ORDER

Adopt new sections 2293, 2293.1, 2293.2, 2293.3, 2293.4, 2293.5, 2293.6, 2293.7, 2293.8, 2293.9, and Appendix 1, title 13, California Code of Regulations (CCR), to read as follows:

[Note: The entire text of sections 2293, 2293.1, 2293.2, 2293.3, 2293.4, 2293.5, 2293.6, 2293.7, 2293.8, 2293.9, and Appendix 1 is new language and shown as plain text. Existing sections 2290, 2291, 2292.1, 2292.2, 2292.3, 2292.4, 2292.5, 2292.6, and 2292.7 would be grouped as indicated under new subarticle 1 (Specifications for Current Alternative Motor Vehicle Fuels). Existing sections 2293 and 2293.5 would be renumbered to 2294 and 2295 and would be grouped as indicated under new subarticle 3 (Ancillary Provisions). The proposed amendments to existing text are shown in underline to indicate addition and ~~strikeout~~ to show deletions. All other portions remain unchanged and are indicated by the symbol are shown in s 2293 and .]

Chapter 5. Standards for Motor Vehicle Fuels Article 3. Specifications for Alternative Motor Vehicle Fuels

Subarticle 1. Specifications for Current Alternative Motor Vehicle Fuels

§2290. Definitions.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2291. Basic Prohibitions.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.1 Fuels Specifications for M100 Fuel Methanol.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.2 Specifications for M-85 Fuel Methanol.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.3 Specifications for E-100 Fuel Ethanol.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.4 Specifications for E-85 Fuel Ethanol.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.5 Specifications for Compressed Natural Gas.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.6 Specifications for Liquefied Petroleum Gas.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2292.7 Specifications for Hydrogen.

* * * * *

Note: Authority cited: Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016,

Subarticle 2. Commercialization of New Alternative Diesel Fuels

§2293. Purpose.

The purpose of this regulation is to establish a comprehensive, multi-stage process governing the commercialization of new alternative diesel fuels (ADF) in California, ranging from the initial limited sales of an ADF while it undergoes a screening evaluation; through expanded sales governed by enhanced monitoring, testing, and multimedia evaluations; and ending with full-scale commercial sales as warranted. This regulation is intended to foster the introduction and use of innovative ADFs in California while ensuring no significant adverse impacts overall on public health or the environment relative to conventional, petroleum-based CARB diesel.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code: and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.1. Applicability.

- (a) Starting January 1, 2015, no person shall sell, offer for sale or supply an alternative diesel fuel (ADF) intended for use in California unless the person is conducting such transactions pursuant to an approved Memorandum of Understanding issued to or otherwise applicable to that person under Stage 1 or 2 of this program, or the person is meeting all the applicable requirements under Stage 3A or 3B of this program.
- (b) An ADF shall be deemed to be intended for use in motor vehicles in California if it is:
 - (1) stored at a facility which is equipped and used to dispense that type of alternative diesel fuel to motor vehicles, or
 - (2) delivered or intended for delivery to a facility which is equipped and used to dispense that type of alternative diesel fuel to motor vehicles, or
 - (3) sold, offered for sale or supplied to a person engaged in the distribution of motor vehicle fuels to motor vehicle fueling facilities, unless the person selling, offering or supplying the fuel demonstrates that he or she has taken reasonably prudent precautions to assure that the fuel will not be used as a motor vehicle fuel in California.
- (c) For the purposes of this subarticle, each retail sale of alternative diesel fuel for use in a motor vehicle, and each supply of alternative diesel fuel into a motor vehicle

fuel tank, shall also be deemed a sale or supply by any person who previously sold or supplied such alternative diesel fuel in violation of this subarticle.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§ 2293.2. Definitions.

- (a) For the purposes of sections 2293 through 2293.9, the definitions in Health and Safety Code sections 39010 through 39060 shall apply, except as otherwise specified in this subarticle 2:
- (1) “Alternative diesel fuel” or “ADF” means any non-CARB diesel fuel used in a compression ignition engine that does not consist solely of hydrocarbons, and is not subject to a specification under title 13, CCR, section 2292. All ADFs that are substantially similar to an ADF subject to an approved Executive Order or MOU shall be deemed to fall within the class of ADFs subject to that same approved Executive Order or MOU.
 - (2) “Biodiesel” means a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the specifications set forth by the ASTM International in the latest version of *Standard Specification for Biodiesel Fuel Blend Stock (B100) for Middle Distillate Fuels* D6751 contained in the ASTM publication entitled: Annual Book of ASTM Standards, Section 5, as defined in 4 CCR 4140(a).
 - (3) “Biodiesel Blend” means biodiesel blended with petroleum-based diesel fuel.
 - (4) “Blend Level” means the ratio of an ADF to the CARB diesel it is blended with, expressed as a percent by volume. The blend level may also be expressed as “AXX,” where “A” represents the particular ADF and “XX” represents the percent by volume that ADF is present in the blend with CARB diesel (e.g., a 50% by volume biodiesel/CARB diesel blend is denoted as “B50”).
 - (5) “Blendstock” means a component that is either used alone or is blended with another component(s) to produce a finished fuel used in a motor vehicle. A blendstock that is used directly as a transportation fuel in a vehicle is considered a finished fuel.
 - (6) “B5” means a biodiesel blend containing no more than five percent biodiesel by volume.
 - (7) “B20” means a biodiesel blend containing more than five and up to 20 percent biodiesel by volume.

- (8) “CARB Diesel fuel” means a light or middle distillate fuel which may be comingled with up to five (5) volume percent biodiesel, and meeting the definition and requirements for “diesel fuel” or “California nonvehicular diesel fuel” as specified in 13 CCR 2281 et seq. “CARB Diesel fuel” may include, renewable diesel; gas-to-liquid fuels; Fischer-Tropsch fuels; CARB diesel blended with additives specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel; and CARB diesel specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel.
- (9) “Criteria Pollutant” means any air pollutant for which a California ambient air quality standard (CAAQS) or a national ambient air quality standard (NAAQS) has been established. A list of air pollutants for which a CAAQS or NAAQS has been established can be found at <http://www.arb.ca.gov/research/aaqs/aaqs2.pdf>, June 2013, which is incorporated herein by reference.
- (10) “Diesel Substitute” means any liquid fuel that is intended for use with CARB diesel or CARB diesel blends in a compression ignition engine. “Diesel substitute” includes, but is not limited to, renewable diesel; gas-to-liquid fuels; Fischer-Tropsch fuels; CARB diesel blended with additives specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel; and CARB diesel specifically formulated to reduce emissions of one or more criteria or toxic air contaminants relative to reference CARB diesel.
- (11) “Effective ADF Blend Level” means the actual, statewide-average ADF blend level, adjusted to account for various air pollution mitigating considerations, which may include but are not limited to, the use of various diesel substitutes that reduce air emissions of the pollutant for which the significance threshold was identified (e.g., renewable diesel, which reduces NO_x emissions); the fleet penetration of new technology diesel engines; composition of the feedstocks used to produce the ADF; volumes of lower-emission CARB diesel fuel, including those with emissions-reducing additives; and other factors as deemed appropriate by the Executive Officer. The effective ADF blend level is compared to the significance threshold to determine when to apply mitigation strategies for those ADFs for which the Executive Officer has identified a significance threshold.
- (12) “Executive Officer” means the Executive Officer of the Air Resources Board, or his or her designee.
- (13) “Executive Order” means the document signed by the Executive Officer, or his or her designee, which specifies the stage at which a regulated party(ies) for an ADF is or will be operating under, as provided in this subarticle, and any

enforceable terms, conditions, and requirements applicable to the regulated party(ies) must meet in order to sell, offer for sale, or supply that ADF for use in California.

- (14) “Finished Fuel” means a fuel that is used directly in a vehicle for transportation purposes without requiring additional chemical or physical processing.
- (15) “Hydrocarbon” means any chemical or mixture that is composed solely of hydrogen and carbon.
- (16) “Importer” has the same meaning as defined in the Low Carbon Fuel Standard (17 CCR 95481(a)).
- (17) “LCFS” means the Low Carbon Fuel Standard (17 CCR 95480—95490).
- (18) “Memorandum of Understanding (MOU)” means an enforceable agreement, executed between the Executive Officer and an applicant(s), which meets the requirements of this subarticle and specifies the terms and conditions by which the ADF at issue will be sold and used in California. MOUs issued under this subarticle are not subject to the Board’s reservation of powers pursuant to Board Resolution 78-10 (February 23, 1978) or Resolution 05-40 (July 21, 2005).
- (19) “Multimedia Evaluation” has the same meaning as defined in Health and Safety Code section 43830.8(b).
- (20) “Multimedia Evaluation Guidance Document” means the procedure governing the Executive Officer’s multimedia evaluation conducted prior to establishing a motor vehicle fuel specification. The multimedia evaluation guidance document (“Guidance Document and Recommendations on the Types of Scientific Information Submitted by Applicants for California Fuels Environmental Multimedia Evaluations”) is available at www.arb.ca.gov/fuels/multimedia/guidancedoc.pdf, June 2008, which is incorporated herein by reference.
- (21) “New Technology Diesel Engine (NTDE)” means a diesel engine that meets at least one of the following criteria:
 - (A) 2010 ARB emission standards for on-road heavy duty diesel engines under 13 CCR 1956.8.
 - (B) Tier 4 emission standards for non-road compression ignition engines under 13 CCR 2421, 2423, 2424, 2425, 2425.1, 2426, and 2427.
 - (C) Equipped with or employs a Diesel Emissions Control Strategy (DECS), verified by ARB pursuant to 13 CCR 2700 et seq., which uses selective catalytic reduction to control NOx.

- (22) “Non-ester renewable diesel” means a diesel fuel that is produced from nonpetroleum renewable resources but is not a mono-alkyl ester and which is registered as a motor vehicle fuel or fuel additive under 40 CFR Part 79, as amended by Pub. L. 91-604.
- (23) “Non-ester renewable diesel blend” means non-ester renewable diesel blended with petroleum-based diesel fuel.
- (24) “Non-petroleum renewable resources” means non-fossil fuel resources including but not limited to biomass, waste materials, and renewable crude.
- (25) “Performance Criteria” means a list of indicators, including but not limited to the total volume and volume percent represented by an ADF’s sales in California, that are specified by the Executive Officer for use in determining whether the significance level for a pollutant has been reached or will be reached.
- (26) “Person” has the same meaning as defined in Health and Safety Code section 39047 and includes, but is not limited to, alternative diesel fuel producers, importers, marketers and blenders. “Person” includes the plural when two or more persons are subject to an Executive Order executed or an interim or final fuel specification issued pursuant to the requirements of this subarticle.
- (27) “Producer” has the same meaning as defined in the Low Carbon Fuel Standard (17 CCR 94581(a)).
- (28) “Reference CARB Diesel” has the same meaning as “reference fuel” as that term is defined in 13 CCR 2282(g)(3).
- (29) “Significance Level” means, for a given pollutant X, either of the following, whichever applies:
- (A) For an ADF blended with CARB diesel, the significance level means the blend level of the ADF below which the combined effects of:
 - 1. the use of the ADF in new technology diesel engines, and
 - 2. the use of diesel substitutes that reduce emissions of X result in no increase in the emissions of X.
 - (B) For an ADF used as a neat fuel, the significance level means any use of the ADF below which there is no increase in the emissions of X.
- (30) “Toxic Air Contaminant” means any substance identified or designated by the Air Resources Board as a toxic air contaminant pursuant to Health and Safety

Code sections 39655 or 39657, or is designated as a hazardous air pollutant under section 112 of the federal Clean Air Act (42 U.S.C 7412).

(31) “Trade Secret” has the same meaning as defined in Government Code section 6254.7.

(b) List of Acronyms and Abbreviations

AAQS	Ambient Air Quality Standards
ADF	Alternative Diesel Fuels
ARB or Board	California Air Resources Board
CAA or the Act	Clean Air Act
CDFA	California Department of Food and Agriculture
CEPC or Council	California Environmental Policy Council
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CCR	California Code of Regulations
DME	Dimethyl Ether
DMS	Division of Measurement Standards, (Division within CDFA)
EISA	Energy Independence and Security Act of 2007
EO	Executive Officer
FAME	Fatty Acid Methyl Esters
GHG	Greenhouse Gas
HC	Hydrocarbons
H&SC	California Health and Safety Code
LCFS	California Low Carbon Fuel Standard
MMT	Million Metric Tons
MMWG	Multimedia Working Group
MOU	Memorandum of Understanding
NOx	Oxides of Nitrogen
NREL	National Renewable Energy Lab
NTDE	New technology diesel engines
OSFM	Office of the State Fire Marshal
PAHs	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matter
ppmw	Parts per Million by Weight
RFS	Renewable Fuels Standard
SCR	Selective Catalytic Reduction
SWRCB	California State Water Resources Control Board
SVO	Straight Vegetable Oil
U.S. EPA	U.S. Environmental Protection Agency

UST
WVO

Underground Storage Tanks
Waste Vegetable Oil

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.3. Exemptions.

This subarticle does not apply to any of the following, as specified:

- (a) Fuels that have a specification under sections 2292—2292.7 of subarticle 1;
- (b) CARB diesel blends comprised solely of CARB diesel and one or more diesel additives comprising in the aggregate no more than 1.0 percent by volume of the CARB diesel blend. This provision does not apply to additives used pursuant to the mitigation measures specified in Appendix 1;
- (c) ADF fuels used in fleets comprising 95 percent or more new technology diesel engines (NTDE) are presumed to be exempt from the mitigation requirements specified in this subarticle. To the extent the use of an ADF in such NTDEs reduce or result in no greater emissions of one or more criteria, toxic, or other air pollutants relative to conventional CARB diesel, the Executive Officer may include the volume and emission reduction ability of that ADF in those NTDEs when determining whether the significance threshold has been reached in a specified year and, if so, the extent mitigation is required pursuant to section 2293.6; and
- (d) CARB diesel fuel is exempt from the mitigation requirements specified in this subarticle. To the extent the use of CARB diesel fuel with beneficial properties reduces emissions of one or more criteria, toxic, or other air pollutants relative to conventional CARB diesel, the Executive Officer may include the volume and emission reduction ability of that CARB diesel fuel when determining whether the significance threshold has been reached in a given year and, if so, the extent mitigation is required pursuant to section 2293.6.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.4. General Requirements Applicable to All ADFs.

In addition to the requirements in 2293.5, starting January 1, 2015, no person shall sell, offer for sale or supply an ADF intended for use in motor vehicles in California unless that ADF meets the requirements set forth in this subarticle 2.

- (a) Has been registered with U.S. EPA under 40 CFR part 79 prior to its first sale, offer for sale, or supply for use in California.
- (b) Meets all applicable regulatory requirements promulgated by the California Department of Food and Agriculture (including, but not limited to, 4 CCR sections 4140—4148, 4200, and 4202—4205).
- (c) Meets all other applicable local, State, and federal requirements.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.5. Phase-In Requirements.

[Note: The goal of this comprehensive process is to foster the introduction of new, lower polluting ADF fuels by allowing the limited sales of innovative ADFs in stages while emissions, performance, and environmental impacts testing is conducted. This testing is intended to develop the necessary, real-world information to quantify the environmental and human health benefits from using new ADFs, determine whether these fuels have any significant adverse environmental impacts relative to conventional CARB diesel, and identify any vehicle/engine performance issues such fuels may have.]

It is a violation of this article for any person to sell, offer for sale, or supply an ADF intended for use in motor vehicles in California that does not meet the requirements of this subarticle or an approved Stage 1 MOU, Stage 2 MOU, or an applicable fuel specification under Stage 3A or 3B, as provided in this subarticle.

(a) Stage 1: Pilot Program.

[Note: The purpose of this stage is to allow limited, small fleet use of innovative fuels while requiring screening tests and assessments to quickly determine whether there will be unreasonable potential impacts on air quality, the environment and vehicular performance. Such data will help inform more extensive testing and analysis to be conducted in Stage 2. This Stage 1 is modeled after the existing ARB regulation that provides limited, fuel test program exemptions under 13 CCR 2259.]

(1) Stage 1 Application.

No person, who is not already subject to Stage 2 or has obtained an approved fuel specification under Stage 3A or 3B, may sell, offer for sale, or supply a candidate ADF intended for use in motor vehicles in California without an approved Stage 1 MOU governing the limited sales and use of that candidate ADF. A person seeking a Stage 1 MOU must submit an application to the Executive Officer that includes all the following information:

- (A) Expected program duration, not to exceed one year except as provided in section 2293.5(a)(4)(B) below;
- (B) An estimate of the maximum number of vehicles or engines involved in the program;
- (C) The mileage duration per vehicle involved in this stage;
- (D) The quantity of fuel expected to be used in the pilot program, not to exceed the energy equivalent of one million gallons of diesel fuel per year, per ADF total;
- (E) The site(s) in which the testing during this stage will be conducted (including the street address, city, county, and zip code);
- (F) The manner in which the distribution pumps will be labeled to ensure proper use of the test fuel;
- (G) The name, address, telephone number, title of the person(s) and the name of the company or organization requesting entry into a Stage 1 pilot program; and
- (H) If different from the information in (G) above, the name, address, telephone number and title of the person(s) and the name of the company or organization responsible for recording and making the information specified above available to the Executive Officer and the location in which such information will be maintained.
- (I) Chemical and physical properties of the candidate ADF: complete chemical speciation, Chemical Abstract Services (CAS) numbers (if available), density, energy content, vapor pressure, oxidative potential, distillation curve, log K_{ow} (water-octanol partition coefficient), and Henry's law coefficient.
- (J) Environmental information about the ADF: Material Safety Data Sheet(s) (MSDS) for all components of the candidate ADF, production process diagram, identification of potential human health effects, lifecycle flow diagram (including all stages of the process-raw material extraction, manufacturing, distribution, use and disposal including all intervening transportation steps), and potential release scenarios during production (including by-products), transportation and use.
- (K) Identify whether the fuel is intended to be blended with diesel, whether it can be used as a neat fuel, or whether it can be used either way.
- (L) Plan for commercialization under this regulation.
- (M) Emissions testing completed on criteria pollutants.

- (N) Attestation that the vehicles to be used in the pilot program are owned by the applicant or the applicant has received written consent from their owners.
- (O) The vehicle identification number (VIN) of each vehicle participating in the pilot program.
- (P) Affirmative statement that the owner(s) of all vehicles to be used in the applicant's pilot program are aware of any possible warranty issues that may arise from the use of the candidate ADF or candidate ADF/CARB diesel blend in their engines.
- (Q) A declaration by the applicant that:
 - 1. there is an existing fuel standard for the ADF as required by Business and Professions Code Chapter 14, sections 13400 to 13460; or if no such standard exist,
 - 2. a copy of the developmental fuel variance the applicant has submitted to the California Department of Food and Agriculture pursuant to Business and Professions Code section 13405 and proof of its approval; and,
 - 3. the requirements of Business and Profession Code Section 12001–13800 other than fuel quality have been met; and,
 - 4. the California Department of Food and Agriculture received a copy of the application required to be submitted under 13 CCR §2293.5.
- (R) Proof that the candidate ADF has been registered with the U.S. Environmental Protection Agency under 40 CFR 79.

It is the responsibility of the applicant to identify any specific portion of the information submitted above as trade secret. Any such trade secret information identified by the applicant shall be treated pursuant to 17 CCR 91000—91022 and the California Public Records Act (Government Code sec. 6250 et seq.).

(2) Stage 1 Application Completeness Determination.

- (A) After receiving a pilot program application, the Executive Officer shall advise the applicant in writing within 20 business days either that the application is provisionally complete or that specified additional information is required to make it provisionally complete.
- (B) After receiving the additional information required under (A), the Executive Officer shall advise the applicant in writing within 15 business days either that the application is now provisionally complete or that specified additional information is still required to make it complete.

- (C) If additional information is required and not received within 60 days the application will be deemed incomplete.
- (3) Public Comment and Final Action on a Stage 1 Application.
- (A) After deeming an application provisionally complete, the Executive Officer shall post the application on ARB's internet web site at for 15 business days for public comments. Only comments related to potential factual or methodological errors may be considered by the Executive Officer. Within 30 calendar days, the applicant shall either make revisions to its application and submit those revisions to the Executive Officer, or submit a detailed written response to the Executive Officer explaining why no revisions are necessary.
 - (B) Within 20 business days of receiving the applicant's response to the public comments under (A), the Executive Officer shall either approve or disapprove the pilot program. The Executive Officer shall notify the applicant of his/her decision in writing and provide, if the application is denied, the reasons for the denial.
 - (C) The Executive Officer shall disapprove a proposed pilot program if he/she determines the use of the candidate ADF, under the terms and conditions of the pilot program as proposed, poses an unacceptable risk to the community in which the pilot program is proposed to be conducted, or its risks substantially outweigh the putative benefits of using the candidate ADF.
 - (D) No approval of a pilot program shall be effective without an approved Memorandum of Understanding (MOU) executed between the Executive Officer and the applicant(s). The MOU shall include terms and conditions that the applicant must meet in order to provide the candidate ADF fuel in California during the term of the MOU. The terms and conditions shall be based on the information specified in (1)(A)--(R) above, as well as require the following:
 - 1. any additional information the Executive Officer determines is necessary to fill in data gaps that may have been identified during the application process;
 - 2. additional toxicity and other testing the Executive Officer determines is necessary and appropriate to better characterize any substance in the candidate ADF; and
 - 3. evidence of substantial progress in working in good faith with the original equipment/engine manufacturers of the engines involved in the MOU, consensus standards organizations (e.g., ASTM),

regulatory agencies, and other interested parties toward developing a consensus set of fuel specifications for the candidate ADF.

4. The use of adequate controls to ensure appropriate fuel quality and performance in consideration of vehicle performance, impact on the environment and fuel production. Appropriate controls include but are not limited to the use of interim fuel specifications and consensus standards.

(4) Operation under a Stage 1 MOU.

- (A) For the duration of the MOU, the applicant must meet all the terms and conditions specified therein;
- (B) The Executive Officer may terminate or modify a MOU, with 30 days written notice to the applicant(s), for failure of the applicant(s) to comply with any of the terms and conditions of the MOU, failure to comply with any other applicable provision in this subarticle, or for good cause. Good cause includes, but is not limited to, a determination by the Executive Officer that the information submitted in the application was inaccurate or incomplete and that the use of the ADF, under the terms and conditions of the approved pilot program, may pose an unacceptable risk to the community in which the pilot program is being conducted, or its risks substantially outweigh the putative benefits of using the candidate ADF;
- (C) The Executive Officer shall not revoke or modify an approved Stage 1 MOU without first affording the applicant an opportunity for a hearing in accordance with 17 CCR 60040 et seq.;
- (D) In the event an applicant cannot complete an approved pilot program within the allotted time, the applicant(s) may request a six month extension, renewable up to three times; and
- (E) Upon successful completion of the pilot program, the applicant(s) may submit an application for a Stage 2 MOU, as specified in section 2293.5(b) below.

(b) *Stage 2: Development of Fuel Specification.*

[Note: The purpose of this stage is to allow limited but expanded fleet use of an ADF that has successfully undergone the Stage 1 pilot program. Stage 2 candidate ADFs undergo additional emissions and performance testing to better characterize potential impacts on air quality, the environment and vehicular performance. This testing and assessment will be conducted pursuant to a formal multimedia evaluation leading to the development of a fuel specification, as appropriate. Further, the multimedia evaluation

will be the basis for determining whether the candidate ADF has an associated significance threshold for any criteria, toxic, or other air pollutant. The establishment of a significance threshold determines whether the candidate ADF can proceed to mitigated sales under Stage 3A or unmitigated sales under Stage 3B.]

(1) Stage 2 Application.

A person who has successfully completed a pilot program for a candidate ADF under section 2293.5(a) may apply for entrance into a Stage 2 for that candidate ADF. An applicant for Stage 2 must submit an application to the Executive Officer that includes all the following information:

- (A) Planned duration for this stage, not to exceed one year, renewable up to four times or as otherwise provided in section 2293.5(b)(4);
- (B) An estimate of the maximum number of vehicles or engines involved in this stage along with a description of the emissions control technology;
- (C) The mileage duration per vehicle involved in this stage;
- (D) The quantity of the candidate ADF fuel expected to be used in this stage, not to exceed the energy equivalent of 30 million gallons of diesel fuel per year;
- (E) The site(s) in which the testing during this stage will be conducted (including the street address, city, county, and zip code);
- (F) Any changes or updates to the information submitted under 2293.5(a)(1)(F)—(S) to reflect the expanded scope of vehicles, locations, fuel volume, timeframe, and other aspects of operation under Stage 2. For each of these items, the applicant must specify whether there has been no change or update, or if there has been a change or update, what that change or update is; and
- (G) Identification of the test lab and principal investigator, including his/her curriculum vitae, who will be conducting the multimedia evaluation for the candidate ADF.

It is the responsibility of the applicant to identify any specific portion of the information submitted above as trade secret. Any such trade secret information identified by the applicant shall be treated pursuant to 17 CCR 91000—91022 and the California Public Records Act (Government Code sec. 6250 et seq.).

(2) Stage 2 Application Completeness Determination

- (A) After receiving a Stage 2 application, the Executive Officer shall advise the applicant in writing within 20 business days either that the application is provisionally complete or that specified additional information is required to make it provisionally complete;
- (B) After receiving the additional information required under (A), the Executive Officer shall advise the applicant in writing within 15 business days either that the application is now provisionally complete or that specified additional information is still required to make it provisionally complete.

(3) Public Comment and Final Action on a Stage 2 Application

- (A) After deeming an application provisionally complete, the Executive Officer shall post the application on ARB's internet web site for 30 calendar days for public comments. Only comments related to potential factual or methodological errors or information regarding vehicle performance may be considered by the Executive Officer. Within 30 days, the applicant shall either make revisions to its application and submit those revisions to the Executive Officer, or submit a detailed written response to the Executive Officer explaining why no revisions are necessary;
- (B) Within 20 business days of receiving the applicant's response to the public comments under (A), the Executive Officer shall either approve or disapprove the Stage 2 application. The Executive Officer shall notify the applicant of his/her decision in writing and provide, if the application is denied, the reasons for the denial;
- (C) The Executive Officer shall disapprove a proposed pilot program if he/she determines the use of the ADF, under the terms and conditions of the Stage 2 program as proposed, poses an unacceptable risk to the community(ies) in which the program is proposed to be conducted, or its risks substantially outweigh the putative benefits of using the ADF;
- (D) No approval of a Stage 2 program shall be effective without an approved Memorandum of Understanding (MOU) executed between the Executive Officer and the applicant(s). The MOU shall include terms and conditions that the applicant must meet in order to provide the ADF fuel in California during the term of the MOU. The terms and conditions shall be based on the information specified in (1)(A)-(G) above, as well as require the following:

1. any additional information requested in writing by the Executive Officer to fill in data gaps that may have been identified during the application process;
 2. additional toxicity and other testing the Executive Officer determines is necessary and appropriate to better characterize any substance in the ADF;
 3. substantial progress in working in good faith with the original equipment/engine manufacturers of the engines involved in the MOU (e.g., Westport, Volvo, etc.), consensus standards organizations (e.g., ASTM), regulatory agencies, and other interested parties toward developing a consensus set of fuel specifications for the ADF. These efforts must culminate in adoption of consensus standards by the end of the Stage 2 MOU.
- (4) Operation under a Stage 2 MOU
- (A) For the duration of the MOU, the applicant must meet all the terms and conditions specified therein;
 - (B) The Executive Officer may terminate a MOU, with 30 days written notice to the applicant(s), for failure of the applicant(s) to comply with any of the terms and conditions of the MOU, failure to comply with any other applicable provision in this subarticle, or for good cause. Good cause includes, but is not limited to, a determination by the Executive Officer that the information submitted in the application was inaccurate or incomplete and that the use of the ADF, under the terms and conditions of the approved Stage 2 program, may pose an unacceptable risk to the community in which the Stage 2 program is being conducted, or its risks substantially outweigh the putative benefits of using the ADF;
 - (C) In the event an applicant cannot complete an approved Stage 2 program within the allotted time, the applicant(s) may request a 1 year extension, renewable up to four times. The Executive Officer may provide additional extensions due to delays in completion of a multimedia evaluation, adoption of the applicable consensus standards, or for other good cause;
 - (D) Upon successful completion of the Stage 2 program, the applicant(s) may sell, offer for sale, or supply an ADF intended for use in motor vehicles in California pursuant to either Stage 3A or 3B, whichever applies, as specified in section 2293.5(c) or (d) below.

(5) Multimedia Evaluation and Determination of Significance Threshold

- (A) Pursuant to the approved Stage 2 MOU, Health and Safety Code section 43830.8, and the Multimedia Evaluation Guidance Document, the applicant shall conduct the prescribed multimedia evaluation under direction from ARB staff;
- (B) The multimedia evaluation shall identify and evaluate any significant adverse impact on public health or the environment, including air, water, or soil, that may result from the production, use, or disposal of the ADF, relative to conventional CARB diesel, under Stage 2, 3A, and 3B;
- (C) In addition to determining any significant impacts, the multimedia assessment shall also include an evaluation of potential mitigation measures for each of the significant impacts identified;
- (D) Approval of a multimedia evaluation shall be subject to the provisions of Health and Safety Code section 43830.8;
- (E) The Executive Officer shall identify a significance threshold based on the multimedia evaluation conducted pursuant to this subsection. Approved significance thresholds shall be listed in Table 1 of section 2293.6.

(6) Completion of Stage 2

No person operating under Stage 2 may sell, offer for sale, or supply an ADF for use in motor vehicles in California under Stage 3A or 3B unless the Executive Office has determined in writing that the person has successfully completed the requirements of Stage 2. To be deemed as successfully completing Stage 2, the applicant must meet all the following requirements:

- (A) Comply with all requirements specified in the approved Stage 2 MOU;
- (B) Adopt consensus standards applicable to the ADF;
- (C) Obtain approval of at least 75 percent of compression ignition engine original equipment manufacturers for which the ADF is expected or intended to be used. Such approval must represent approval of the ADF blend levels expected or intended to be used in those engines;
- (D) Identify appropriate fuel specifications for the ADF and obtained written approval of those specifications by the Executive Officer;
- (E) Identify appropriate mitigation strategies for the ADF to be applied in the event the significance threshold identified by the Executive Officer is reached; and

- (F) Obtain a written determination by the Executive Officer that all the above requirements have been met.

In the event the Executive Officer identifies a significance threshold under (5)(D) above, the Executive Officer shall post notice on the ARB website his/her intent to initiate a rulemaking to incorporate the significance threshold and approved mitigation strategies into this subarticle. Upon completion of that rulemaking, all persons subject to Stage 2 for an ADF shall be subject to the provisions of Stage 3A.

(c) *Stage 3A: Commercial Sales Subject to Mitigation*

In the event the Executive Officer has determined there is a significance threshold for an ADF, the following procedure shall apply:

- (1) The Executive Officer shall first determine the current ADF blend level and the blend level trajectory based on an analysis of ADF sales in recent years;
- (2) Based on the analysis in (c)(1), the Executive Officer shall estimate the year(s) in which the effective ADF blend level is projected to reach 25%, 50%, 75%, and 95% of the significance threshold.
 - (A) In estimating these levels, the Executive Officer shall consider mitigating effects from various factors, including various diesel substitutes that reduce air emissions of the pollutant for which the significance threshold was identified (e.g., renewable diesel, which reduces NOx emissions); the fleet penetration of new technology diesel engines; composition of the feedstocks used to produce the ADF; volumes of lower-emission CARB diesel fuel, including those with emissions-reducing additives; and other factors as deemed appropriate by the Executive Officer. These factors shall be considered in determining the effective ADF blend level at a specific point (e.g., the ADF blend level adjusted to account for various mitigating factors such as the use of new technology diesel engines and renewable diesel). The effective ADF blend level will then be compared to the significance threshold to determine when mitigation must be applied. The methodology for calculating the effective ADF blend level is specified in section 2293.6.
 - (B) The Executive Officer shall post the results of and basis for such estimates on the ARB's website;
- (3) When the effective ADF blend level reaches 75% of the significance threshold, the Executive Officer shall post on the ARB website a notice of intent to apply the mitigation strategies identified in Appendix 1 for the ADF

when the effective ADF blend level is projected to reach 95% of the significance threshold. Once the 75% level is reached, all suppliers of an affected ADF shall provide monthly reports to the Executive Officer, as specified in section 2293.8, additionally at this point all producers and importers of the affected ADF shall submit a mitigation plan in accordance with 2293.5(c)(5);

- (4) Once the effective ADF blend level has reached 95% of the significance threshold, the requirement to apply mitigation becomes effective and any producer or importer of the affected ADF shall comply with the terms of the mitigation plan by which they are covered. Each mitigation plan shall apply mitigation on a proportion of their total fuel equal to difference between the projected effective blend level and 95 percent of the significance level for each year.
- (5) Individual producers or importers of ADF or a group of producers or importers of an ADF may apply to the Executive Officer for a mitigation plan. The application shall include the location of each production or import facility included in the plan, the amount of ADF production or importation capacity of each facility, the amount of ADF produced or imported at each facility for the prior two years, and an exact description of how the producer, importer, or group intends to mitigate emissions of pollutants of concern related to their production or importation using the mitigation options in Appendix 1. After receiving an application for a mitigation plan, the Executive Officer shall advise the applicant in writing within 20 business days either that the application is complete or that specified additional information is required to make it complete. After receiving additional information, the Executive Officer shall advise the applicant in writing within 15 business days that either the application is now complete or that specified additional information is still required to make it complete. After deeming an application complete, the Executive Officer shall approve or deny the application. In determining whether or not to approve the application the Executive Officer shall consider in their analysis any regional or seasonal effects that may occur based on the mitigation plan. If the Executive officer denies the application, he/she shall notify the applicant in writing of that determination. If the Executive Officer approves the application, he/she shall issue an Executive Order to the applicant(s) deeming them in compliance with the mitigation portion requirements of this regulation.

Stage 3B: Commercial Sales Subject to No Mitigation

If the Executive Officer has determined that there is no significance threshold for an ADF, no mitigation measures or sales restrictions are required for that ADF. For an ADF that is subject to this provision, the fuel provider shall report to the Executive Officer the following information on a quarterly basis for any such ADF the fuel provider sold, offered for sale, or supplied for use in California:

- (1) The volume of ADF (A100) blendstock, if applicable;
- (2) The volume of ADF (A100) neat fuel, if applicable;
- (3) The volume of ADF/CARB diesel blend, if applicable.

For purposes of this provision, the fuel provider may use information submitted to the ARB through the Low Carbon Fuel Standard Reporting Tool (LRT), as appropriate.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.6. Significance Thresholds and Effective ADF Blend Levels.

An ADF for which a significance threshold has been determined by the Executive Officer shall be subject to the Stage 3A provisions specified in section 2293.5. The specific mitigation requirements in Appendix 1 shall apply at the time the Executive Officer determines the effective ADF blend level will be at least 95% of the significance threshold.

Table A.1. Significance Thresholds

Alternative Diesel Fuel	Significance Threshold	Effective ADF Blend Level	Comments
Biodiesel	10 % blend level	See 2293.6(a)	NOx is the pollutant of concern
[Reserved]	[Reserved]	[Reserved]	[Reserved]
[Reserved]	[Reserved]	[Reserved]	[Reserved]

(a) The effective ADF blend level for biodiesel is calculated as follows:

$$EB = 100 \times \left[\frac{NBV - 0.5LN - 0.73RD - VM - 0.55AB}{TCV} \right]$$

Where,

EB = effective ADF blend level, expressed as percent biodiesel

- NBV = net volume of biodiesel used in compression-ignition engines in California, excluding gallons used in B5 or less, expressed in gallons
- NBV = net volume of biodiesel used in compression-ignition engines in California, excluding gallons used in B5 or less, expressed in gallons
- LN = volume of low-NOx diesel used in compression-ignition engines in California, excluding renewable diesel, expressed in gallons
- RD = volume of renewable diesel used in compression-ignition engines in California, expressed in gallons
- VM = volume of biodiesel, employing one of the mitigation strategies specified in Appendix 1 prior to the date mitigation is required under 2293.5(c)(4), used in compression-ignition engines in California, expressed in gallons
- AB = volume of animal-fats-based biodiesel used in compression-ignition engines in California, excluding gallons used in B5 or less, expressed in gallons
- TCV = total volume of all fuels used in compression-ignition engines in California (not including any fuel with a specification under 13 CCR 2292), expressed in gallons

Low-NOx diesel (LN) means a diesel fuel that meets the following specifications:

Table A.2. Fuel Specifications for Low-NOx Diesel Fuel

Property	Test Method	Limit
Unadditized Cetane Number	ASTM D6890-13a	≥ 67
Total Aromatics	ASTM D5186-03(2009)	≥ 6.4 mass %
Polycyclic Aromatic Hydrocarbons	ASTM D5186-03(2009)	≥ 0.6 mass %
API Gravity	ASTM D287-12b	≥ 47.4 degrees API

When the ratio of New Technology Diesel Engines in the California heavy duty vehicle fleet is 95 percent or greater, as determined using the latest version of EMFAC, the effective blend level will be deemed to be B0 or zero percent, and no mitigation will be required.

(b) The effective ADF blend level for other ADFs is calculated as follows:

[Reserved for future use]

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.7. Specifications for Alternative Diesel Fuels.

Unless otherwise required by a mitigation strategy in effect, any ADF that is sold, offered for sale, supplied for use in California, produced, or imported into California must meet the following specifications:

(a) Specifications for Biodiesel.

(1) *Biodiesel Blendstock or Neat Fuel (B100).*

Table A.3. Fuel Specifications for B100

Property	Test Method	Value
Unadditized Cetane Number	ASTM D613-10ae1	≥47
API Gravity	ASTM D287-12b	≥27 degrees API
Sulfur	ASTM D5453-93	≤15 ppm

(2) *Biodiesel Blends.* The fuel specifications promulgated by the California Department of Food and Agriculture in 4 CCR sections 4140-4148, 4200, and 4202-4205 shall apply to any biodiesel blend.

(b) Specifications for Other Alternative Diesel Fuels:

Table A.4. Fuel Specifications for Other ADFs

ADF	Property	Test Method	Value
[Reserved]	[Reserved]	[Reserved]	[Reserved]
[Reserved]	[Reserved]	[Reserved]	[Reserved]
[Reserved]	[Reserved]	[Reserved]	[Reserved]
[Reserved]	[Reserved]	[Reserved]	[Reserved]

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.8. Reporting and Recordkeeping.

(a) Sampling

For reporting of fuel properties as required by the MOU, an applicable sampling methodology set forth in 13 CCR section 2296 shall be used.

(b) Reporting

(1) For Stages 1 and 2

A person operating under a Stage 1 or Stage 2 MOU must submit quarterly reports to the Executive Officer throughout the term of the MOU. Each report shall include the following:

- (A) The volume of ADF and ADF blend offered, supplied, or sold during each quarter;
- (B) Results of a specified number of representative samples, for fuel properties by test methods specified in the MOU;
- (C) Progress made toward completing the terms of the MOU;
- (D) Any changes or updates to information submitted during the application process regarding the beneficial or adverse impacts of the ADF in California.

(2) For Stage 3A

Except as provided in this paragraph, a person operating within Stage 3A must submit monthly reports to the Executive Officer. Each report shall include the following:

- (A) The volume of ADF and ADF blend offered, supplied, or sold during each month;
- (B) Results of a specified number of representative samples, for fuel properties by test methods specified in the MOU;
- (C) The volume of other applicable quantity of the mitigation strategy used during each month;
- (D) The blend rate of mitigation strategies used during each month, if applicable.

If the Executive Officer publishes notice that the effective ADF blend level has reached 75% of the significance threshold pursuant to section 2293.6(c)(2) and (3), any person subject to this provision shall report the information specified in (1)-(3) above for the affected ADF by the end of each month following the notice publication.

(3) For Stage 3B

A person operating within Stage 3B must submit monthly reports to the Executive Officer, with each reporting specifying the volume of ADF sold, supplied, or offered for sale in California during each month. In addition, the monthly reports shall contain results of a specified number of representative samples, for fuel properties by test methods specified in the MOU.

(c) Recordkeeping

- (1) The producer shall maintain, for two years from the date of each sampling, records showing the sample date, product sampled, container or other vessel sampled, final blend volume, and the results of the fuel properties by the proscribed test methods.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.9. Severability.

Each part of this subarticle shall be deemed severable, and in the event that any part of this subarticle is held to be invalid, the remainder of this subarticle shall continue in full force and effect.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

Subarticle 3. Ancillary Provisions

§2293.2294. Equivalent Test Methods.

* * * * *

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

§2293.52295. Exemptions for Alternative Motor Vehicle Fuel Used in Test Programs.

The Executive eOfficer shall consider and grant test program exemptions from the requirements of this Article in accordance with section 2259.

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). Reference: Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

Appendix 1. Mitigation Measures.

A person subject to the Stage 3 mitigation requirements (section 2293.5(c)) may meet the mitigation requirement by implementing any of the following mitigation measures as applicable, either alone or in combination:

Additives approved for mitigation purposes, Low-NO_x diesel (i.e., CARB diesel that has properties such that the pollutant that has triggered the significance level finding is already mitigated to the degree necessary to reduce the pollutant emissions below the significance level), an ADF-CARB diesel blend certified as emissions equivalent to CARB diesel or better, a neat ADF finished fuel certified as emissions equivalent to CARB diesel or better, or other options certified by the Executive Officer for this purpose.

(a) Biodiesel:

(1) Approved Emissions Equivalent Additives:

The following list shows the additive and required amounts as well as allowed blend level:

(A) Di-tert-butyl peroxide (DTBP): Biodiesel blends that contain DTBP by volume in the amounts specified in the table below are considered NO_x mitigated. Any person who blends DTBP with a biodiesel blend in accordance with this report these volumes under the requirements of 2293.8, and whenever a report or record is made, the amount of biodiesel mitigated using each of the levels below must be included along with the actual amount of DTBP used.

Table A.5: DTBP Mitigation Blend Level

Biodiesel Blend Level	Required level of DTBP
B0 to <B10	0 ppm
B10 to <B15	≥0.75 percent
B15 to B20	≥1.0 percent
Above B20	Cannot be mitigated by DTBP alone

(B) [Reserved for Future Use]

(2) Low-NO_x Diesel base fuel.

Hydrocarbon diesel fuel that meets the following specifications shall be considered Low-NO_x diesel.

Table A.6: Low-NOx Diesel Fuel Parameters

Property	Test Method	Limit
Unadditized Cetane Number	ASTM D6890-13a	≥ 67
Total Aromatics	ASTM D5186-03(2009)	≤ 6.4 mass%
PAH	ASTM D5186-03(2009)	≤ 0.6 mass%
API Gravity	ASTM D287-12b	≥ 47.4 degrees API

Any biodiesel blend below B20 that was derived from at least 4.0 gallons of Low-NOx diesel for each gallon of biodiesel in the blend, will be considered NOx mitigated.

(3) Certification of Alternative Diesel Fuels Resulting in Emissions Equivalence with Diesel

(A) The Executive Officer, upon application of any producer or importer, may certify alternative diesel fuel formulations or additives in accordance with (a)(3) of this appendix. The applicant shall initially submit a proposed test protocol to the Executive Officer. The proposed test protocol shall include: (A) the identity of the entity proposed to conduct the tests described in (a)(3)(F) of this appendix; (B) test procedures consistent with the requirements of (a)(3) of this appendix; (C) test data showing that the fuel to be used as the reference fuel satisfies the specifications identified in (a)(3)(E) of this appendix; (D) reasonably adequate quality assurance and quality control procedures; and (E) notification of any outlier identification and exclusion procedure that will be used, and a demonstration that any such procedure meets generally accepted statistical principles.

Within 20 business days of receipt of a proposed test protocol, the Executive Officer shall advise the applicant in writing either that it is complete or that specified additional information is required to make it complete. Within 15 business days of submittal of additional information, the Executive Officer shall advise the applicant in writing either that the information submitted makes the proposed test protocol complete or that specified additional information is still required to make it complete. Within 20 business days after the proposed test protocol is deemed complete, the Executive Officer shall either approve the test protocol as consistent with this (a)(3) of this appendix or advise the applicant in writing of the changes necessary to make the test protocol consistent with (a)(3) of this appendix. Any notification of approval of the test protocol shall include the name, telephone number, and address of the Executive Officer's designee to receive notifications pursuant to (a)(3)(F)(iii)2. of this appendix. The tests shall not be conducted until the protocol is approved by the Executive Officer.

Upon completion of the tests, the applicant may submit an application for certification to the Executive Officer. The application shall include the approved test protocol, all of the test data, a copy of the complete test log prepared in accordance with (a)(3)(F)(iii)2. of this appendix, a demonstration that the candidate fuel meets the requirements for certification set forth in (a)(3) of this appendix, and such other information as the Executive Officer may reasonably require.

Within 20 business days of receipt of an application, the Executive Officer shall advise the applicant in writing either that it is complete or that specified additional information is required to make it complete. Within 15 business days of submittal of additional information, the Executive Officer shall advise the applicant in writing either that the information submitted makes the application complete or that specified additional information is still required to make it complete. Within 20 business days after the application is deemed complete, the Executive Officer shall grant or deny the application. Any denial shall be accompanied by a written statement of the reasons for denial.

(B) The candidate fuel.

The candidate fuel to be used in the comparative testing described in (a)(3)(F) of this appendix shall be one of the following:

1. ADF formulation: The candidate fuel shall be the fuel blendstock or fuel blend that the applicant is attempting to certify. If the applicant is attempting to certify a fuel blend, that blend shall consist of the fuel blendstock blended to 20 percent with the reference fuel. The applicant shall report all of the candidate fuel properties under (a)(3)(C) of this appendix for the candidate fuel.
2. Biodiesel additives: The candidate fuel shall be a mixture of the additive to be certified at the concentration specified by the applicant and the biodiesel additive certification fuel specified in (a)(3)(D) of this appendix. If the additive to be certified is meant to be used in B20 fuel blends, the candidate fuel shall be a mixture of the additive to be certified at the concentration specified by the applicant and the biodiesel additive certification fuel specified in (a)(3)(D) of this appendix blended to 20 volume percent biodiesel content with the reference fuel. The applicant shall report all of the candidate fuel properties under (a)(3)(C) of this appendix for both the certification fuel without the additive, and the candidate fuel.

(C) Candidate fuel properties.

The applicant shall report all of the properties of the candidate fuel listed below. The candidate fuel shall be representative of the fuel that the applicant will produce commercially, and shall not contain streams or feedstocks that will not be used in the commercial fuel that the applicant intends to sell. If the executive officer determines that the candidate fuel contains streams or feedstocks that will not be used in the commercial fuel, this will be grounds for rejection of the application.

Table A.7: Candidate fuel properties

Property	Test Method
Sulfur Content	ASTM D5453-93
Aromatic Hydrocarbon Content, Volume %	ASTM D5186-03(2009)
Polycyclic Aromatic Content, Weight %	ASTM D5186-03(2009)
Nitrogen Content	ASTM D4629-12
Unadditized Cetane Number	ASTM D613-10ae1
API Gravity	ASTM D287-12b
Viscosity at 40°C, cSt	ASTM D445-12
Flash Point, °F, minimum	ASTM D93-13
Distillation, °F	ASTM D86-12
Initial Boiling Point	
10 % Recovered	
50 % Recovered	
90 % Recovered	
End Point	
FAME Content %	EN14103:2011

- (D) *Biodiesel additive certification fuel.* The biodiesel additive certification fuel shall be a biodiesel (fatty acid methyl ester) produced by transesterification of virgin soybean oil with the following properties.

Table A.8: Additive certification fuel blendstock properties

Property	Test Method	Fuel Specifications
Sulfur Content	ASTM D5453-93	15 ppm maximum
Nitrogen Content	ASTM D4629-12	10 ppm maximum
Unadditized Cetane Number	ASTM D613-10ae1	47-50
API Gravity	ASTM D287-12b	27 – 33
Viscosity at 40°C, cSt	ASTM D445-12	2.0 – 4.1
Flash Point, °F, minimum	ASTM D93-13	266
Distillation, °F	ASTM D86-12	
90 % Recovered		620-680
FAME Content %	EN 14103:2011	Report

(E) *The reference fuel.* The reference fuel used in the comparative testing described in (a)(3)(F) of this appendix shall be produced from straight-run California diesel fuel by a hydrodearomatization process and shall have the characteristics set forth below under "Reference Fuel Specifications" (the listed ASTM methods are incorporated herein by reference):

Table A.9: Reference Fuel Specifications

Property	Test Method	Fuel Specifications
Sulfur Content	ASTM D5453-93	15 ppm maximum
Aromatic Hydrocarbon Content, Volume %	ASTM D5186-03(2009)	10 % maximum
Polycyclic Aromatic Content, Weight %	ASTM D5186-03(2009)	10 % maximum
Nitrogen Content	ASTM D4629-12	10 ppm maximum
Unadditized Cetane Number	ASTM D613-10ae1	48 minimum
API Gravity	ASTM D287-12b	33 – 39
Viscosity at 40°C, cSt	ASTM D445-12	2.0 – 4.1
Flash Point, °F, minimum	ASTM D93-13	130
Distillation, °F	ASTM D86-12	
Initial Boiling Point		340 – 420
10 % Recovered		400 – 490
50 % Recovered		470 – 560
90 % Recovered		550 – 610
End Point		580 – 660

(F) *Emissions testing.*

1. Exhaust emission tests using the candidate fuel and the reference fuel shall be conducted in accordance with the "California Exhaust Emission Standards and Test Procedures for 1985 and

Subsequent Model Heavy-Duty Diesel-Powered Engines and Vehicles," as incorporated by reference in Title 13, California Code of Regulations, Section 1956.8(b). The tests shall be performed using a Detroit Diesel Corporation Series 60 engine, through December 31, 2017, or a 2004-2006 model-year, Cummins ISM370 engine having a nominal torque rating of 1450 ft-lb and a nominal power output of 360 to 380 hp, and produced between January 2004 and December 2006, inclusive, starting January 1, 2015, or, if the Executive Officer determines that the 2004-2006 Cummins ISM370 is no longer representative of the pre-2007 model-year, heavy duty diesel engine fleet, another engine found by the Executive Officer to be representative of such engines. A determination by the Executive Officer that an engine is no longer representative shall not affect the certification of a diesel fuel formulation based on prior tests using that engine pursuant to a protocol approved by the Executive Officer.

2. The comparative testing shall be conducted by a party or parties that are mutually agreed upon by the Executive Officer and the applicant. The applicant shall be responsible for all costs of the comparative testing.

3. The applicant shall use one of the following test sequences:

- a. If both cold start and hot start exhaust emission tests are conducted, a minimum of five exhaust emission tests shall be performed on the engine with each fuel, using either of the following sequences, where "R" is the reference fuel and "C" is the candidate fuel: RC RC RC RC RC (and continuing in the same order). or RC CR RC CR RC (and continuing in the same order).

The engine mapping procedures and a conditioning transient cycle shall be conducted with the reference fuel before each cold start procedure using the reference fuel. The reference cycle used for the candidate fuel shall be the same cycle as that used for the fuel preceding it.

- b. If only hot start exhaust emission tests are conducted, one of the following test sequences shall be used throughout the testing, where "R" is the reference fuel and "C" is the candidate fuel:

Alternative 1: RC CR RC CR (continuing in the same order for a given calendar day; a minimum of twenty individual exhaust

emission tests must be completed with each fuel)

Alternative 2: RR CC RR CC (continuing in the same order for a given calendar day; a minimum of twenty individual exhaust emission tests must be completed with each fuel)

Alternative 3: RRR CCC RRR CCC (continuing in the same order for a given calendar day; a minimum of twenty-one individual exhaust emission tests must be completed with each fuel)

For all alternatives, an equal number of tests shall be conducted using the reference fuel and the candidate fuel on any given calendar day. At the beginning of each calendar day, the sequence of testing shall begin with the fuel that was tested at the end of the preceding day. The engine mapping procedures and a conditioning transient cycle shall be conducted after every fuel change and/or at the beginning of each day. The reference cycle generated from the reference fuel for the first test shall be used for all subsequent tests.

For alternatives 2 and 3, each paired or triplicate series of individual tests shall be averaged to obtain a single value which would be used in the calculations conducted pursuant to (a)(3)(G)(iii) of this appendix.

4. The applicant shall submit a test schedule to the Executive Officer at least one week prior to commencement of the tests. The test schedule shall identify the days on which the tests will be conducted, and shall provide for conducting the test consecutively without substantial interruptions other than those resulting from the normal hours of operations at the test facility. The Executive Officer shall be permitted to observe any tests. The party conducting the testing shall maintain a test log which identifies all tests conducted, all engine mapping procedures, all physical modifications to or operational tests of the engine, all recalibrations or other changes to the test instruments, and all interruptions between tests and the reason for each such interruption. The party conducting the tests or the applicant shall notify the Executive Officer by telephone and in writing of any

unscheduled interruption resulting in a test delay of 48 hours or more, and of the reason for such delay. Prior to restarting the test, the applicant or person conducting the tests shall provide the Executive Officer with a revised schedule for the remaining tests. All tests conducted in accordance with the test schedule, other than any tests rejected in accordance with an outlier identification and exclusion procedure included in the approved test protocol, shall be included in the comparison of emissions pursuant to (a)(3)(G) of this appendix.

5. In each test of a fuel, exhaust emissions of oxides of nitrogen (NO_x) and particulate matter (PM) shall be measured.

(G) The average emissions during testing with the candidate fuel shall be compared to the average emissions during testing with the reference fuel, applying one-sided Student's t statistics as set forth in Snedecor and Cochran, *Statistical Methods* (7th ed.), page 91, Iowa State University Press, 1980, which is incorporated herein by reference. The Executive Officer shall issue a certification pursuant to this paragraph only if he or she makes all of the determinations set forth in (a)(3)(G)(i) and (a)(3)(G)(ii) below, after applying the criteria of (a)(3)(G)(iii) of this appendix.

1. The average individual emissions of NO_x and PM, respectively, during testing with the candidate fuel do not exceed the average individual emissions of NO_x and PM, respectively, during testing with the reference fuel.
2. Use of any additive identified pursuant to (a)(3)(b)(ii) of this appendix in heavy-duty engines will not increase emissions of noxious or toxic substances which would not be emitted by such engines operating without the additive. In addition, cellular tests on the particulate emissions from heavy-duty engines will not show greater harm for mutagenicity, inflammation, DNA damage, or oxidative stress with the use of any such additive than would occur with such engines operating without the additive.
3. In order for the determinations of (a)(3)(G)(i) of this appendix to be made, for each referenced pollutant the candidate fuel shall satisfy the following relationship:

$$\bar{x}_C < \bar{x}_R + \delta - S_p \times \sqrt{\frac{2}{n}} \times t(a, 2n - 2)$$

Where:

\bar{x}_C =	Average emissions during testing with the candidate fuel
\bar{x}_R =	Average emissions during testing with the reference fuel
δ =	tolerance level equal to 1 percent of \bar{x}_R NOx, 2 percent of \bar{x}_R for PM.
S_p =	Pooled standard deviation
$t(a, 2n-2)$ =	The one-sided upper percentage point of t distribution with $a = 0.15$ and $2n-2$ degrees of freedom
n =	Number of tests of candidate and reference fuel

(H) If the Executive Officer finds that a candidate fuel has been properly tested in accordance with (a)(3) of this appendix, and makes the determinations specified in (a)(3)(G) of this appendix, then he or she shall issue an Executive Order certifying the alternative diesel fuel or additive formulation represented by the candidate fuel. The Executive Order shall identify all of the characteristics of the candidate fuel determined pursuant to (a)(3)(C) of this appendix. The Executive Order shall provide that the certified alternative diesel fuel formulation has the following specifications: [1] a sulfur content, total aromatic hydrocarbon content, polycyclic aromatic hydrocarbon content, and nitrogen content not exceeding that of the candidate fuel, [2] a cetane number and API gravity not less than that of the candidate fuel, [3] any additional fuel specification required under (a)(3) of this appendix, and [4] presence of all additives that were contained in the candidate fuel, in a concentration not less than in the candidate fuel, except for an additive demonstrated by the applicant to have the sole effect of increasing cetane number. Additionally the Executive Order shall contain a table mirroring the table in Appendix 1 (a)(1)(A) listing the required concentration of additive at each 5 percent interval of blend level, if applicable. All such characteristics shall be determined in accordance with the test methods identified in (a)(3)(C) of this

appendix. The Executive Order shall assign an identification name to the specific certified biodiesel fuel formulation.

(l) *In-use testing.*

1. If the executive officer determines that a commercially available biodiesel fuel blend meets all of the specifications of a certified biodiesel fuel formulation set forth in an Executive Order issued pursuant to (a)(3)(H) of this appendix, but does not meet the criteria of (a)(3)(G) of this appendix when tested in accordance with (a)(3)(F), the Executive Officer shall modify the Executive Order as is necessary to assure that biodiesel fuel blends sold commercially pursuant to the certification will meet the criteria set forth in (a)(3)(G). The modifications to the order may include additional specifications or conditions, or a provision making the order inapplicable to specified biodiesel fuel producers.

2. The Executive Officer shall not modify a prior Executive Order without the consent of the applicant and of the producer of the commercially available biodiesel fuel blend found not to meet the criteria, unless the applicant and producer are first afforded an opportunity for a hearing in accordance with Title 17, California Code of Regulations, Part III, Chapter 1, Subchapter 1, Article 4 (commencing with Section 60040). If the Executive Officer determines that a producer would be unable to comply with this regulation as a direct result of an order modification pursuant to this subsection, the Executive Officer may delay the effective date of such modification for such period of time as is necessary to permit the producer to come into compliance in the exercise of all reasonable diligence.

(b) [Reserved]

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Appendix B

Technology Assessment

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Appendix B. TECHNOLOGY ASSESSMENT

A. Literature Search

Multiple studies have looked at the impact of biodiesel on heavy-duty diesel vehicle NO_x emissions. The National Renewable Energy Lab (NREL) and the U.S. EPA have both examined the literature to determine these effects. Neither of these databases focused primarily on the effects of using CARB diesel as the base fuel. To fill this knowledge gap, ARB staff conducted a literature search that addresses the impacts of biodiesel use on NO_x emissions in heavy duty engines using California diesel as the base fuel.

The literature search focused on biodiesel blends B20 and below and characterized studies by their baseline fuel properties. Studies that used either explicitly CARB diesel or a diesel fuel that was tested to have a cetane number of at least 49 were included in the analysis. The studies included in this analysis were all performed using engine dynamometer with commercially available engines, and no engine modifications. Studies using test cycles based on a single speed and mode were excluded from this analysis.

Based on this literature search staff performed an analysis to determine what the overall effects of biodiesel on NO_x at different blends were. Each set of tests in a study using the same engine and test cycle were considered to be an individual data point, and each of these data points were weighted equally. Table B.1 shows the results of the analysis completed by staff. In general, the literature shows that NO_x emissions from soy-based biodiesel are greater than NO_x emissions from animal-based biodiesel, and the NO_x increase is pronounced in blends that use a high cetane base fuel more so than in blends using a lower cetane base fuel.

Table B.1: NO_x Impacts of Biodiesel in Heavy Duty Engines

	High-Cetane Base fuel (≥49)	Low-Cetane Base fuel (<49)
B5 all feedstock	+0.3%	-1.3%
B5 soy	+0.4 %	+0.7 %*
B5 animal	+0.2 %	-2.7 %
B10 soy	+2.7%	+0.2%
B20 all feedstock	+3.2%	+1.5 %
B20 soy	+3.9%	+1.8 %
B20 animal	+1.8 %	+ 0.0 %

* This number is based on one study.

Below is a list of all the studies that were included in the high cetane literature search analysis.

Table B.2: List of Studies from High Cetane Literature Search

Author	Title	Published	Year
Durbin	Biodiesel Characterization and NOx Mitigation Study	Final Report Prepared for Robert Okamoto, M.S. and Alexander Mitchell, CARB	2011
Clark	Transient Emissions Comparisons of Alternative Compression Ignition Fuel	SAE 1999-01-1117	1999
Eckerle	Effects of Methyl Ester Biodiesel Blends on NOx Emissions	SAE 2008-01-0078	2008
McCormick	Fuel Additive and Blending Approaches to Reducing NOx Emissions from Biodiesel	SAE 2002-01-1658	2002
McCormick	Regulated Emissions from Biodiesel Tested in Heavy-Duty Engines Meeting 2004 Emissions	SAE 2005-01-2200	2005
Nuszkowski	Evaluation of the NOx emissions from heavy duty diesel engines with the addition of cetane improvers.	Proc. I Mech E Vol. 223 Part D: J. Automobile Engineering, 223, 1049-1060	2009
Thompson	Neat fuel influence on biodiesel blend emissions	Int J Engine Res Vol. 11, 61-77.	2010

Below, Figures B.1, B.2, and B.3 show all of the data points considered in Staff's literature search as they relate to NOx. These graphs show the impacts from all data, from those data using soy biodiesel, and from those data using animal biodiesel. As is shown from the linear interpolation of soy and animal biodiesel trends, soy biodiesel emits about 2.2 times as much NOx as animal biodiesel.

Figure B.1: NOx Impact of Biodiesel Blended in High Cetane Base Fuel

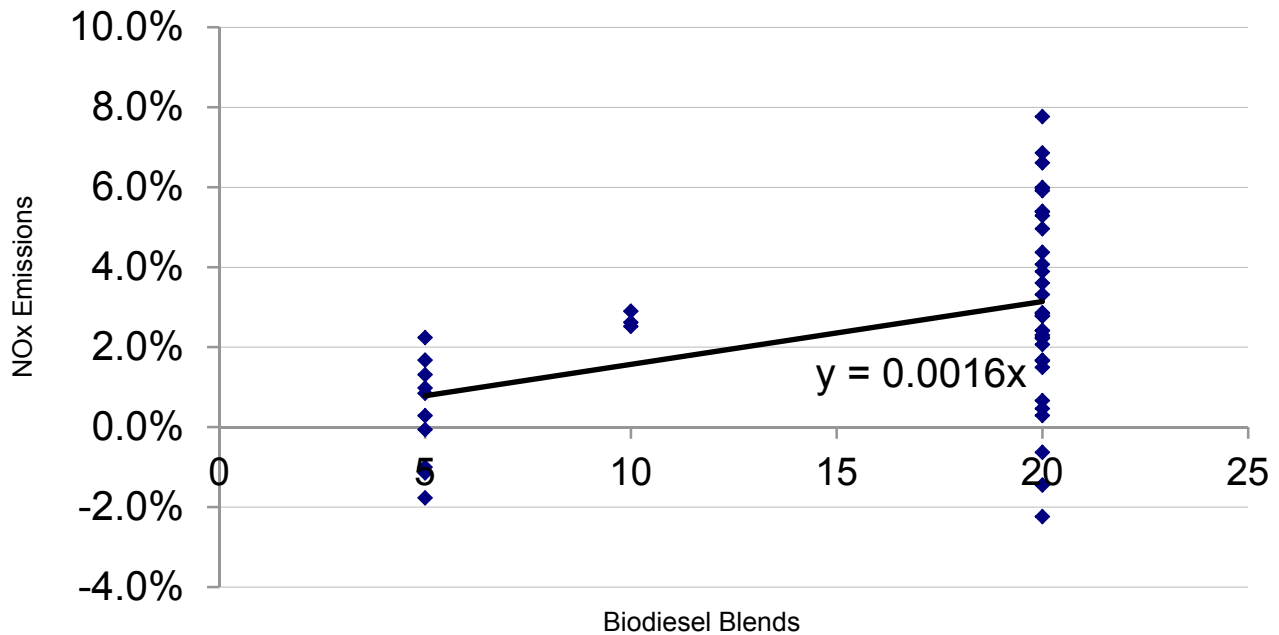


Figure B.2: NOx Impact of Soy Biodiesel Blended in High Cetane Base Fuel

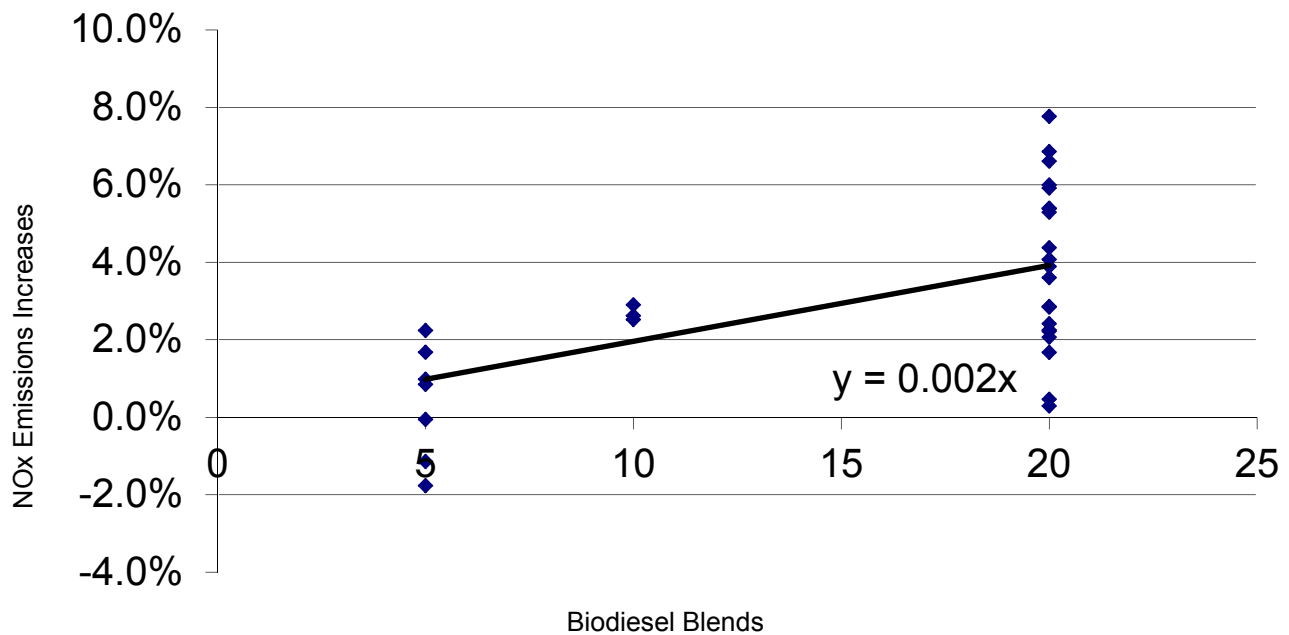
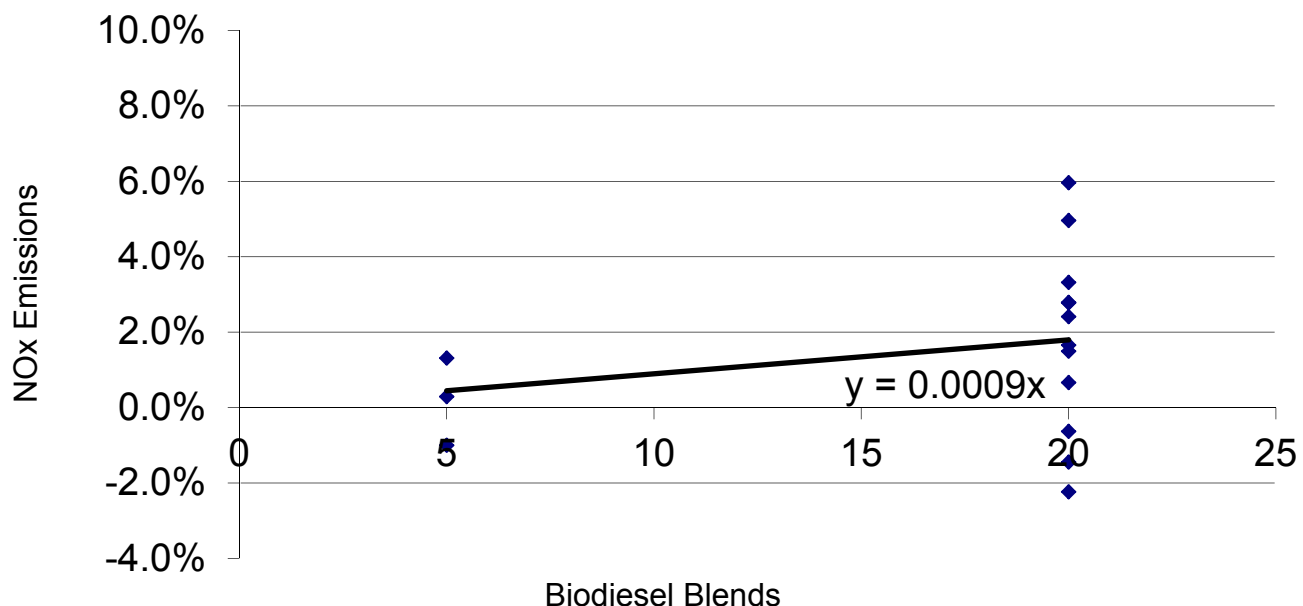


Figure B.3: NOx Impact of Animal Biodiesel Blended in High Cetane Base Fuel



B. Explanation of Factors in Biodiesel Effective Blend Level Calculation

Below is the formula that is used to calculate the effective blend level of biodiesel, when determining whether the significance level for NOx has been reached.

Equation ____. Biodiesel Effective Blend Level Formula

$$EB = 100 \times \left[\frac{NBV - 0.5LN - 0.73RD - VM - 0.55AB}{TCV} \right]$$

Where,

- EB = effective ADF blend level, expressed as percent biodiesel
- NBV = net volume of biodiesel used in compression-ignition engines in California, excluding gallons used as B5 or less, expressed in gallons
- LN = volume of low-NOx diesel used in compression-ignition engines in California, excluding renewable diesel, expressed in gallons
- RD = volume of renewable diesel used in compression-ignition engines in California, expressed in gallons
- BM = volume of biodiesel, employing one of the mitigation strategies specified in Appendix 1 prior to the date mitigation is required under 2293.5(c)(4), used in compression-ignition engines in California, expressed in gallons

- AB = volume of animal-fats-based biodiesel used in compression-ignition engines in California, expressed in gallons
- TCV = total volume of all fuels used in compression-ignition engines in California (not including any fuel with a specification under 13 CCR 2292), expressed in gallons

The factor 0.5 for the term LN is derived from the ratio of 4 to 1 required of LN to fully mitigate NOx from biodiesel. This ratio is reduced to 2 to 1 to mitigate the NOx down to B10 from B20, so every gallon of LN diesel mitigates 0.5 gallons of biodiesel. The factor of 0.73 for the term RD is derived from mitigation testing that showed that 2.75 gallons of renewable diesel mitigated 1 gallon of biodiesel NOx. This ratio is reduced to 1.375 to 1 to mitigate the NOx down to B10 from B20, so 1 gallon of renewable diesel mitigates 0.73 gallons of biodiesel NOx. The ratio of 0.55 for the term AB is derived from the relationship that soy biodiesel emits about 2.2 times more NOx than animal biodiesel. Therefore if we expect most biodiesel to be soy based, using 1 gallon of animal biodiesel reduces the expected NOx increase by 0.55 gallons.

C. Staff Projection of Fuels Impacting Biodiesel Effective Blend Level Calculation

The table below shows staff's projections for fuels that are relevant to the calculation of effective blend level for biodiesel. The mitigation trigger is 95 percent of the significance threshold for biodiesel in all years. The BD volume is staff's projection of biodiesel consumption in California, in million gallons, based on other organization projections and data on past biodiesel volumes. BD content is the BD volume as a portion of total diesel. Total diesel is the total diesel used and high case projected diesel consumption, in million gallons, contained in the CEC's 2011 Integrated Energy Policy Report. Animal BD is staff's projection of the amount of biodiesel consumed that is from animal feedstocks, in million gallons, based on current levels in the Low Carbon Fuel Standard Reporting Tool of 10 percent of total biodiesel. BD portion sold as B5 is based on current B5 content of 90 percent³⁷ continuing until total biodiesel is above B5, then declining over time. RD Volume is staff's projection of the volume of renewable diesel consumed in California, in million gallons, based on 50 percent of current production volumes being used in California by 2020. RD to BD ratio is the volume of Low NOx diesel divided by total biodiesel minus biodiesel sold as B5. Min RD to BD is the ratio of renewable diesel to biodiesel that will guarantee no increases in NOx, which is 1.375. EM is the percentage of the total California heavy-duty diesel fleet that is expected to be New Technology Diesel Engines, according to EMFAC 2007. Effective Blend is the blend level of biodiesel as calculated using the equation in proposed section 2293.6, assuming that LN and VM are each zero.

³⁷ Based on a phone communication with Mr. Russ Kinzig, Kinder Morgan, October 4, 2013.

Table B.3: Fuel Projections

Year	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Mitigation trigger	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%	9.5%
BD Volume (MMG)	5	11	18	40	80	120	175	219	264	310	350	380	410	440
BD Content %	0.2%	0.3%	0.5%	1.2%	2.3%	3.3%	4.8%	5.9%	7.0%	8.2%	9.1%	9.7%	10.4%	11.0%
Total Diesel (MMG)	3295	3280	3340	3410	3510	3590	3650	3700	3760	3800	3850	3900	3950	4000
Animal BD (MMG)	0.5	1.1	1.8	4.0	8.0	12.0	17.5	21.9	26.4	31.0	35.0	38.0	41.0	44.0
BD portion sold as B5	90%	90%	90%	90%	90%	90%	90%	80%	70%	60%	50%	45%	40%	35%
RD Volume (MMG)	0	0	1	50	65	85	100	154	209	263	317	350	400	450
RD to BD ratio	0.0	0.0	0.6	4.3	3.8	5.4	5.7	3.5	2.6	2.1	1.8	1.7	1.6	1.6
Min RD to BD	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4	1.4
EM	5%	10%	15%	20%	26%	36%	45%	50%	55%	59%	67%	76%	82%	94%
Effective Blend	0.0%	0.0%	0.0%	-1.0%	-1.1%	-1.4%	-1.5%	-1.9%	-2.0%	-1.9%	-1.7%	-1.5%	-1.5%	-1.4%

Appendix C

Staff Estimate of the Cost of Biodiesel NOx Mitigation

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Appendix C

Staff Estimate of the Cost of Biodiesel NOx Mitigation

Introduction:

Based on staff's proposals, biodiesel NOx mitigation would be required once the statewide effective blend level reaches the significance threshold trigger. This level corresponds to about a B10 (i.e. ten volume percent biodiesel) statewide average. California consumption of diesel fuel is currently about 3.5 billion gallons annually, so at the effective blend level of B10, the corresponding volume of biodiesel that would trigger the need for mitigation would be 350 million gallons.

As pointed out in the initial statement of reasons (i.e., Staff Report) technology chapter V, staff has found that there is an increase in NOx emissions of about four percent relative to a B20 blend of soy biodiesel with CARB diesel.

The ARB sponsored study, **Biodiesel Characterization and NOx Mitigation Study (2011)**, resulted in the identification of potential options to mitigate the NOx increases for biodiesel fuel use. These options include:

- Use of approved NOx control additives;
- Use of a certified ADF (i.e., biodiesel) formulation; or
- Blending biodiesel with Low-NOx diesel fuels.

Staff assessed the cost of each compliance option for mitigating NOx from biodiesel blends.

1. Use of Approved NOx Control Additives

To determine the costs of compliance using approved NOx control additives, staff estimated the cost of using di-tert butyl peroxide (DTBP) at a treat rate of one percent by mass for all biodiesel produced for California. Staff assumed that for widespread additive use, fuel terminals would be best suited to provide the ability to inject the additive for all biodiesel production, due to higher throughput, economy of scale and resulting lower costs. In 1992, ARB implemented the gasoline deposit control additive regulation (title 13 CCR section 2257), which requires all gasoline in California to contain additives, similarly to DTBP in biodiesel. As a result, virtually all gasoline deposit control additives are currently injected into gasoline at the terminal level.

Staff estimated the cost of additive NOx mitigation based on the cumulative cost of new wide scale infrastructure (including the cost of operation) and the cost of the DTBP additive.

a. *Infrastructure, Operations and Maintenance Costs:*

Staff received an estimate from Kinder Morgan, the largest California terminal company, to design, build and operate a large new additive injection facility to the scale required to treat all biodiesel production. Kinder Morgan indicated that additive equipment would be necessary both at their Fresno terminal and their Colton terminal. Kinder Morgan estimated a total capital cost of about \$6.8 million for both of their facilities and corresponding to a maximum throughput of 7.2 million gallons of B100 per year (i.e., 100,000 gal/day per facility). This includes the cost of offsite construction, equipment costs, equipment installation costs and start-up costs. In addition to infrastructure cost, Kinder Morgan also provided an estimate of \$40,000 for the annual cost of operations and maintenance. These costs reflected the cost to operate the DTBP additive injection equipment as well as on-going maintenance and repair.

To calculate total annualized capital cost, staff utilized the following capital recovery factor: $CRF = \text{Interest rate} / [1 - (1 + \text{interest rate})^{-\text{years of loan}}]$

Therefore, for a ten year amortization at a five percent loan interest rate, the capital recovery factor is: $CRF_{10} = 0.05 / [1 - (1.05)^{-10}] = 0.1295$,

Using the capital recovery factor the annual cost of capital is:
 Annual Capital Cost = Total Capital Cost x CRF₁₀, or
 \$6,800,000 x 0.1295 = \$880,600/year

Together with the operations and maintenance costs, the total annual cost to provide additive at two Kinder Morgan facilities would be: \$880,600 + \$40,000 = \$920,600

Likewise, if the two Kinder Morgan facilities treat biodiesel with DTBP at the one percent treat rate and if Kinder Morgan treats 3.6 million gallons of biodiesel per year, then the incremental cost of adding additive to biodiesel will be \$920,600/7,200,000 gallons per year, or \$0.12/gal.

b. Additive Cost:

To determine the cost of the DTBP additive, staff solicited quotes from several chemical production companies, but found that for the quantities needed, DTBP pricing were based on bulk volumes. Staff received a bulk volume quote of \$3.45 for every 10 metric tons purchased and delivered to California³⁸. Using conversion factors and DTBE density to calculate the cost per gallon, we get:

$\$3.45/\text{kg} \times 0.79 \text{ kg/L} \times 3.7854 \text{ L/gal} = \$10.32/\text{gal DTBP}$.

To add DTBP at one volume percent to 350,000,000 gallons of biodiesel, then 3,500,000 gallons of DTBP (i.e., 350,000,000 gal x 0.01) would be required for a total annual additive cost of:

$3,500,000 \text{ gallons DTBP} \times \$10.32/\text{gallon DTBP} = \$36,120,000$.

³⁸ Email from Karl Wang, Orchid Chemical

Therefore, the additive cost on a per gallon basis to treat 350,000,000 gallons of biodiesel will result in:

$\$36,120,000/350,000,000\text{gallons} = \$0.10/\text{gallon biodiesel treated}.$

This cost achieves full NOx mitigation of blends up to B20. Therefore:

Total cost of adding DTBP to biodiesel = Cost of Injection/gal + Cost of Additive/gal, or
= \$0.12/gal + \$0.10/gal
= \$0.22/gal.

2. Use of a Certified Biodiesel Blend Formulation

This mitigation option is being proposed by staff and is modeled after the existing certification program contained in the California diesel fuel regulation under title 13 CCR section 2282(g). In the proposed certification program, a prescribed engine test protocol is followed for a candidate biodiesel blend fuel to derive emissions data and that data is compared to emissions data derived using the same test protocol on a conventional diesel reference fuel. Based on a statistical evaluation of the data, staff could determine if the candidate biodiesel blend demonstrates the same emissions performance as the conventional diesel reference fuel. If the statistical criteria is met, then the candidate biodiesel blend would achieve NOx mitigation and thereby be deemed a certified biodiesel blend.

Given the highly confidential and competitive nature of certifying specific fuel formulations, it is likely that all individual biodiesel producers may need to obtain their own individual certification to optimize their particular biodiesel blend formulations. The notable exception may be the case in which a trade association obtains a certification which subsequently is made available to their membership. However, for purposes of this analysis staff assumed that all 22 biodiesel producers listed in Table 10.7 would need to incur the cost of certification. Furthermore, there may be additional production costs associated with certified biodiesel blends such as in the case of designer blends using combinations of Low-NOx diesel, additives and specialized biodiesel feedstocks. However, it is impossible for staff to predict these costs.

Staff concludes that the cost of this mitigation option would be similar to previous certifications completed under 13 CCR Section 2282(g). Historically, the cost of certification has ranged between 100,000 and 300,000 dollars. Any costs incurred during the research and development (R&D) of the candidate fuel was not factored into the cost analysis for this compliance option. Those R&D costs were attributed to the normal operating business practices of emerging industries. Therefore, based on the upper end of the range of certification cost, the total cost for 22 biodiesel producers would be \$6,600,000. If no additional production costs apply to certified biodiesel blends, then the cost of certifying 200,000,000 gallons of biodiesel is $\$6,600,000/200,000,000\text{ gallons of biodiesel}$, or \$0.03/gallon. This cost does not account for any incremental production cost of meeting the certified formation specification.

3. Cost to Use Low-NOx Diesel

The third compliance option identified by staff to mitigate NOx emissions from biodiesel blends involves the use of Low-NOx diesel blendstocks. Previous studies have demonstrated that the use of renewable diesel fuel, or other high cetane renewable fuels like gas to liquid or Fischer-Tropsch fuels, is effective in mitigating NOx emissions associated with biodiesel blends. Studies show that to mitigate the NOx effect of a B20 blend, producers would need to use a ratio of 4:1, of renewable diesel to CARB diesel for the non-biodiesel portion of the blend.

Renewable diesel is available in today's market either as an imported product, or from production in a refinery. To date, Kern Oil in Bakersfield is one the few California refiners who provide limited quantities of renewable diesel.

Due to economic incentives on renewable diesel stemming from credits under the low carbon fuel standard and renewable identification numbers from the renewable fuel standard, in addition to a blender's tax credit, the cost of renewable diesel in California is relatively low priced today and competitive with CARB diesel. Currently, Neste Oil imports renewable diesel into California because current global market conditions favor these imports. While this may suggest a low cost option of NOx mitigation, the quantities are very low relative to the volume needed to mitigate biodiesel if it should be required.

Because California is still under a statewide B1 level, staff anticipates that mitigation will not be required for several years (if at all), and is likely that current global market conditions will change and not remain sustainable at today's renewable diesel fuel prices. This is especially true as renewable diesel production volume ramps up to meet the higher demands of the LCFS requirements. Current reporting under the LCFS, indicates that 7 million gallons of renewable diesel fuel were produced this year with an estimated 20 million gallons being produced by the end of 2013. This represents only a small fraction of the volume required to mitigate the volume corresponding to meeting the trigger level at B10. To meet the renewable diesel fuel demand for potential mitigation and LCFS, staff believes that a more sustainable source of renewable diesel would be required suggesting the need for domestic production.

Determining the cost of producing renewable diesel in a refinery is highly complex since actual costs depend on a large number of parameters, including feedstock costs, refinery process modifications, its use to produce a lower carbon intensive CARB diesel fuel, etc. An initial estimate of the incremental price of domestically produced renewable diesel would account for the difference in feedstock costs, assuming a refinery could process either crude or renewable diesel feedstocks such as animal tallow, waste vegetable oil, algae, etc. In this case, the incremental cost of renewable diesel feedstocks are about \$0.30 per gallon higher than crude feedstocks. So, all things being equal, the incremental cost of purchasing renewable diesel would be at least \$0.30 per gallon and since studies show that it takes four gallons of renewable diesel to mitigate the NOx impact of one gallon of biodiesel. Therefore, the overall cost

of mitigation based on feedstocks alone would be \$1.20 per gallon of mitigated biodiesel.