California Air Resources Board

Public Hearing to Consider Proposed Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation

Staff Report: Initial Statement of Reasons

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Table of Contents

List of Tables

List of Figures

I. Executive Summary

California Air Resources Board (CARB or Board) staff is proposing amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation (Proposed Amendments) (Cal. Code Regs., tit. 13, §§ 2449 et seq.). CARB adopted the In-Use Off-Road Diesel-Fueled Fleets Regulation (Off-Road Regulation or Current Regulation) in 2007 to reduce diesel particulate matter (DPM) emissions and oxides of nitrogen (NOx) emissions from off-road heavy-duty diesel vehicles in use in California. These vehicles are used in construction, mining, industrial operations, and other industries. This Initial Statement of Reasons ("ISOR" or "Staff Report") provides the basis for CARB staff's proposal to amend the Current Regulation to further reduce emissions from off-road heavy-duty diesel vehicles. Driven by the Proposed 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy), which sets a goal of reducing NOx emissions by 4.0 tons per day in the off-road diesel sector through this action, the Proposed Amendments aim to phase out the oldest and dirtiest off-road diesel vehicles in order to meet the State's multiple public health and air quality goals.

A. Current In-Use Off-Road Diesel-Fueled Fleets Regulation

CARB approved the Off-Road Regulation for adoption in 2007 and it became effective in 2008. The Off-Road Regulation was amended twice in 2009, and again in 2010 in order to relax the Off-Road Regulation's requirements to accommodate the regulated community which was facing compliance challenges due to the economic downturn at that time. The Off-Road Regulation addresses emissions from a wide variety of off-road diesel vehicles, ranging from small skid-steer loaders used in residential landscaping to very large mining trucks, and include dozers, forklifts, cranes, and excavators.

The purpose of the Off-Road Regulation is to reduce DPM, NOx, and other criteria air pollutants from in-use off-road diesel-fueled vehicles in California. (Cal. Code Regs., tit. 13, § 2449, subd. (a).) The Off-Road Regulation requires fleets to reduce their emissions by retiring older engines and replacing the retired engines with newer engines, repowering older engines, or installing verified diesel emission control strategies in older engines (VDECS); and by restricting the addition of older vehicles to fleets. The Off-Road Regulation has been effective, but is in need of updates as technology continues to advance and California's air quality needs remain serious.

B. Need for the Proposed Amendments

Despite significant improvements in California's air quality over the past decades, major populated regions in California are still not in attainment with the federal national ambient air quality standards (NAAQS) for particulate matter 2.5[1] (PM2.5) and ozone. As on-road vehicle

[1] PM2.5 is fine particulate matter that are 2.5 microns or less in diameter.

emissions continue to be reduced by CARB regulations, the percentage of total emissions emitted by off-road vehicles is increasing, urgently warranting further control, especially in light of pressing public health needs in communities across California.

Off-road diesel vehicles also emit diesel particulate matter (DPM) which has been identified as a toxic air contaminant (TAC) by CARB and poses a significant public health risk, especially at the local level. Action is needed to reduce DPM at a statewide level to reduce the health risk throughout California, especially in communities that experience disproportionate burdens from exposure to TACs.

The Proposed 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy) proposes several measures to address these needs for further emissions reductions from the off-road sector, and the Proposed Amendments are identified as one such measure.

C. Overview of the Proposed Amendments

The Proposed Amendments, as identified in the Proposed 2022 State SIP Strategy, are critical measures needed to achieve further emissions reduction from the off-road sector to achieve California's clean air goals. The Proposed Amendments would reduce emissions by requiring that fleets phase-out operation of their oldest and highest-emitting off-road diesel vehicles, prohibiting the addition of high-emitting vehicles to a fleet, and requiring the use of R99 or R100 renewable diesel (RD99/100)[2] in off-road diesel vehicles. Below is a list of the major changes included in the Proposed Amendments and more detail can be found in Chapter IV of this Staff Report:

- Phase-out of the oldest and highest-emitting off-road engines (Tier 0, 1, and 2) from operation in California. This provision will be implemented by fleet size and engine Tier;
- Restrict the addition of vehicles with Tier 3 and 4i engines, which is an expansion of provisions of the Current Regulation that restrict the vehicle-engine Tier that can be added to a fleet;
- Require contracting entities to obtain and retain a fleet's valid Certificate of Reported Compliance prior to awarding a contract or hiring a fleet;
- Mandate the use of RD99/100 for all fleets, with some limited exceptions;
- Provide voluntary compliance flexibility options for fleets that adopt zero-emission technology; and
- Include additional requirements to increase enforceability, provide clarity, and provide additional flexibility for permanent low-use vehicles.

[2] Fuel that is 99 percent or 100 percent renewable diesel.

D. Summary of Public Process

To ensure an open and transparent rulemaking process, staff have engaged in an extensive public process since the development of the Proposed Amendments in May 2021. CARB staff conducted 3 virtual public workshops, 3 workgroup meetings, and over 30 individual meetings with stakeholders upon request to gather additional information and feedback during the development of the Proposed Amendments. Attendees of these meetings included impacted community members, industry stakeholders, local air districts, consultants, construction companies, off-road vehicle operators, and vehicle manufacturers. Staff established the Proposed Amendments email, ordamendments@arb.ca.gov, so that the public may reach out to CARB staff at any time.

ES Table 1. List of Proposed Amendments Workshops and Workgroups

Meeting	Date
First Workshop	May 6, 2021
Renewable Diesel Workgroup	September 10, 2021
Prime Contractor and Public Works Workgroup	September 21, 2021
Cost and Incentives Workgroup	October 15, 2021
Second Workshop	December 14, 2021
Third Workshop	May 16, 2022

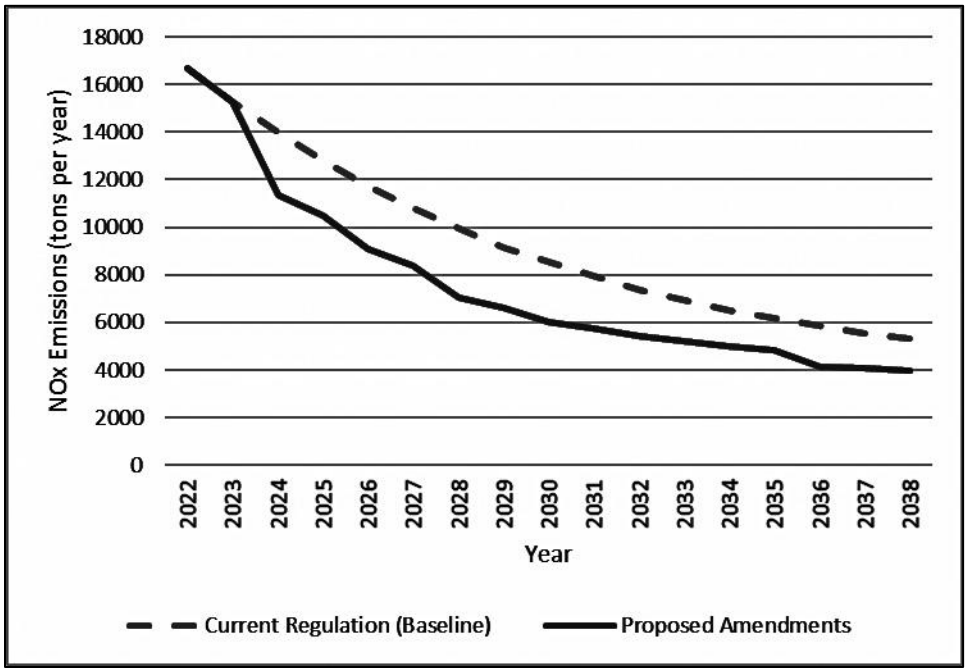
E. Benefits of the Proposed Amendments

1. Air Quality Benefits

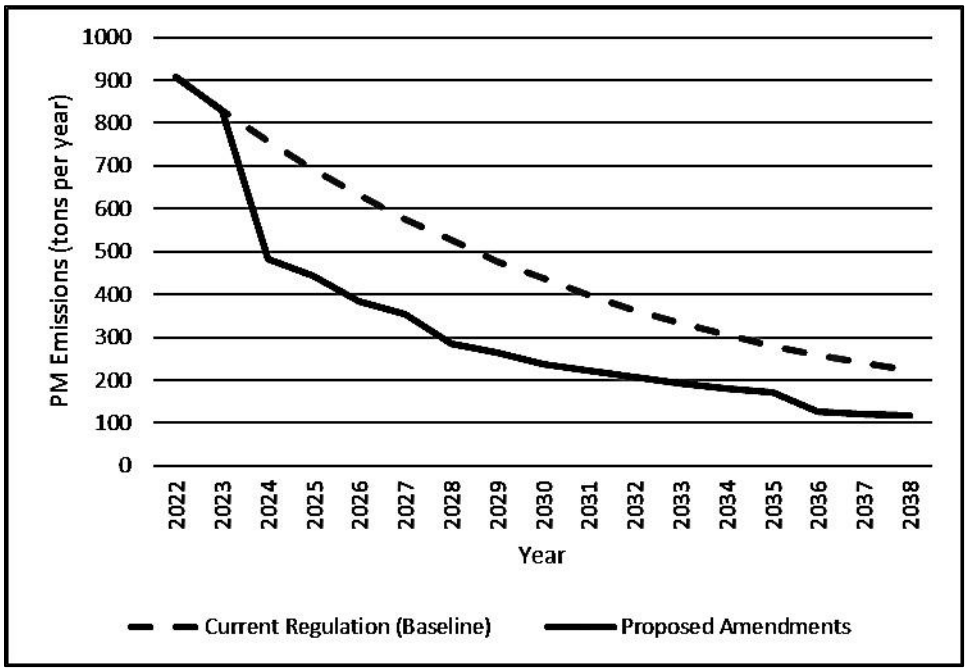
Cumulatively, from 2024 through 2038, the Proposed Amendments are expected to reduce statewide emissions from off-road diesel-fueled vehicles by approximately 31,087 tons of NOx and 2,717 tons of PM beyond the reductions expected from the Current Regulation. About half of the additional NOx and PM reductions from the Proposed Amendments are expected to be realized within the first 5 years of implementation. The additional emissions reductions from the Proposed Amendments are expected to reduce the concentration of PM in the communities in which these vehicles operate, benefitting both local residents and the operators of the vehicles alike, as well as reduce the concentration of ozone which provides regional health benefits.

ES Figure 1 and ES Figure 2 compare the overall emissions under the baseline and Proposed Amendments scenarios for NOx and PM, respectively.

ES Figure 1. Statewide NOx Emissions from Off-Road Diesel Vehicles under the Baseline and Proposed Amendments from 2022 through 2038



ES Figure 2. Statewide PM Emissions from Off-Road Diesel Vehicles under the Baseline and Proposed Amendments from 2022 through 2038



2. Health Benefits

CARB staff estimated the reduction in adverse health outcomes associated with reduced emissions of PM2.5 and NOx due to the Proposed Amendments. These health outcomes include cardiopulmonary mortality, hospital admissions for cardiovascular and respiratory illnesses, and emergency room (ER) visits for asthma. Based on the analysis, staff estimates that the total reduction in the number of cases statewide due to the implementation of the Proposed Amendments from 2024 to 2038 would be as follows:

- 571 fewer premature deaths (446 to 699, 95 percent confidence interval),
- 82 fewer hospital admissions for cardiovascular illnesses (0 to 161, 95 percent confidence interval),
- 98 fewer hospital admissions for respiratory illnesses (23 to 173, 95 percent confidence interval), and
- 277 fewer ER visits for asthma (175 to 379, 95 percent confidence interval).

The statewide valuation of health benefits is calculated by multiplying the number of avoided adverse health outcomes by valuation per incident, the results of which are in ES Table 2. below.

ES Table 2. Total Statewide Valuation of Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2024 through 2038

Outcome	Valuation (million 2020$)
Avoided Premature Deaths	$5,727.0
Avoided Hospital Admissions for Cardiovascular Illnesses	$4.9
Avoided Hospital Admissions for Respiratory Illnesses	$5.1
Avoided ER Visits for Asthma	$0.2
Total	$5,737

Over the course of the twelve-year implementation period, the Proposed Amendments will lead to substantial PM and NOx reductions from one of the largest sources of emissions today and help avoid hundreds of premature deaths and pollution-related health impacts in communities across the State, with an overall health benefits valuation of over $5 billion.

3. Community Benefits

The purpose and intent of the Proposed Amendments are to further reduce NOx and DPM from in-use off-road diesel vehicles, which is consistent with CARB's environmental justice goal of reducing exposure to air pollutants and reducing adverse health impacts from TACs in all communities, including low-income communities and communities of color.

As of January 2022, 17 communities have been selected under AB 617 to develop and implement a CERP and/or a Community Air Monitoring Plan (CAMP). The CERPs identify each community's air pollution concerns and a suite of strategies to reduce emissions from the identified sources. These strategies can include new regulations, new incentive grant funding, and new exposure reduction resources and tools. Ten of the AB 617 community steering committees identified in-use off-road diesel equipment and/or activities and facilities that utilize in-use off-road diesel equipment as a top concern in their communities and would directly benefit from the Proposed Amendments.

The Proposed Amendments will provide emission reductions and associated improvements to air quality, beyond the Current Regulation, that will help protect all communities and would be a benefit in environmental justice communities frequently located in areas with increased exposure to air pollution and toxics from in-use off-road diesel vehicles.

F. Costs Associated with the Proposed Amendments

ES Table 3 shows the total statewide costs and cost savings for the Proposed Amendments. This table includes direct costs and cost savings for businesses in addition to costs to local, State and federal governments.

ES Table 3. Total Statewide Costs and Savings for the Proposed Amendments (in Millions)[3]

Year	Annual Vehicle Capital Costs (amortized, with tax)	Tier 4 final Maintenance Costs	Contracting Costs	Signage Costs	Total Net Costs
2023	$400,133,680	$0	$0	$0	$400,133,680
2024	$373,473,361	$1,916,532	$12,501,229	$3,519,603	$391,410,725
2025	$499,765,955	$1,916,532	$12,501,229	$3,519,603	$517,703,319
2026	$459,745,469	$2,903,146	$12,501,229	$3,519,603	$478,669,447
2027	$670,871,821	$2,903,146	$12,501,229	$3,519,603	$689,795,799
2028	$199,489,502	$4,857,867	$12,501,229	$3,519,603	$220,368,201
2029	$245,688,241	$4,857,867	$12,501,229	$3,519,603	$266,566,940
2030	$56,625,623	$5,631,267	$12,501,229	$3,519,603	$78,277,721
2031	$71,395,269	$5,631,267	$12,501,229	$3,519,603	$93,047,367
2032	($194,852,203)	$6,027,650	$12,501,229	$3,519,603	($172,803,722)
2033	($172,273,292)	$6,027,650	$12,501,229	$3,519,603	($150,224,810)
2034	($235,371,379)	$6,027,650	$12,501,229	$3,519,603	($213,322,898)
2035	($198,663,992)	$6,027,650	$12,501,229	$3,519,603	($176,615,511)
2036	($207,549,848)	$6,239,292	$12,501,229	$3,519,603	($185,289,724)
2037	($181,510,769)	$6,239,292	$12,501,229	$3,519,603	($159,250,645)
2038	($157,936,538)	$6,239,292	$12,501,229	$3,519,603	($135,676,414)
Total	**$1,629,030,900**	**$73,446,097**	**$187,518,435**	**$52,794,045**	**$1,942,789,477**

[3] Note that totals may not add due to rounding.

II. Introduction and Background

A. Overview

California Air Resources Board (CARB or Board) staff is proposing amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation (Proposed Amendments) (Cal. Code Regs., tit. 13, §§ 2449 et seq.). CARB adopted the In-Use Off-Road Diesel-Fueled Fleets Regulation (Off-Road Regulation or Current Regulation) in 2007 to reduce diesel particulate matter (DPM) emissions and oxides of nitrogen (NOx) emissions from off-road heavy-duty diesel vehicles in use in California. These vehicles are used in construction, mining, industrial operations, and other industries. This Initial Statement of Reasons ("ISOR" or "Staff Report") provides the basis for CARB staff's proposal to amend the Current Regulation to further reduce emissions from off-road vehicles.

Despite significant improvements in California's air quality over the past decades, major populated regions in California are still not in attainment with the federal national ambient air quality standards (NAAQS) for particulate matter 2.5[4] (PM2.5) and ozone. As on-road vehicle emissions continue to be reduced by CARB regulations, the percentage of total emissions emitted by off-road vehicles is increasing, urgently warranting further control, especially in light of pressing public health needs in communities across California. The Proposed 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy) proposes several measures to address this need for further emissions reductions from the off-road sector.

The Proposed Amendments are one such measure and they would reduce emissions by requiring that fleets phase-out operation of their oldest and highest-emitting off-road diesel vehicles, prohibiting the addition of high-emitting vehicles to a fleet, and by requiring the use of R99 or R100 renewable diesel (RD99/100)[5] in off-road diesel vehicles. The Proposed Amendments would also include additional administrative requirements for prime contractors and public works awarding bodies, with the goal of improving enforceability and compliance with the Off-Road Regulation.

Implementation of the Proposed Amendments, with requirements proposed to be phased in from 2024 through 2036[6], would reduce emissions of NOx from off-road diesel vehicles by as much as 24 percent, and reduce DPM by as much as 42 percent, greatly decreasing health risks from the operation of off-road diesel vehicles in California. Table 1 provides a summary of the benefits expected from the full implementation to 2038 of the Proposed Amendments beyond what is expected over the same period from the Current Regulation.

[4] PM2.5 is fine particulate matter that are 2.5 microns or less in diameter.

[5] Fuel that is 99 percent or 100 percent renewable diesel.

[6] Note that costs are analyzed starting in 2023 to account for the actions that fleets will need to take to comply with the January 1, 2024 requirements. Benefits are analyzed starting 2024 to reflect the first full year of implementation of those January 1, 2024 requirements.

Table 1:Statewide Cumulative Benefits of Proposed Amendments by 2038

Benefit	Cumulative Benefit by 2038
NOx Reduction	31,087 tons
$PM_{2.5}$ Reduction	2,717 tons
Estimated Avoided Premature Deaths	571
Estimated Avoided Hospital Admissions	180
Estimated Avoided Emergency Room Visits for Asthma	277
Health Benefits Valuation (2020$)	$5.74 billion

These requirements are expected to reduce the concentration of particulate matter (PM) in the communities in which these vehicles operate, benefitting both local residents and the operators of the vehicles alike. Furthermore, the proposed administrative requirements will ensure that compliant fleets are not subject to unfair competition from noncomplying fleets, by aiding enforcement of the regulation's provisions.

In addition to providing much-needed public health protection for the millions of Californians who still breath unhealthy air and reducing community exposure to air toxics, the Proposed Amendments are also a critical component of CARB's Proposed 2022 State SIP Strategy, which outlines firm commitments for emissions reductions that CARB is obligated to achieve in order to meet current health-based federal ambient air quality standards in California.

Over the course of the twelve-year implementation period, the Proposed Amendments will lead to substantial PM and NOx reductions from one of the largest sources of emissions today and help avoid hundreds of premature deaths and pollution-related health impacts in communities across the State, with an overall health benefits valuation of over $5 billion.

B. Regulatory Authority

The California Legislature has designated CARB as the State agency that is "charged with coordinating efforts to attain and maintain ambient air quality standards...and [] systematically attack[ing] the serious problem caused by motor vehicles, which is the major source of air pollution in many areas of the state." (Health & Saf. Code, § 39003; see also Health & Saf. Code, §§ 39002, 43000, 43000.5.) To carry out its duties and powers, CARB is required adopt standards, rules, and regulations, and "do such acts as may be necessary." (E.g., Health & Saf. Code, §§ 39600, 39601, 39602.5, 43013). In particular, CARB is required

to “adopt regulations to achieve the maximum feasible reduction in volatile organic compounds (VOC) emitted by consumer product,” if CARB determines that adequate data establishes the regulations are necessary to attain State and federal ambient air quality standards and the regulations are commercially and technologically feasible and necessary. (Health & Saf. Code, § 41712, subd. (b).) In addition, the United States Environmental Protection Agency (U.S. EPA) may “authorize California to adopt and enforce standards and other requirements relating to the control of emissions from” off-road vehicles and engines. (42 U.S.C. § 7543(e)(2)(A).)

C. Background

The Proposed Amendments address emissions from a wide variety of off-road diesel vehicles. Heavy-duty off-road diesel-powered vehicles are a diverse group, ranging from small skid-steer loaders used in residential landscaping to very large mining trucks, and include dozers, forklifts, cranes, and excavators.

Common off-road diesel vehicle types are described below.

Dozer

Figure 1. Photo of Dozer

The term dozer (or bulldozer) refers to an off-road tractor, either tracked or wheeled, equipped with a blade. For emissions inventory work, dozers are generally referred to as “crawler tractors.” A ripper, which is a claw-like device, may be attached to the back of a larger dozer (typically greater than 200 horsepower (hp)). The ripper is useful in loosening up the ground so that the blade will be able to penetrate and fill quickly. Dozers are used in a wide variety of industries, such as construction and mining, for earthwork and grading to move piles of dirt or for demolition, and in industrial settings to position bulk cargo.

Loader

Figure 2. Photo of a Loader

The term "loader" is generic and can refer to any type of off-road tractor that uses a bucket on the end of movable arms to lift materials into trucks and move material such as dirt, debris, building materials, bulk goods, heavy objects, or snow. Loaders are used widely in construction, mining, industrial sectors, and for road maintenance. There are many different types of loaders, including, but not limited to, front end, skid steer, backhoe, rubber-tired, and crawler.

Loaders are manufactured in a wide range of sizes, from 25 hp (for small, skid steer loaders) to over 1,000 hp (for large, rubber-tired loaders), with most being between 200 hp and 750 hp. Small loaders may have bucket capacities of 1 cubic yard or less, while large rubber-tired loaders can have a bucket capacity over 45 cubic yards.

Forklift

Figure 3. Photo of a Mast Forklift

Forklifts are industrial trucks used to hoist and transport materials by means of one or more steel forks inserted under the load. Forklifts are extremely diverse in both their size and custom cargo handling abilities. Forklift engines can be powered by internal combustion engines, such as compression ignition (i.e., diesel or natural gas) or spark ignition (i.e., gasoline or propane) engines, or electric motors. Compression ignition forklifts are usually designed for higher lift capacity than their electric or spark-ignited counterparts and are subject to the Off-Road Regulation. Spark-ignited forklifts are subject to the Large Spark-Ignition Fleet Regulation (LSI Regulation) which is separate from the Off-Road Regulation. Diesel forklifts tend to have lift capacities of over 6,000 pounds, are usually used outdoors, and have pneumatic tires. Forklifts are used in a variety of applications, including,

but not limited to, manufacturing, construction, retail, meat and poultry processing, lumber and building supplies, trades, agriculture, and a variety of warehouse operations.

Motor Grader

Figure 4. Photo of a Motor Grader

Motor graders are used to establish a rough or finish grade, spread material for building paved roads, build and maintain unpaved roads such as rural or mine haul roads, and clear snow from roads. Motor graders typically contain engines with between 125 to 500 hp, and blade widths range from 12 to 24 feet.

Crane

Figure 5. Photo of a Crane

There are a wide variety of cranes that range in size, weight, and function. Cranes are used to lift and lower materials, and to move them horizontally. Large cranes are commonly used in the construction of buildings and bridges, and in manufacturing. Smaller cranes are used in a variety of applications across many sectors. Cranes may have telescoping, lattice, or articulating (folding) booms. The capacity rating is in tons that the crane can safely lift. Smaller cranes may have engines that range from less than 25 hp to over 500 hp. Some of the largest cranes have 2 engines, an upper and lower engine. In these cranes, the lower engine propels the vehicle to position itself and the upper engine provides the power for performing the lifting or dragging function once in position. Smaller cranes only have one engine, which is used to both propel the vehicle and to provide lifting power.

Scraper

Figure 6. Photo of a Scraper

A scraper is a large machine used for earthmoving and mining. The rear section has a vertically moveable hopper with a sharp horizontal front edge. The hopper can be hydraulically lowered and raised. When the hopper is lowered, the front edge cuts into the soil and fills the hopper. The engines range from 175 to over 500 hp. The heavier scraper types have 2 engines (tandem-powered).

Excavator

Figure 7. Photo of an Excavator

An excavator is a machine made for digging out earth with its bucket to create trenches, holes, and foundations. The bucket may sometimes be swapped out with other attachments to perform other tasks. Excavators generally come in three sizes, the largest being standard excavators used for bulk earthmoving and heavy lifting. Midi excavators are used when a job site is in a confined area and have more power than a mini excavator. A mini excavator is the smallest machine and is used when a small footprint is needed or a job site space is tight.

The construction industry is the primary user of off-road diesel vehicles in California, but off-road diesel vehicles are also used by industries such as airlines (ground support equipment), mining, equipment rental, oil and gas drilling, and the industrial sector. Government agencies also use off-road diesel vehicles for road maintenance, lawn and tree care for recreational spaces, and other activities.

The industrial sector using these vehicles includes thousands of facilities, both wholesale and retail distribution points, throughout the State, where forklifts, cranes, and other tractors are used to facilitate manufacturing, and to distribute raw materials and finished products. This sector includes a wide variety of business types, such as recycling facilities, landfills,

refineries, power plants, retail and wholesale goods distribution, utility services, golf courses, ski resorts, sewage treatment plants, landscape materials, and factories.

There are hundreds of manufacturers of off-road diesel vehicles. Some vehicle manufacturers also manufacture engines for their off-road diesel equipment, but most off-road diesel vehicle manufacturers design off-road diesel vehicles to accept engines manufactured by other companies. Some off-road diesel engine manufacturers also supply engines to multiple vehicle manufacturers. A review of vehicles and engines reported to CARB in DOORS, the online reporting tool for CARB's Off-Road Regulation, reveals that there are over 700 unique equipment manufacturers, over 60 equipment types, and over 120 unique engine manufacturers.

D. Current Regulations & Programs

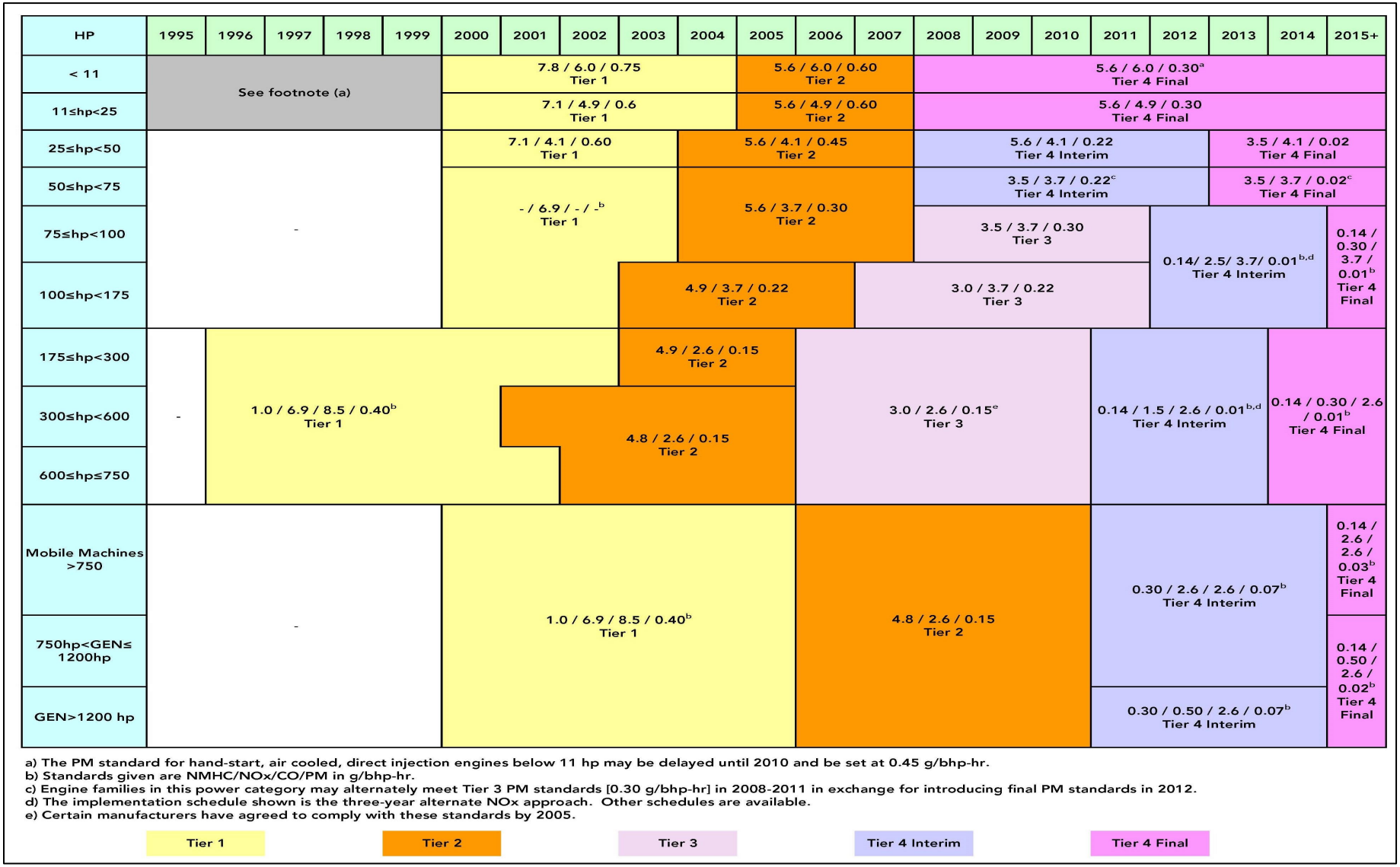
1. Standards for New Off-Road Engines

CARB's regulatory programs for new off-road diesel engines are largely harmonized with U.S. EPA's for nonroad diesel engines. The terms "off-road" and "nonroad" refer to the same type of engine or equipment, with EPA using the term "nonroad" and CARB using the term "off-road." The engines discussed here are mobile and land-based, ranging in hp from 25 to more than 750 hp in rated power. Other off-road engines, such as those in locomotives, off-highway recreational vehicles, and marine vessels, are excluded from this discussion, as these engines are subject to different emission standards.

Since the mid 1990's, emission standards adopted by U.S. EPA and CARB have required new off-road engines to become progressively cleaner. In developing the standards for new engines, staff worked closely with U.S. EPA to develop harmonized federal and California programs. The emission standards are divided into four increasingly stringent levels (Tiers); the allowed emission level and effective dates vary by hp. Until the mid-1990s, off-road diesel engines were not subject to emission standards (commonly known as Tier 0 or "uncontrolled"). Starting in 1996, depending on engine size, the tiered standards began to be phased in. Tier 4 standards are divided into two stages for engines with a maximum rated hp of 25 or greater, interim and final. Figure 8 displays the implementation years for the off-road compression ignition engine emission standards in grams per brake horsepower-hour (g/bhp-hr).

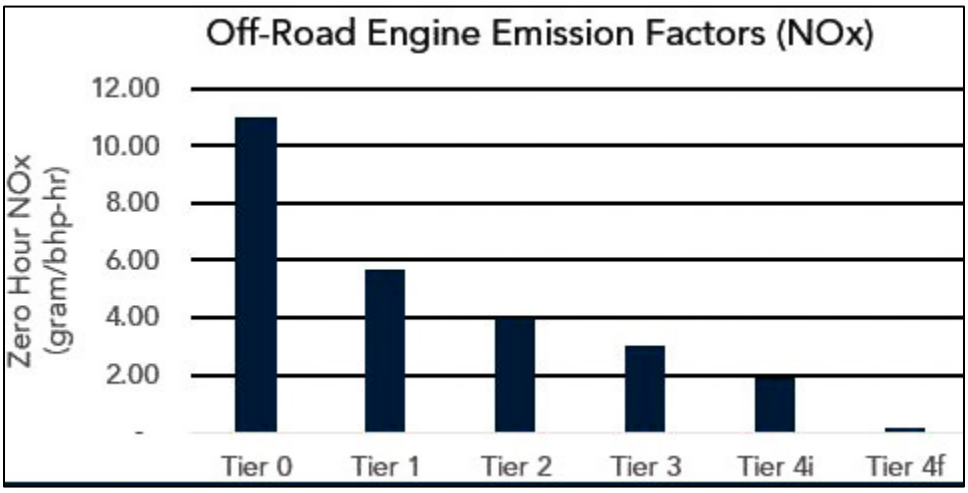
Both U.S. EPA and California engine standard regulations included a Transition Program for Equipment Manufactures (TPEM or flexibility program). This program was a temporary exemption that allowed diesel equipment manufacturers to delay installing the newest compliant tier engines in their products for up to seven years. TPEM was created in response to equipment manufacturers' concerns that engine manufacturers would not provide sufficient notice to the equipment manufacturers detailing changes to the engine design in order to meet the tighter emission standards. The result of this program was that non-Tier 4 compliant engines were installed in new equipment for up to seven years after the introduction dates of Tier 4 shown in Figure 8.

Figure 8. Off-Road Compression-Ignition (Diesel) Engine Standards (NMHC+NOx/CO/PM in g/bhp-hr)



The Tier 4 Final standards require the use of advanced exhaust after-treatment technologies to control both PM and NOx and result in diesel engines that emit 80 times less NOx than Tier 0 engines (100-175 hp), as shown in Figure 9 below.

Figure 9. Off-Road Emission Factors by Tier



2. In-Use Off-Road Diesel-Fueled Fleet Regulation

CARB approved the Off-Road Regulation in 2007 and became effective in 2008. The Off-Road Regulation was amended twice in 2009, and again in 2010. In January 2009, amendments to the Off-Road Regulation were adopted by the Board to extend the deadline for receiving double credits for early installation of PM retrofits, modify the changing-fleet-size requirements, and clarify that all sellers of off-road vehicles must maintain records of the disclosure of applicability of the Off-Road Regulation to those vehicles. In July 2009, amendments to the Off-Road Regulation were adopted by the Board to provide additional incentives to spur early actions by fleets to reduce emissions, and to make several minor clarifications to the regulation. In December 2010, amendments to the Off-Road Regulation were adopted by the Board to delay the initial compliance dates for all fleets by four years, provide a path to compliance without any required retrofits, and simplify the regulation. All of the previously mentioned amendment changes were adopted in order to relax the Off-Road Regulation's requirements to accommodate the regulated community which was facing compliance challenges due to the economic downturn at that time.

The Off-Road Regulation, which has the same applicability as the Proposed Amendments, applies to any person, business, or government agency who owns, operates, or sells within California any vehicles with diesel-fueled or alternative diesel fueled off-road compression-ignition engine with maximum hp of 25 or greater, provided that the vehicle cannot be registered and driven safely on-road or was not designed to be driven on-road, even if it has been modified so that it can be driven safely on-road. (Cal. Code Regs., tit. 13, § 2449, subds. (b)(1) & (b)(2)(D).) A "vehicle" is a device by which any person or property may be propelled, moved, or drawn upon a highway, excepting a device moved exclusively by human power or used exclusively upon stationary rails or tracks. (Veh. Code section 670).

The regulation also applies to:

- Workover rigs;
- Both engines of two-engine cranes and two-engine water drilling rigs that have auxiliary engines with a rated brake hp of 50 hp or greater, and
- Both engines of two-engine vehicles that have auxiliary engines with a rated brake hp of 50 hp or greater and that:
  - Are not subject to CARB's Public Agencies and Utilities Fleet Regulation,
  - Are not sweepers subject to the CARB's Truck and Bus Regulation, and
  - Do not contain a Tier 0 auxiliary engine.

(Cal. Code Regs., tit. 13, § 2449, subds. (b)(2) & (b)(2)(E)(10) & (11).)

Examples of vehicles or equipment that are not subject to the Off-Road Regulation include:

- Vehicles with engines rated at less than 25 maximum hp;
- Vehicles that are not self-propelled;
- Portable engines, except auxiliary engines on 2-engine vehicles;
- Vehicles used exclusively for personal (noncommercial) use;
- Locomotives;
- Marine engines or commercial marine vessels;
- Recreational off-highway vehicles;
- Vehicles used exclusively in agricultural operations;
- Vehicles powered by gasoline, propane, or alternative fuels that are spark-ignited (not compression-ignited);
- Combat and tactical support equipment;
- Stationary equipment;
- Two-engine vehicles that are not two-engine cranes or two-engine water drilling rigs, and that have Tier 0 auxiliary engines;
- Two-engine vehicles that are subject to CARB's Fleet Rule for Public Agencies and Utilities; and
- Equipment subject to CARB's Regulation for Mobile Cargo Handling Equipment (CHE) at Ports and Intermodal Rail Yards.

(Cal. Code Regs., tit. 13, § 2449, subd. (b)(2)(G).)

The purpose of the Off-Road Regulation is to reduce DPM, NOx, and other criteria air pollutants from in-use off-road diesel-fueled vehicles in California. (Cal. Code Regs., tit. 13, § 2449, subd. (a).) The Off-Road Regulation requires fleets to reduce their emissions by retiring older engines and replacing them with newer engines, repowering, or installing verified diesel emission control strategies (VDECS); and by restricting the addition of older vehicles to fleets. The Off-Road Regulation has been effective, but is in need of updates as technology continues to advance and California's air quality needs remain serious, which are discussed further in Chapter III of this Staff Report.

The emission performance requirements of the Current Regulation require fleets to meet declining fleet average targets that are phased in by fleet size. There are two ways to be compliant with the emission performance requirements of the Current Regulation:

1. A fleet can either meet its fleet average target, calculated based on the fleet's equipment composition, or

2. Comply with the Best Available Control Technology (BACT) requirements (i.e., the fleet must turn over a certain percent of its total fleet hp or use accrued credits).

If a fleet meets the fleet target for a given year, it is not required to take further action. If a fleet does not meet its fleet target, it can comply by meeting the BACT requirement, which requires a fleet to turn over a certain percentage of the fleet's total hp (generally 10 percent) or use credits accrued by the fleet for actions taken in previous years. The phase-in of the fleet average targets are described in Table 2. If a fleet does not meet its final fleet target by the final date shown in Table 2, the fleet is required to turn over 10 percent of its total fleet hp each year until it meets that target. The Current Regulation also has annual fleet reporting requirements, vehicle labeling requirements, and special provisions for vehicles that operate for less than 200 hours per year (low-use vehicles). The compliance dates and compliance requirements by fleet size are incorporated into CARB's baseline off-road emission inventory, as well as into the upcoming updated 2022 CARB Construction, Industrial, Mining and Oil Drilling Emissions Inventory (2022 Off-Road Inventory). For each year a fleet reports and submits a Responsible Official Affirmation of Reporting attesting to their compliance with the regulation, CARB issues the fleet a Certificate of Reported Compliance.

Table 2. Fleet size, Phase-in Dates of Performance Requirements, and Number of Fleets and Vehicles

Fleet Size	Fleet Average Target or BACT Date (January 1)	Number of Fleets	Number of Vehicles (% of total)	Number of Fleets Meeting Final Target
Large (>5,000 total hp)	2014-2023	1,023	109,663 (56%)	520
Medium (2,501 to 5000 total hp)	2017-2023	694	16,523 (8%)	229
Small (≤2,500 total hp)	2019-2028	11,242	71,061 (36%))	4,533
Ultra-small[7] (optional) (< 500 total hp)	2019-2029	6,741 (subset of small)	17,995 (subset of small)	N/A
Total fleets and vehicles		12,959	197,247	

[7] Ultra-small fleets are fleets with less than 500 total horsepower and not required to meet a final fleet average target but instead are required to be comprised of 100 percent Tier 2 vehicles by January 1, 2029.

As shown in Table 2, the Current Regulation is almost fully implemented for large and medium fleets. Small and ultra-small fleets are approximately halfway through implementation. Table 2 also shows the number of fleets that are already meeting their final fleet average target and have reached full compliance with the emission performance requirements of the Current Regulation (January 1, 2023, targets for large and medium fleets and January 1, 2028, targets for small fleets). Note that these data are current as of July 2022 and do not reflect the number of fleets that will meet the fleet average target on January 1, 2023. As shown, 51 percent of large fleets, 33 percent of medium fleets, and 40 percent of small fleets have already achieved full compliance with the Current Regulation's emission performance requirements.

3. Low Carbon Fuel Standard

CARB approved the Low Carbon Fuel Standard (LCFS) in 2009, and began implementing it on January 1, 2011. Since 2009, LCFS has been amended several times, with the latest major amendments approved in 2018. LCFS is designed to decrease the life cycle carbon intensity (CI) of California's transportation fuel pool and provide an increasing range of low-carbon and renewable alternatives, which reduce petroleum dependency and achieve greenhouse gas (GHG) and other air quality benefits. To achieve these goals, LCFS sets annual CI standards, or benchmarks, which decrease over time, for gasoline and diesel, and for the fuels that replace them. Fuels and fuel blendstocks with CIs below the benchmark generate credits which can be sold to offset the costs of the lower CI fuel to consumers; renewable diesel (RD) is generally one such fuel. Fleets are able to take advantage of the lower cost of RD as a result of the LCFS credits and use cleaner fuel at a reduced price. RD is currently available in volumes that would readily fulfill the fueling needs of vehicles subject to the Proposed Amendments. LCFS will continue to support production and consumption of RD and is expected to increase the availability of RD in future years.

4. Other CARB Regulations

Due to the variety of off-road heavy-duty vehicles that exist, off-road diesel-fueled vehicles can be subject to different CARB regulations addressing specific vehicle types or operations. The regulations are designed so that each vehicle is subject to only one regulation, with the exception of auxiliary engines on two engine vehicles. A few of these CARB regulations, other than the Off-Road Regulation, are described below.

CARB's Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards

Most vehicles that operate strictly at California ports or intermodal rail yards are not covered by the Off-Road Regulation but are instead subject to CARB's Regulation for Mobile Cargo Handling Equipment (CHE Regulation). The CHE Regulation establishes requirements for in-use and newly purchased diesel-powered Cargo Handling Equipment used at ports and intermodal rail yards.

"Cargo Handling Equipment" is defined by the CHE Regulation as any off-road, self-propelled vehicle or equipment used at a port or intermodal rail yard to lift or move

container, bulk, or liquid cargo carried by ship, train, or another vehicle, or used to perform maintenance and repair activities that are routinely scheduled or that are due to predictable process upsets. CHE equipment subject to the CHE Regulation includes, but is not limited to, rubber-tired gantry cranes, yard trucks, top handlers, side handlers, reach stackers, forklifts, loaders, aerial lifts, excavators, and dozers. CHE equipment that does not operate at a port or intermodal rail yard is not subject to the regulation.

Certain equipment is exempt from the CHE Regulation and may instead be subject to the Off-Road Regulation, including mobile cranes and rented, leased, or contracted equipment brought onto a port or intermodal rail yard to perform unexpected repairs that are not routine in nature or due to predictable maintenance activities.

CARB's Fleet Rule for Public Agencies and Utilities

This regulation applies to municipalities and utilities that own, lease, or operate on-road diesel-fueled heavy-duty vehicles with engines certified to greater than 0.01 g/bhp-hr PM that do not come equipped with the original equipment manufacturer filter. If a two-engine vehicle is subject to this regulation, it is not subject to the Off-Road Regulation.

CARB's Portable Diesel Engine Air Toxic Control Measure

Diesel equipment that is not self-propelled (i.e., equipment that does not contain an engine that provides motive power), such as diesel generators and air compressors, are not covered by the Off-Road regulation. Such equipment, if 50 brake hp and above and stationary, are likely subject to CARB's Airborne Toxic Control Measure (ATCM) for Stationary Compression Ignition Engines. Such equipment that are 50 brake hp and above and portable are likely subject to CARB's ATCM for Diesel Particulate Matter from Portable Engines Rated at 50 hp and Greater (Portable Diesel Engine ATCM). However, in some cases, the auxiliary engine on a two-engine vehicle may be subject to the Off-Road Regulation and, possibly, also local air district permitting rules.

CARB's Portable ATCM is primarily implemented through local air districts. CARB's Portable Equipment Registration Program (PERP), which is a voluntary statewide program to register portable equipment such as air compressors, generators, concrete pumps, tub grinders, wood chippers, water pumps, drill rigs, pile drivers, rock drills, abrasive blasters, aggregate screening and crushing plants, and concrete batch plants. With certain limited exceptions, portable equipment registered in PERP may operate throughout the State without obtaining permits from any of California's 35 air quality management or air pollution control districts (air districts). In the event a local air district requires a permit for the auxiliary engine on a two-engine vehicle, the auxiliary engine may be registered in PERP to satisfy the local air district permitting requirement, and would be subject to the Off-Road Regulation instead of the Portable Diesel Engine ATCM.

CARB's On-Road Truck and Bus Regulation

The Regulation to Reduce Emissions of Diesel Particulate Matter, Oxides of Nitrogen and Other Criteria Pollutants, from In-Use Heavy-Duty Diesel-Fueled Vehicles (Truck and Bus Regulation) generally applies to individuals, private companies, and Federal agencies that own diesel vehicles with a Gross Vehicle Weight Rating greater than 14,000 lbs. that operate

in California. The Truck and Bus Regulation has been in effect since December 2008, and is now in the last replacement phase, with a final deadline of January 1, 2023, to upgrade to 2010 or newer MY engines. Heavy-duty vehicles that can be registered and driven safely on-road or are designed to be driven on-road are generally not subject to the Off-Road Regulation, and may be subject to CARB's Truck and Bus Regulation or another CARB regulation. Although several types of two-engine vehicles are subject to the Off-Road Regulation, two-engine sweepers are subject to the Truck and Bus Regulation.

CARB's Solid Waste Collection Vehicle Regulation- Heavy Cranes

The On-Road Heavy-Duty Diesel-Fueled Residential and Commercial Solid Waste Collection Vehicles (SWCV) Regulation was amended, effective on July 1, 2019, to include heavy cranes with a phase in schedule that provided sufficient time for crane operators to upgrade equipment without disrupting business operations. Heavy cranes regulated under the SWCV Regulation are large specialized on-road cranes with a single diesel engine. Heavy cranes that are regulated under the SWCV Regulation are not subject to the Off-Road Regulation.

CARB's Large Spark-Ignition Fleet Regulation

The LSI Regulation applies to operators of forklifts, sweeper/scrubbers, industrial tow tractors, and airport ground support equipment. LSI-regulated vehicles include in-use off-road gasoline, propane, and compressed natural gas vehicles with greater than one liter displacement that are rated at 25 hp or greater. The LSI Regulation has been in place since 2006, and applied target fleet average emission levels that decreased over time to encourage integration of electric vehicles, newer lower-emitting engines, and retrofit emission control devices into fleet vehicles. The LSI Regulation does not apply to small fleets with 3 or fewer forklifts and/or pieces of non-forklift LSI equipment. Vehicles covered under the LSI Regulation are not subject to the Off-Road Regulation, as they are not diesel-fueled.

CARB's Zero-Emission Forklift Regulation Under Development

CARB staff is currently developing the Zero-Emission Forklift Regulation, which would drive greater deployment of zero-emission forklifts within fleets throughout the state. Because diesel forklifts are subject to on-going compliance requirements set forth in the Off-Road Regulation, staff's proposal for the Zero-Emission Forklift Regulation, scheduled for Board consideration in 2023, will focus on the transition of large spark-ignition forklifts to zero-emission technology.

CARB's Transport Refrigeration Unit Regulation (Part II Under Development)

Transport Refrigeration Units (TRUs) are refrigeration systems powered by diesel internal combustion engines designed to refrigerate or heat perishable products that are transported in various containers, including truck vans, semi-truck trailers, shipping containers, and railcars. TRU engines are relatively small, ranging from 9 to 36 hp, but a significant number of these engines congregate at distribution centers, truck stops, and other facilities, resulting in the potential for health risks to those that live and work nearby.

CARB staff are developing a proposal that would require the transition of diesel-powered TRUs to zero-emission technology in two phases. Part 1 consists of proposed amendments to

the TRU Air Toxic Control Measure, which the Board approved in 2022 and is awaiting OAL approval. The proposed amendments include requirements for the transition of diesel-powered truck TRUs to zero-emission, a PM emission standard for newly manufactured non-truck TRUs, lower global warming-potential refrigerant, facility registration and reporting, expanded TRU reporting and labeling, and fees. CARB staff are now assessing zero-emission options for non-truck TRUs, and plan to propose a second rulemaking (Part 2) to the Board for consideration in 2025. TRUs are not subject to the Off-Road Regulation.

CARB's Commercial Harbor Craft Regulation

The Off-Road Regulation does not apply to marine engines or commercial marine vessels and there is little overlap between the CHC Regulation and the Off-Road Diesel Regulation, except in certain situations such as a forklift or tractor operating on a barge.

E. Air Pollution from Vehicles Subject to the Off-Road Regulation

Emissions from vehicles that are subject to the Off-Road Regulation include criteria pollutants such as PM2.5 and NOx, and Toxic Air Contaminants (TAC) such as DPM. This section provides a summary of the different forms of air pollution emitted from diesel-fueled off-road vehicles.

1. Near-Source Toxics

Diesel-fueled off-road engines emit a complex mixture of air pollutants that pose serious health concerns to nearby communities. Diesel exhaust includes gaseous TACs, a mixture of toxics in the particulate phase, such as DPM, and other pollutants that have health impacts due to near-source exposure, such as carbon monoxide (CO). In 2002, U.S. EPA conducted its first comprehensive review of the potential effects of exposure to diesel engine exhaust.[8] This hazard assessment determined that diesel engine exhaust emissions are a likely human carcinogen, and the World Health Organization has classified diesel emissions as carcinogenic to humans.[9]

DPM is PM emitted from diesel-fueled engines and is composed of carbon particles, such as Black Carbon, and over 40 TACs that are known cancer-causing organic substances, such as arsenic, polycyclic aromatic hydrocarbons (HC), benzene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene. In 1998, CARB identified DPM as a TAC that can cause cancer, birth defects, other serious illnesses, and leads to an increase in mortality. Long-term exposure to DPM can increase the risk of lung cancer and many of the same noncancer

[8] U.S. EPA. (2002). National Center for Environmental Assessment. (2002). Health Assessment Document for Diesel Engine Exhaust. Retrieved July 6, 2022, from *https://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=36319*

[9] IARC. (2012a). IARC Monographs: Volume 105 - Diesel and Gasoline Engine Exhausts and Some Nitroarenes. World Health Organization. Retrieved July 6, 2022, from *IARC Monographs - Volume 105 – Diesel and gasoline engine exhausts and some nitroarenes 5-12 June 2012 (who.int)*

health effects resulting from exposure to PM2.5,[10] such as premature death, asthma, increased respiratory symptoms, decreased lung function in children, and can increase hospitalizations and emergency room (ER) visits for exacerbated chronic heart and lung disease. Those most vulnerable to noncancer health effects are children whose lungs are still developing and the elderly, who often have chronic health problems. In addition to its health effects, DPM significantly contributes to smog and haze, reducing visibility.

Black Carbon, or PM 2.5 from diesel combustion, is identified as a short-lived climate pollutant (SLCP), which CARB is working towards reducing in California to help California attain its SLCP reduction goals.

Off-road diesel fueled vehicles are used in a variety of operations, such as in construction, warehouses, and other industrial facilities. These operations occur in close proximity to large populations and communities and the toxic emissions from these vehicles adversely impact Californians where they live and work.

2. Criteria Pollutants

The federal Clean Air Act (CAA) requires U.S. EPA to set NAAQS for six common air pollutants (also known as "criteria air pollutants"). The criteria air pollutants include particle pollution (i.e., PM) and ground-level ozone, among others, which can be harmful to health and the environment. The vehicles subject to the Off-Road Regulation emit DPM which is discussed in more detail in the near-source toxics section above.

PM can be inhaled into the upper airways and lungs, creating respiratory ailments leading to public health concerns. Exposure to PM can increase premature mortality, hospital admissions for cardiopulmonary causes, acute and chronic bronchitis, asthma attacks, and respiratory symptoms, and the health effects are of particular concern for sensitive groups such as infants, children, the elderly, and those with preexisting heart or lung disease.[11]

NOx consists of highly reactive gases, including nitric oxide (NO) and nitrogen dioxide (NO2). NOx emissions from diesel engines can undergo chemical reactions in the atmosphere, leading to the formation of PM2.5 and ozone, which have harmful effects on the respiratory system.[12] Short-term exposure to elevated concentrations of NOx is known to irritate the respiratory system and aggravate respiratory diseases, particularly asthma, leading to hospital admissions, visits to ERs, and respiratory symptoms such as coughing, wheezing, or difficulty breathing.

NOx is a precursor to ozone, which is formed in combination with VOC in the presence of heat and sunlight. Ozone can damage the tissues of the respiratory tract, causing

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[10] CARB. (n.d.-a). Overview: Diesel Exhaust & Health. California Air Resources Board. Retrieved August 12, 2022, from *Overview: Diesel Exhaust & Health | California Air Resources Board*

[11] CARB. (n.d.-a). Overview: Diesel Exhaust & Health. Retrieved August 12, 2022, from *Overview: Diesel Exhaust & Health | California Air Resources Board*

[12] U.S. EPA. (n.d.-a). Basic Information about NO2. Retrieved August 12, 2022, from *https://www.epa.gov/no2-pollution/basic-information-about-no2*

inflammation and irritation, and result in symptoms such as coughing, chest tightness, and the worsening of asthma symptoms. Exposure to ozone can reduce the volume of air that the lungs take in and cause shortness of breath.

For more information on the impact that vehicles subject to the Off-Road Regulation have on air quality in California, refer to Chapter VII of this Staff Report.

F. Funding Opportunities

CARB manages a broad portfolio of incentives that collectively help achieve CARB's emission reduction goals. CARB's incentive programs help achieve reductions of TACs, criteria pollutants, and climate change pollutants, while improving the environments of disadvantaged residents through disadvantaged community (DAC) targets. Incentive programs also accelerate the introduction of cleaner technologies, including zero-emission technologies needed to meet California's long-term air quality and climate goals.

Table 3 lists the currently-available incentive programs that may provide funding for cleaner and advanced technology for off-road in-use diesel-fueled equipment, as well as supporting electric charging or alternative fueling infrastructure. Note that many of these programs are competitive, and some fund a variety of projects other than off-road diesel equipment. For both the Carl Moyer Program and the Community Air Protection Program, CARB sets overall criteria, while air districts implement the programs at a local level, administer funds, and select projects for funding.

Table 3. Funding Programs for Off-Road Diesel Vehicles

Program	Description
Clean Off-Road Equipment Voucher Incentive Project (CORE) Clean Off-Road Equipment Voucher Incentive Project | California Air Resources Board	CORE provides vouchers to California purchasers and lessees of zero-emission off-road equipment on a first-come, first-served basis, with increased incentives for equipment located in disadvantaged communities and for small businesses.
Carl Moyer Memorial Air Quality Standards Program (Carl Moyer Program) Carl Moyer Memorial Air Quality Standards Attainment Program | California Air Resources Board	Grant funding for cleaner-than-required engines, equipment, and other sources of air pollution, implemented as a partnership between CARB and California's 35 local air districts.
AB 617 Community Air Protection Incentives Program Community Air Protection Incentives Guidelines | California Air Resources Board	Incentives directed by local air districts to put advanced technologies, including zero-emission off-road diesel equipment, to work for cleaner air for the California communities that are most heavily impacted by air pollution.

1. CORE

Originally launched in February of 2020, CORE incentivizes California fleets to purchase or lease zero-emission off-road equipment. CORE's first year of funding focused on commercially available freight equipment that had yet to achieve a significant market foothold. CARB's Fiscal Year 2021-22 Funding Plan allocated $194.45 million to CORE, and expanded CORE's incentive assistance portfolio by adding funding for construction equipment, agricultural equipment, commercial harbor craft, and professional landscape equipment for small businesses and sole proprietors.[13]

CORE encourages the purchase of off-road freight and other heavy-duty off-road equipment powered by zero-emission technology over internal combustion options by providing a streamlined, point-of-sale voucher process for purchasers to receive funding to help offset the higher cost of such equipment. Because CORE is intended to encourage California off-road fleets to expand their zero-emission operations, it is expected to benefit the residents of California by providing immediate criteria pollutant and GHG emission reductions. Additionally, the project deploys and advances the critical technologies necessary for California to meet its long-term air quality and climate change goals.

CORE vouchers are processed on a first-come, first-served basis and do not require scrappage. The program also provides enhancements for equipment deployed in disadvantaged communities, purchases made by small businesses, and infrastructure. Moreover, CORE allows for stacking of funds from other sources if those other sources also allow stacking of funds. The maximum CORE voucher cap is $500,000 per equipment piece.

CORE-eligible vehicles that may be subject to the Off-Road Regulation include large forklifts, airport cargo loaders, wide-body aircraft tugs, mining equipment, excavators, dozers, skid-steers, loaders, backhoes, and other types of construction vehicles.

2. Carl Moyer Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program) is a grant program that funds cleaner-than-required engines and equipment. The Carl Moyer Program has, for over 20 years, provided funding opportunities for early and extra cost-effective emission reductions that can be credited towards California's State Implementation Plan (SIP). The Carl Moyer Program has provided more than $270 million dollars in incentive funding for off-road equipment, accounting for approximately 22 percent of all Carl Moyer funding spent since 1998. These funds were directed to in-use off-road diesel equipment including construction, cargo handling, ground support, transportation refrigeration units and forklift equipment. The $270 million figure does not include funding spent on marine, locomotive, agricultural, and lawn and garden applications. Of the

[13] CARB. (2021a). Proposed Fiscal Year 2021-22 Funding Plan for Clean Transportation Incentives. Retrieved July 6, 2022, from *FY 2021-2022 Funding Plan For Clean Transportation Incentives (ca.gov)*

$270 million, over $122 million has funded scrapers and $29 million has funded rubber-tired loaders for use in construction operations.[14]

Funding opportunities exist through the Carl Moyer Program for the replacement, retrofit, or repower of off-road vehicles to provide early emission reductions that are surplus to the regulatory requirements. Currently, eligibility for Carl Moyer program funding depends on several factors, including fleet size, hours of usage, and the type of reduced emission technology. Regulatory compliance deadlines impact eligibility by defining the end of the surplus emission reduction period. The Proposed Amendments will impact funding opportunities in the Carl Moyer Program in order to ensure that the emission reductions are surplus to the Proposed Amendments. However, Carl Moyer Program funding eligibility options for off-road equipment will continue to be available if the Proposed Amendments are approved and become effective but will be dependent upon the emission standard of the vehicle and when fleets apply for funding.

3. Community Air Protection Incentives Program

The Community Air Protection Incentives Program includes funding to support a community-focused action framework to improve air quality and reduce exposure to criteria air pollutants and TACs through emission reductions in the communities most impacted by disproportionate levels of air pollution. AB 617 directed CARB to establish the Community Air Protection Program to address the disproportionate burdens that these communities continue to struggle. The Community Air Protection Incentives Program, introduced in 2017, has provided millions of dollars to community prioritized emission reduction measures, including in the off-road in-use diesel fueled source category equipment. Cumulative funding for off-road construction, cargo handling, ground support and other equipment is estimated to be in excess of $58 million to-date, although this number is subject to change as projects are liquidated.[15]

III. The Problem that the Proposal is Intended to Address

California's air quality has significantly improved over the past decade, due, in large part, to CARB regulation. However, despite these improvements, major populated regions in California are still in non-attainment with the federal PM2.5 and ozone standards. In order to meet the federal air quality standards, and to improve public health, further PM and NOx emissions reductions are needed in the State, especially from the off-road sector, as seen in Figure 10, which was first presented in the 2020 Mobile Source Strategy.[16]

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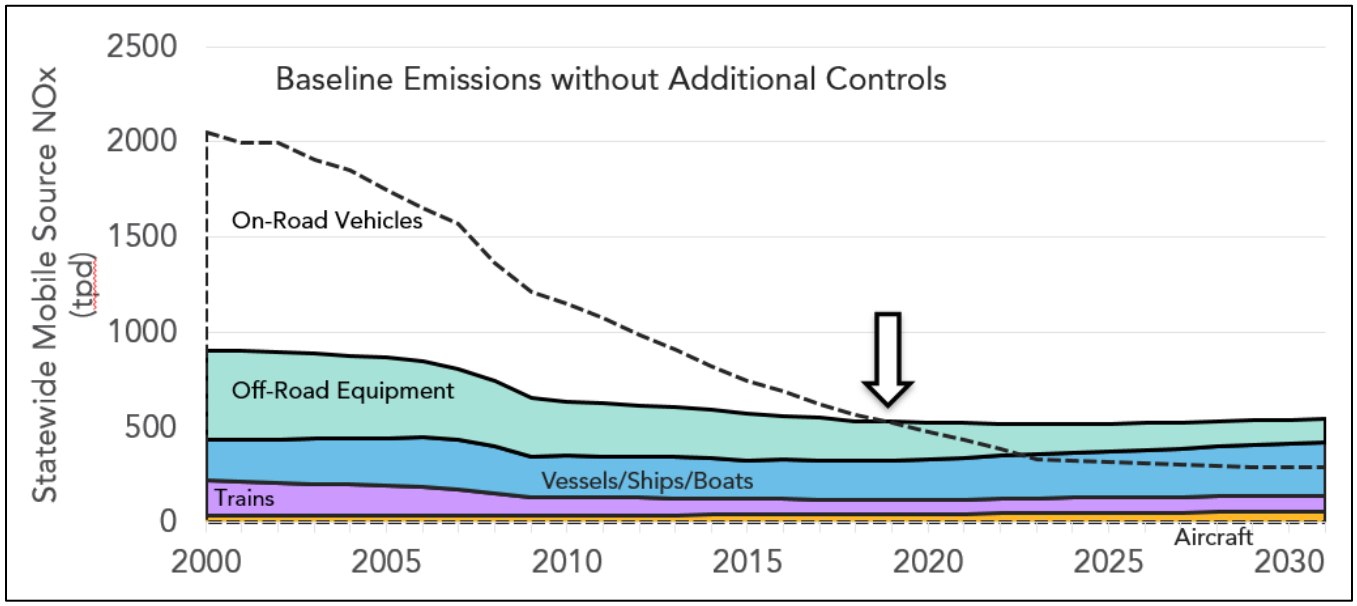
[14] CARB. (2020a). Carl Moyer Program Statistics: 2020 Reporting Cycle. Retrieved July 11, 2022, from *2020 Carl Moyer Program Statistics*

[15] As obtained from CARB's 2022 Mid-Cycle CAP Reporting.

[16] CARB. (2021b). 2020 Mobile Source Strategy Presentation. Retrieved July 5, 2022, from *2020 Mobile Source Strategy - October 2021 Board Presentation (ca.gov)*

Figure 10. Statewide Emissions of NOx by Mobile Sector



The importance of achieving further NOx emissions reductions from the off-road sector, which includes off-road equipment subject to the Current Regulation and the Proposed Amendments, as well as waterborne vessels, trains, and aircraft, is only getting more critical as the share of NOx emissions from the on-road sector as a portion of total emissions continues to decline as a result of CARB's robust on-road regulatory and incentive policies. As shown by the arrow in Figure 10, the emissions from the combined off-road sector exceed those of on-road vehicles.

In a further analysis of data taken from the latest version of the California Emissions Projection Analysis Model (CEPAM)[17], the standalone off-road sector excluding locomotives, aircraft, waterborne vessels, portable equipment, and agriculture, which includes the vehicles subject to the Current Regulation and the Proposed Amendments, comprise, as of 2022, 14 percent of the total statewide NOx emissions and 7 percent of the total statewide PM emissions from mobile sources, as shown in Figure 11 and Figure 12. This category also includes some other types of equipment that are not subject to the Current Regulation and the Proposed Amendments, mostly small equipment with engines rated under 25 hp and equipment that are not normally powered by diesel, such as large spark-ignition equipment.

[17] CARB. (2022a). California Emissions Projection Analysis Model (CEPAM): External Adjustment Reporting Tool. Retrieved July 22, 2022.

Figure 11. Statewide Mobile Source NOx Emissions, by Source, in 2022.

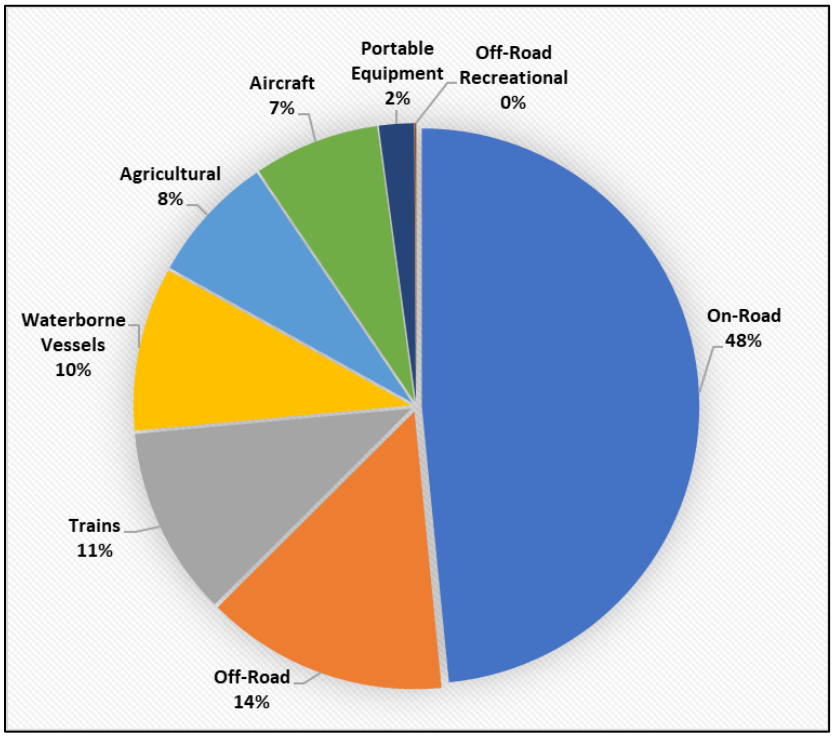
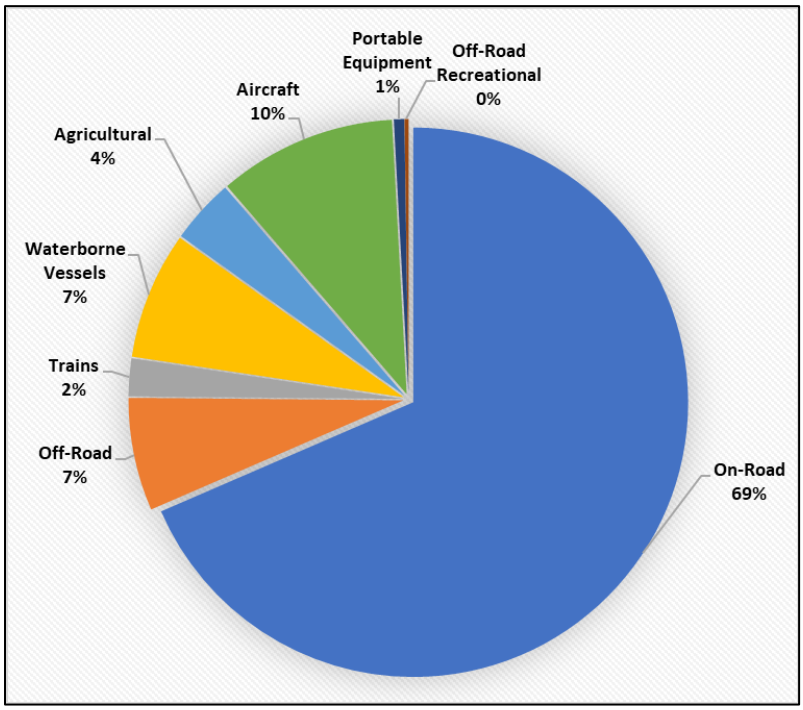


Figure 12. Statewide Mobile Source PM Emissions, by Source, in 2022.



While the Current Regulation has greatly reduced emissions from affected off-road diesel vehicles, the off-road sector still remains a major source of mobile source emissions, with a

sizeable portion of these emissions from a relatively small population of older vehicles. In 2022, among the off-road vehicle population covered under the Current Regulation, less than 10 percent are powered with Tier 0 engines, but these engines are responsible for 30 percent of NOx emissions and over 40 percent of PM emissions. Combined with Tier 1 and Tier 2 engines as well, these 29 percent of vehicles are responsible for 60 percent of NOx emissions and 69 percent of PM emissions. The contribution towards the total NOx and PM emissions by engine tier are shown in Figure 13 and Figure 14, respectively. Overall, the Proposed Amendment scenario is expected to reduce NOx and PM annual emissions from off-road vehicles by 75 percent and 44 percent, respectively, by 2036, compared to current levels.

Figure 13. Statewide NOx Emissions of Vehicles Subject to the Off-Road Regulation, by Off-Road Engine Tier, in 2022 and in 2036 under the Current Regulation and the Proposed Amendments.

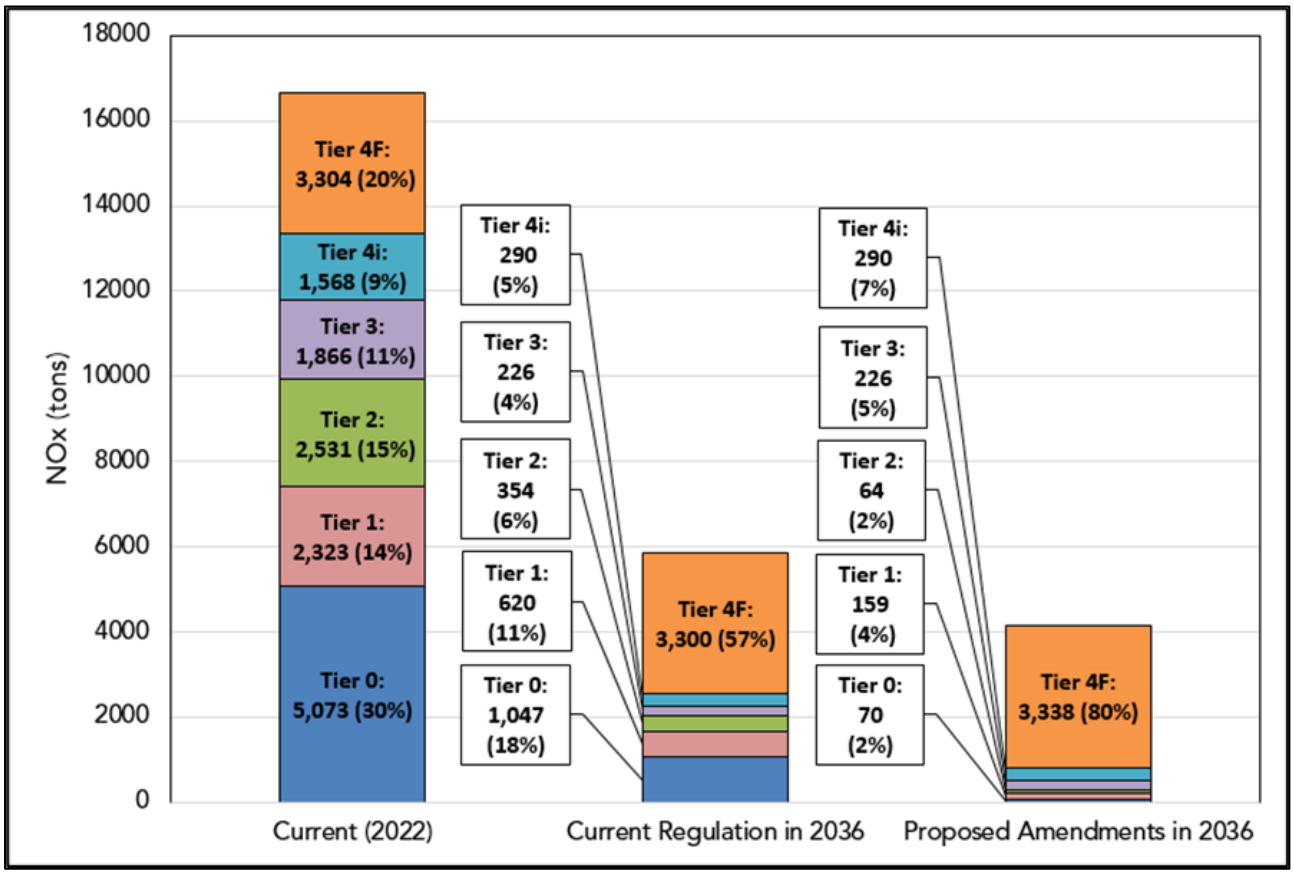
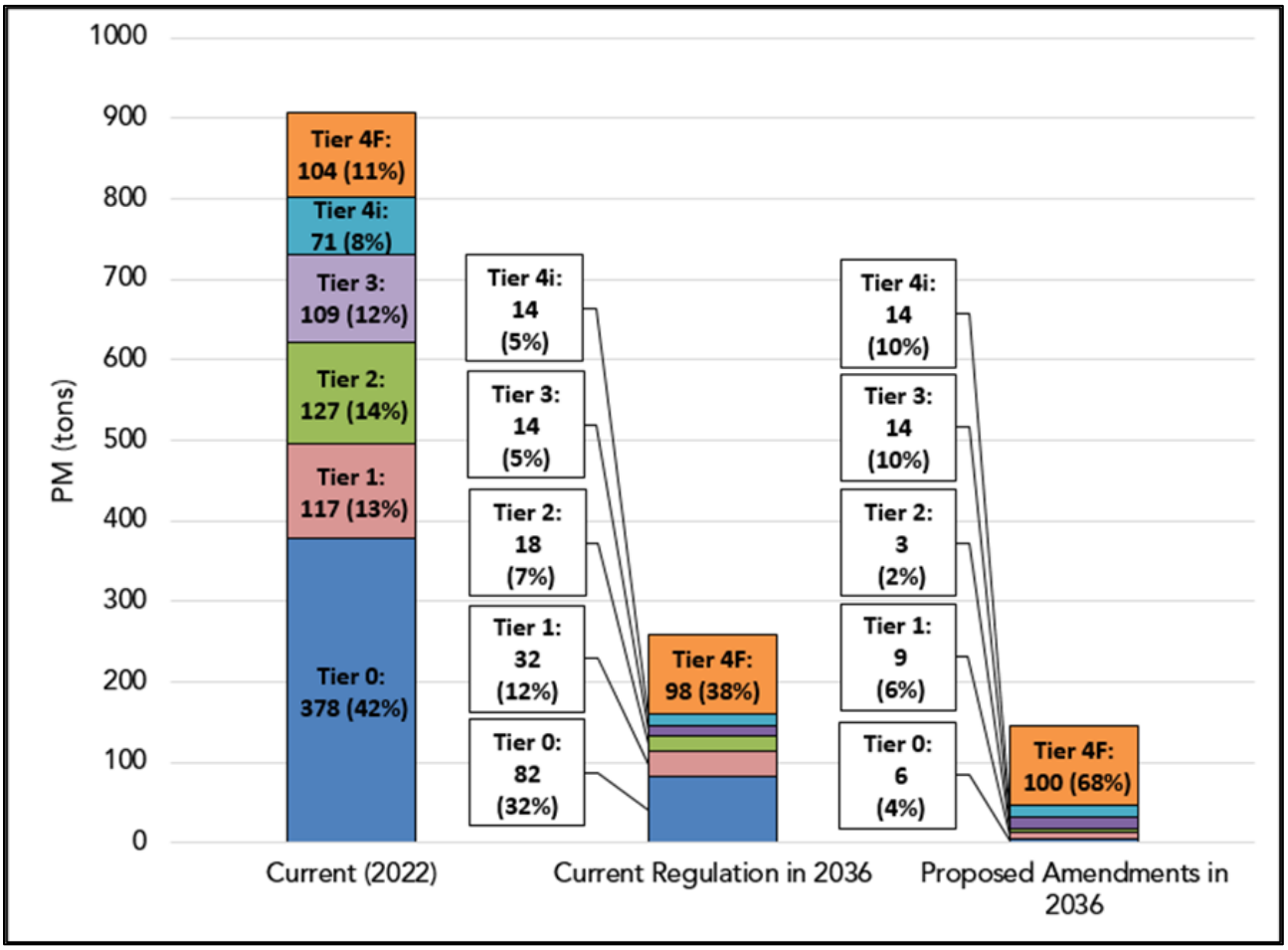


Figure 14. Statewide PM Emissions of Vehicles Subject to the Off-Road Regulation, by Off-Road Engine Tier, in 2022 and in 2036 under the Current Regulation and the Proposed Amendments.



The Proposed Amendments will achieve PM and NOx emission reductions through the removal of in-use Tier 0, 1, and 2 vehicles from fleets and by ensuring that only the cleanest available technology is allowed to be added to fleets. Without these amendments, CARB cannot achieve the emissions reductions necessary to protect communities from toxic emissions from off-road diesel equipment, as well as to meet CARB's NOx and PM emissions reductions commitment that is included in the Proposed 2022 State SIP Strategy, which is needed for federal PM2.5 and ozone standard attainment.

A. Need to Reduce NOx

CARB has made progress in reducing NOx emissions from mobile sources statewide through the implementation of CARB's existing programs, and these programs are expected to continue to provide further emission reductions. However, challenges remain in meeting the

federal ambient air quality standard for ozone for several areas throughout the State, called nonattainment areas.

Ozone nonattainment areas are classified according to the severity of their air pollution problem. Nineteen areas in California are designated as in nonattainment, and of those, ten areas are classified as Moderate and above for the 70 parts per billion (ppb) ozone standard.[18] These areas include California's large urban regions, as well as rural downwind areas, and more than half (21 million out of nearly 40 million) of Californians live in areas that exceed the 70 ppb ozone standard. The South Coast Air Basin and San Joaquin Valley are the only two regions that are classified as Extreme in the nation. The near-term targets for these areas are a 2023 deadline for attainment of the 80 ppb 8-hour ozone standard, and the mid-term attainment years of 2031 and 2037 for the more recent 8-hour ozone standards of 75 ppb and 70 ppb, respectively.[19] Additional NOx reductions from the off-road sector, one of the largest sources of NOx emissions in the State, are essential to meeting these air quality standards. More specifically, CARB has committed to reducing statewide NOx emissions by 4.1 tons per day by 2037 in the Proposed 2022 State SIP Strategy through the Proposed Amendments, making the Proposed Amendments a critical action relied upon to meet California's NOx reduction goals. Table 4 displays areas in California in nonattainment with recent federal ozone standards.

B. Need to Reduce PM

Challenges remain in meeting the PM2.5 ambient air quality standard, especially for the two areas of the State with extreme air quality issues: the South Coast Air Basin and San Joaquin Valley. The near-term targets for these areas are to meet the 35 microgram per cubic meter ($\mu g/m^3$) 24-hour PM2.5 standard by 2024, and the 12 $\mu g/m^3$ annual PM2.5 standard by 2025. It is also important to note that NOx is a precursor to secondary PM2.5 formation, so reductions in NOx emissions also provide benefits to help meet the PM2.5 standards. As a significant source of PM2.5, California needs additional reductions from the off-road sector to meet these PM2.5 air quality standards. Table 4 shows the areas in California in nonattainment with recent federal PM2.5 standards.

In addition to meeting the PM2.5 ambient air quality standard, California also needs to reduce DPM emissions. DPM has been identified as a TAC by CARB, and it poses a significant public health risk, especially at the local level. Action is needed to reduce DPM at a statewide level to reduce the health risk throughout California, especially in communities that experience disproportionate burdens from exposure to TACs. The Proposed Amendments would achieve the PM reductions necessary to achieve PM2.5 federal attainment, as well as to reduce the public health risk from DPM emissions to California communities.

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[18] Based on 2020 monitored ozone design values contoured over population by census tract.

[19] CARB. (2021c). 2020 Mobile Source Strategy. Retrieved July 6, 2022, from *2020 Mobile Source Strategy (ca.gov)*

Black carbon is a component of PM2.5 and is identified as a SLCP, which CARB is working towards reducing in California. The PM reductions that would be achieved by the Proposed Amendments would have a co-benefit of reducing black carbon emissions in California, helping California attain its SLCP reduction goals.

Table 4. 2020 California Nonattainment Area Classification for Ozone and PM2.5 NAAQS: National Ambient Air Quality Standard[20]

Nonattainment Areas	2008 Ozone	2015 Ozone	2006 PM2.5	2012 PM2.5
Butte County	Marginal	Marginal	n/a[21]	n/a
Nevada County	Serious	Moderate	n/a	n/a
Sacramento Metro	Severe	Moderate	Moderate	n/a
San Francisco Bay Area	Marginal	Marginal	Moderate	n/a
Calaveras County	Marginal	Marginal	n/a	n/a
San Joaquin Valley	Extreme	Extreme	Serious	Moderate
San Luis Obispo	Marginal	Marginal	n/a	n/a
Kern County	Serious	Moderate	n/a	n/a
Ventura County	Serious	Serious	n/a	n/a
West Mojave Desert	Severe	Severe	n/a	n/a
Los Angeles	Extreme	Extreme	Serious	Moderate
Riverside County	Severe	Severe	n/a	n/a
San Diego County	Serious	Moderate	n/a	n/a
Imperial County	Moderate	Marginal	Moderate	Moderate
Mariposa County	Moderate	Marginal	n/a	n/a
Amador County	n/a	Marginal	n/a	n/a
Tuolumne County	n/a	Marginal	n/a	n/a
Plumas County	n/a	n/a	n/a	Moderate

[20] CARB. (n.d.-b). Ambient Air Quality Standards Designation Tool. (n.d.). Retrieved August 12, 2022, from *https://ww2.arb.ca.gov/aaqs-designation-tool*

[21] n/a means that an area is unclassified or in the attainment of the relevant air quality standard

C. Need to Enhance Enforceability of the Regulation

The Proposed Amendments would improve compliance with the Off-Road Regulation, with the intent of maintaining a level playing field for compliant vehicles conducting business in California and ensuring that the projected emission reductions are being achieved. By requiring all parties who are responsible for hiring fleets subject to the regulation to only hire fleets that are compliant with the Off-Road Regulation, CARB can achieve its implementation goals more effectively than through CARB enforcement efforts alone. Currently, noncompliant fleets are being hired to do work on projects throughout the state. The Proposed Amendments will prevent these noncompliant fleets from being hired to work on projects under the control of certain hiring entities. By requiring the hiring of only compliant vehicles, CARB can reduce the monetary advantage that noncompliance could provide which will level the playing field for compliant fleets.

D. Need to Regulate Off-Road Diesel Vehicles Statewide

The Off-Road Regulation's requirements apply to off-road diesel fleets uniformly across the State, with some targeted and limited flexibility for fleets operating in captive attainment areas, and it is necessary for the Proposed Amendments to continue to apply uniformly across the State in order to protect public health for all communities and citizens of California and to ensure a level playing field is maintained among the regulated fleets.

As mentioned previously, the main objective of the Off-Road Regulation and the Proposed Amendments is to achieve DPM and NOx reductions from off-road diesel vehicles. DPM in particular poses a significant public health risk, especially at the local level. Although the federal air quality standards for NOx and PM highlight regions that are not in attainment with those standards and need additional reductions to comply with those requirements, the public health benefit of requiring cleaner off-road diesel vehicles to operate in California is critical to be provided to all Californians, especially those working and living near where these vehicles operate, regardless of what region they live in.

In addition, failing to regulate off-road diesel vehicles at the statewide level could inherently provide larger fleets with an unfair competitive advantage over smaller, local fleets. If requirements for the use of cleaner off-road diesel vehicles were to apply to particular regions, such as only nonattainment regions, fleets that have more resources and a statewide presence could potentially shift their cleaner vehicles to operate in the nonattainment regions and operate their dirtier vehicles in other regions of the State. This would have the potential result of those fleets not having to take actions to clean up their fleet and also have the harmful side effect of simply shifting their pollutant emissions to other regions of California. Local and small fleets on the other hand would potentially not have this option of working in different regions of the state, putting them at a financial disadvantage compared to the fleets that might not have had to purchase cleaner off-road diesel vehicles simply because they shifted their dirtier vehicles to attainment regions.

A statewide regulation is also necessary because vehicles used in construction are not limited to operating in just one region or at one location in the State. CARB estimates that about

50 percent of the vehicles subject to the Off-Road Regulation operate in the construction industry and construction activity occurs throughout the State. The most recent forecasts of residential housing permits from the California Department of Finance show that California anticipates the number of residential building permits to increase from 119,600 permits in 2021 to 143,800 permits in 2025, about a 20 percent increase.[22] Reducing emissions from diesel equipment operating in residential construction is necessary to protect the health of the surrounding communities.

E. Need to Address State Policy and Plans Directing CARB to Achieve Further Emission Reductions from the Off-Road Diesel Sector

The Proposed Amendments will implement the actions identified in State policies and plans as needed to obtain additional diesel emission reductions to meet federal and State air quality goals and mandates. The State policies and plans that identify the actions needed are summarized below.

1. 2020 Mobile Source Strategy

CARB released the 2020 Mobile Source Strategy (MSS) in October 2021.[23] The 2020 MSS was developed through a public process that included two virtual workshops and presentations at three Board meetings. The strategy document looks at existing and emerging technologies to reduce emissions from California's transportation sector, including cars, trucks, trains, ships, and other on-road and off-road sources. It provides a top-down description of key needs, intended to be evaluated through subsequent public processes, including regulatory processes like this one. The strategies laid out in the MSS illustrate the technology mixes needed for the State to meet its various clean air goals, including federal ambient air quality standards, community risk reduction, and ambitious mid-and long-term climate change targets. The MSS identifies a goal for a phase-out of Tier 0, 1, and 2 equipment in the off-road diesel sector between 2024 and 2033, as well as limitations on the addition of Tier 3 and 4 interim equipment to fleets, both of which the Proposed Amendments propose to implement.

2. Proposed 2022 State Strategy for the State Implementation Plan

The federal CAA requires areas that exceed the federal health-based NAAQS to develop SIPs that demonstrate how they will attain the standards by specified dates. After an extensive public process, including three public workshops and an informational update to

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[22] California Department of Finance. (2022a). California Economic Forecast – Annual & Quarterly, April 2022. California Department of Finance Economic Research Unit. Retrieved July 12, 2022, from *California-Economic-Forecast-MR-2022-23.xlsx (live.com)*

[23] CARB. (2021c). 2020 Mobile Source Strategy. Retrieved August 12, 2022, from *2020 Mobile Source Strategy (ca.gov)*

the Board, in January 2022, CARB released a draft version of the 2022 State SIP Strategy, and then in August 2022, CARB released the Proposed 2022 State SIP Strategy[24], which outlines CARB's comprehensive strategy to reduce emissions from mobile sources to meet critical air quality and climate goals over the coming years. CARB anticipates taking the Proposed 2022 State SIP Strategy to the Board for consideration in September 2022. The State SIP Strategy includes statewide control measures CARB is committing to bring to the Board for proposed adoption to achieve the NOx reductions needed for attainment.

These Proposed Amendments constitute one of the control measures identified in the Proposed 2022 State SIP Strategy where CARB committed to take the Proposed Amendments to the Board for adoption in 2022 with the goal of achieving 4.0 tons per day of NOx reductions by 2037 through this action. The Proposed Amendments are a critical component of the Proposed 2022 State SIP Strategy and are needed to reach federal air quality attainment.

3. Executive Order N-79-20

In September 2020, Governor Newsom issued Executive Order (EO) N-79-20,[25] which directed CARB, in coordination with other State agencies, U.S. EPA, and local air districts, to develop and propose strategies to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035, where technologically feasible and cost-effective. The Proposed Amendments support the directive of the EO by proposing two unique voluntary regulatory incentives that would provide compliance flexibility for fleets that adopt zero-emission off-road technology, which will encourage early adoption of the technology needed to meet the Governor's directive.

4. Assembly Bill 617

The State of California placed additional emphasis on protecting local communities from the harmful effects of air pollution through the passage of Assembly Bill (AB) 617 (C. Garcia, Chapter 136, Statutes of 2017).[26] AB 617 is a significant piece of air quality legislation that highlights the need for further emission reductions in communities with high air pollution exposure burdens. AB 617 requires CARB and air districts to pursue new community-focused and community-driven actions to reduce air pollution and improve public health in communities that experience disproportionate burdens from exposure to air pollutants. Under AB 617, CARB's Board annually selects communities to develop and implement Community Emission Reduction Plans (CERPs) and/or Community Air Monitoring Plans

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[24] CARB. (2022b). Proposed 2022 State Strategy for the State Implementation Plan. Retrieved August 12, 2022, from *Proposed 2022 State Strategy for the State Implementation Plan August 12, 2022 (ca.gov)*

[25] Executive Department State of California (2020). Executive Order N-79-20. Office of Governor Gavin Newsom. Retrieved January 31, 2022, from *Executive Order N-79-20 (ca.gov)*

[26] California Legislative Information. (2017). AB-617 Nonvehicular air pollution: criteria air pollutants and toxic air contaminants. California Health and Safety Code §§ 39607.1, 40920.6, 40920.8, 42400, 42402, 42411, 42705.5, 44391.2. Retrieved July 6, 2022, from *https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617*

(CAMPs). Seventeen communities have been selected by the CARB Board since 2018 and are currently implementing or developing plans to satisfy this important component of the Community Air Protection Program (Program). More information on specific communities that identified in-use off-road diesel vehicles and/or activities and facilities that utilize in-use off-road diesel vehicles as a top concern in their communities can be found in Chapter X of this Staff Report. The Proposed Amendments are expected to reduce diesel off-road emissions and exposure statewide, and will be of particular benefit in disadvantaged communities experiencing disproportionate burdens.

5. Short-Lived Climate Pollutant Reduction Strategy

CARB's Short-Lived Climate Pollutant (SLCP) Reduction Strategy[27] developed a range of options intended to accelerate the reduction of emissions of SLCPs in California, which include black carbon (soot), methane (CH4), and fluorinated gases (F-gases, including hydrofluorocarbons, or HFCs). The SLCP Reduction Strategy specifically calls out the need for further diesel PM2.5 emissions reductions in order to reduce black carbon, and quantifies the amount of black carbon that will be reduced as a result of regulatory items being proposed under the SIP process, of which these Proposed Amendments are a part. The Proposed Amendments do not directly quantify black carbon emission reductions, but reducing diesel PM2.5 has the co-benefit of reducing black carbon, which is a key strategy outlined in the SLCP Reduction Strategy.

F. Need to Support the Deployment of Zero-Emission Vehicles in the Off-Road Sector

The Governor's EO N-79-20 states that California must develop and propose strategies to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035, where technologically feasible and cost-effective. This directive is critical to meet California's long-term climate and air quality goals due to the criteria pollutant, toxics, and GHG benefits attributed to the operations of zero-emission vehicles (ZEV). In order to hit this goal by 2035, strategies across the spectrum of incentives, regulations, and policy decisions will be necessary to encourage the adoption and growth of ZEVs in the off-road sector.

Presently, zero-emission technology in the off-road sector is at a less mature stage of development than in the on-road sector due to many factors, including demanding duty cycles, high power needs, specialized production, and remote or rugged operating environments. Although some specific off-road equipment categories have already been able to find success with zero-emission operation due to their unique environmental needs and duty cycles, such as forklifts and airport ground support equipment, zero-emission technology is still in the early stages of commercialization in the California off-road sector

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[27] CARB. (2017a). Short-Lived Climate Pollutant Reduction Strategy. Retrieved July 5, 2022, from *https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf*

and is rapidly growing with the support of CARB's extensive zero-emission policies and programs.

To incentivize the creation of the next generation of zero-emission off-road equipment, CARB and other air quality agencies have funded numerous successful demonstration and pilot projects, as well as commercial-launch voucher incentive programs, like CORE, and SIP-creditable emission-reduction programs, like the Carl Moyer Program. Although the Proposed Amendments are targeted towards achieving near-term emission reductions through the retirement of older vehicles, voluntary regulatory flexibilities are an important tool to encourage early adoption of zero-emission technology in addition to the incentives.

Furthermore, early adoption of zero-emission off-road technology plays a critical role in the advancement of beachheads in the off-road sector. First success beachheads in zero-emission deployment have functioned as the foundation for deploying and improving technology, supply chains, and business practices. First successes can be leveraged by expanding use in other areas by using similar powertrains. From there, supply chain volumes can be increased for common components, and fueling infrastructure can be expanded. This progression helps to build confidence in zero-emission vehicle performance and business cases, laying the groundwork for advancing the technology into larger markets and other applications. Successful beachheads have allowed clean technologies to extend to the next-generation vehicles, as well as other on-road and off-road vehicles.[28]

Providing voluntary pathways that offer some benefits to participants, such as compliance flexibility, is critical for moving forward in zero-emission expansion of the off-road sector. As the population of currently available ZEVs deployed in the off-road sector multiplies, fleets will develop practical experience and gain confidence in the technology. This encourages prototype expansion into additional vehicle categories and helps to support the advancement of commercial offerings across the entire off-road sector.

G. Need to Amend the In-Use Off-Road Diesel-Fueled Fleets Regulation

The Current Regulation requires fleets to meet an increasingly stringent set of fleet average targets, with requirements ending in 2023 for large and medium fleets, and in 2028 for small fleets. The most stringent fleet average target in the Current Regulation corresponds roughly to a MY 2012 or Tier 3 average standard. While the Current Regulation has resulted in significant emissions reductions from the off-road sector, the Current Regulation allows Tier 0, 1, and 2 equipment to continue operating indefinitely, with no activity restrictions (depending on the mix of other equipment owned by the fleet). For comparison, a single Tier 0 off-road engine in the 100-175 hp bin has 80 times higher NOx emissions than a Tier 4 Final off-road engine. By 2031, this Tier 0 equipment will be 32 years old or more, Tier 1

[28] CALSTART and CARB. (2022). White Paper - The Beachhead Strategy: A Theory of Change for Medium- and Heavy- Duty Clean Commercial Transportation. CALSTART. Retrieved July 5, 2022, from *The-Beachhead-Strategy_Final.pdf (calstart.org)*

equipment will be 28 to 31 years old, and Tier 2 equipment will be 24 to 27 years old. Significant emissions benefits can be achieved by turning over this older, high-polluting equipment.

The Current Regulation was adopted 15 years ago and later amended 3 times in order to relax the requirements of the Current Regulation to accommodate compliance challenges due to the economic downturn. While the Current Regulation and the introduction of new, cleaner technology through more stringent engine standards has been successful in reducing emissions from off-road vehicles California's air quality challenges remain urgent and additional emission reductions are needed on a faster timeframe than what the current regulations are requiring.

The Proposed Amendments target the removal of the Tier 0, 1, and 2 vehicles currently in use and ensure that any vehicles added to a fleet are the cleanest available technology. Without these amendments, CARB cannot achieve the necessary emissions reductions described in previous sections and will not adhere to the Proposed 2022 State SIP Strategy which identified these amendments as a critical component of the plan. The Proposed Amendments are especially critical to addressing the need to reduce DPM at the community level, to reduce the public health risk of TACs, because under the Proposed Amendments, the oldest and highest-emitting vehicles will no longer be allowed to operate in those communities.

IV. Description of the Proposed Amendments

The Proposed Amendments are designed to be complementary to the existing compliance of fleets and achieve further NOx and DPM reductions by requiring the removal of the oldest and highest-emitting vehicles remaining in fleets. The Proposed Amendments require the phased removal of highly polluting and out-of-date Tier 0, 1, and 2 vehicles still currently in use by fleets and require any newly-added vehicles to have the cleanest available technology. The Proposed Amendments also align with the measure in the Proposed 2022 State SIP Strategy[29] to achieve reductions of 4.0 tons per day of NOx in 2037.

The Proposed Amendments achieve the necessary emission reductions through the following key provisions, which are described in more detail in the subsequent sections in this Chapter IV:[30]

- Phase out the oldest and highest-emitting off-road engines (Tiers 0, 1, and 2) from operation in California. This provision will be implemented by fleet size and engine Tier;

[29] CARB. (2022b). Proposed 2022 State Strategy for the State Implementation Plan. Retrieved August 12, 2022, from *Proposed 2022 State Strategy for the State Implementation Plan August 12, 2022 (ca.gov)*

[30] Where there is any conflict between this document and the text of the Proposed Amendments, the text of the Proposed Amendments governs.

- Restrict the addition of vehicles with Tier 3 and 4i engines, which is an expansion of provisions of the Current Regulation that restrict the vehicle-engine Tier that can be added to a fleet;
- Require contracting entities to obtain and retain a fleet's valid Certificate of Reported Compliance prior to awarding a contract or hiring a fleet;
- Mandate the use of RD99/100 for all fleets, with some limited exceptions;
- Provide voluntary compliance flexibility options for fleets that adopt zero-emission technology; and
- Include additional requirements to increase enforceability, provide clarity, and provide additional flexibility for permanent low-use vehicles.

A. Tier Phase-out

The Proposed Amendments will require that fleets no longer operate vehicles with Tier 0, 1, or 2 off-road engines and specified MYs of on-road engines in California after specified dates, based on fleet size, as summarized in Table 5, below. Some exemptions apply, such as for vehicles used for fewer than 200 hours per year (i.e., low-use).

Table 5. Tier and Model Year (MY) Phase-Out Dates by Fleet Size

Year (January 1)	Large Fleets	Medium Fleets	Small Fleets	Ultra-Small Fleets
2024	Tier 0/MY 1994 or older on-road			
2026	Tier 1/MY 1999 or older on-road	Tier 0/MY 1994 or older on-road		
2028	Tier 2/MY 2003 or older on-road	Tier 1/MY 1999 or older on-road	Tier 0/MY 1994 or older on-road	Tier 0/MY 1994 or older on-road
2030		Tier 2/MY 2003 or older on-road	Tier 1/MY 1999 or older on-road	Tier 1/MY 1999 or older on-road
2032			Tier 2/MY 2003 or older on-road	
2036				Tier 2/MY 2003 or older on-road

In addition, for all fleet sizes, the Proposed Amendments will discontinue the low-use vehicle exemption and the Jobs Corps exemption for Tier 0 or model year 1994 or older on-road engines, requiring the removal of those engines from all fleet's California operations by

January 1, 2036. Tier 0 low-use vehicles contribute significant NOx and PM emissions compared to newer vehicles and under the Current Regulation can operate indefinitely. Given their low usage, staff is proposing significant time to phase these vehicles out, however, their ultimate phase-out is necessary to achieve additional emissions reductions.

The tier phase-out requirements and discontinuation of the low-use vehicle exemption for the oldest vehicles would greatly reduce operations of the oldest and highest-emitting vehicles in communities throughout California.

As mentioned previously, some fleets may still have further compliance obligations for the Current Regulation at the time the compliance dates of the Proposed Amendments start if approved as currently proposed. While 70 percent of medium and large fleets are complying with the Off-Road Regulation by meeting the annual fleet average targets, 30 percent are using BACT (i.e., 10 percent fleet turnover). That number is expected to go down prior to the start of the Proposed Amendments, but for those fleets that are still on the BACT path, the Proposed Amendments may result in a fleet needing to adjust its current compliance strategy. Note that the Proposed Amendments are designed so that any additional actions a fleet must take to comply with the tier phase-out can be used to comply with BACT.

B. Expansion of the Adding Vehicle Requirements

The Proposed Amendments will expand an existing provision that already restricts the addition of Tier 0, 1, and 2 vehicles to fleets owned or operated in California, to include a restriction on the addition of Tier 3 and Tier 4i vehicles, as well as MY 2006 or older on-road vehicles, to fleets. The Proposed Amendments would disallow the addition of older-technology engines into fleets in California on a phased schedule, based on fleet size, as summarized in Table 6, below. This proposed requirement would ensure that new vehicles added to a fleet would meet the cleanest standards, reducing emissions to protect public health and meet air quality standards and goals.

Table 6. Compliance Dates for the Restrictions on Adding Vehicles

Year (January 1)	Large Fleets	Medium Fleets	Small Fleets	Ultra-Small Fleets
2024	Tier 3 Tier 4i/MY 2006 or older on-road	Tier 3 Tier 4i/MY 2006 or older on-road	Tier 3	Tier 3
2028			Tier 4i/MY 2006 or older on-road	
2035				Tier 4i/MY 2006 or older on-road

C. Contracting Requirements

The Proposed Amendments include new contracting requirements for prime contractors[31] and public works awarding bodies[32] beginning on January 1, 2024. These proposed requirements are intended to enhance the enforceability of the Off-Road Regulation, and are based on years of experience implementing and enforcing the Current Regulation. These proposed new requirements would help ensure the expected emissions reductions of the Off-Road Regulation are achieved, by ensuring these entities only hire compliant fleets. Additionally, these proposed new requirements will reduce unfair competition. The proposed requirements are:

- To obtain and retain copies of the valid Certificates of Reported Compliance for the fleet selected for the contract and their listed subcontractors, if applicable; and
- Not enter into a contract with a fleet for which it does not have a valid Certificate of Reported Compliance for the fleet selected for the contract and their listed subcontractors, if applicable.

D. Prime Contractor Requirements

CARB has proposed additional requirements for prime contractors that will provide additional mechanisms for CARB to become aware of and investigate situations in which fleets do not have valid Certificates of Reported Compliance and for CARB staff to receive critical information related to responsible parties from the prime contractors when performing inspections at job sites. These requirements will help ensure the expected emissions reductions of the Off-Road Regulation are achieved, reduce unfair competition and increase enforceability of the Off-Road Regulation. The proposed additional requirements for prime contractors are:

- To collect new valid Certificates of Reported Compliance between March 1 and June 1 of each year for each fleet that has an ongoing contract with the prime contractor;
- To report to CARB any observed noncompliance with the Off-Road Regulation on their job sites, and report any fleets intending to operate at the jobsite that do not have a valid Certificate of Reported Compliance;
- To disclose to CARB, upon request, the responsible party for all vehicles subject to the Off-Road Regulation operating at their job sites; and

[31] For the purpose of these Proposed Amendments, a prime contractor is defined as the entity that contracts directly with the project owner for any project involving the use of vehicles subject to the Off-Road Regulation, which are also proposed to be defined in the Proposed Amendments.

[32] For the purpose of these Proposed Amendments, public works awarding bodies are defined as any public agencies that award or enter into contracts for public works projects, which are also proposed to be defined in the Proposed Amendments.

- To prominently display a sign at each of their job sites, where work on the job site lasts longer than seven days, that includes information regarding the applicability of the Off-Road Regulation, key requirements of the Off-Road Regulation that would help a person from the public identify noncompliant vehicles, and a method to notify CARB when noncompliance with the Off-Road Regulation is observed.

E. Renewable Diesel Requirements

The Proposed Amendments would require fleets to use RD99/100 in their off-road vehicles beginning, January 1, 2024. This requirement will achieve significant near-term NOx and PM reductions, and will not increase or decrease the volume of fuel used by the off-road vehicles that are impacted by the requirement.

The proposed requirements pertaining to RD include the following:

- All fleets are required to use RD99/100 in all vehicles owned or operated in California that are subject to the Off-Road Regulation, with the exception of any fleet that is designated as solely operating in attainment areas (captive attainment area fleet) or any fleet that is comprised entirely of vehicles with Tier 4 Final engines or MY 2007 or newer on-road engines;
- In each year that annual reporting is required under the Off-Road Regulation, a fleet shall submit to CARB an affirmation that the fleet complied with the RD99/100 use requirement;
- Fleets must document and retain records related to the fleet's use of RD99/100; and
- Exemptions are included if a fleet is unable to procure RD99/100 and, in that situation, the fleet must document and retain records related to its inability to procure RD99/100.

F. Optional Zero-Emission Compliance Flexibility

The Proposed Amendments include two zero-emission flexibility provisions beginning on January 1, 2024. These provisions are needed in order to provide a regulatory incentive that encourages the adoption of zero-emission off-road vehicles. The proposed compliance flexibility provisions are the following:

- A fleet may delay the phase-out of one vehicle with a Tier 1 or Tier 2 engine for two years for each zero-emission vehicle it adds to the fleet if all required conditions are met. The zero-emission vehicle would be required to have a similar power output rating to the vehicle whose phase-out is being delayed. The use of this flexibility provision is voluntary and the degree to which it will be employed will depend on individual fleets' decisions. This option gives vehicle operators the chance to use ZEVs in settings that are most important to them, while obtaining some compliance flexibility in return; and

- A fleet may use an alternate compliance pathway and be exempted from the performance requirements of the Current Regulation and the tier phase-out requirements of the Proposed Amendments if the fleet submits a Zero-Emission Transition Application (ZETA) to CARB and commits to completing the ZETA project, CARB approves the ZETA as meeting the regulatory requirements, and the fleet implements the approved ZETA. The ZETA outlines the steps the fleet must take to substantially shift to ZEVs and/or zero-emission operations. The ZETA must be submitted to CARB prior to the compliance dates for which the fleet is seeking an exemption and it must describe the actions the fleet will take to replace, at a minimum, 50 percent of the fleet's total hp with zero-emission technology by January 1, 2035. The ZETA must be approved by the Executive Officer, and then the fleet must adhere to the approved ZETA and provide annual updates to CARB showing its progress in meeting the approved ZETA. If CARB determines that a fleet does not adhere to its approved ZETA based on metrics outlined in the Proposed Amendments, then the fleet must immediately come into compliance with the performance requirements of the Current Regulation and the tier phase-out requirements of the Proposed Amendments.

G. Additional Requirements

Additionally, the Proposed Amendments include the following changes:

Beginning upon adoption of the Proposed Amendments:

- A fleet that observes that the emission control label is no longer visible or readable on any vehicle in its fleet must request a replacement emission control label from the vehicle manufacturer, and
- Small fleets may no longer keep vehicles with no VDECS available indefinitely.

Beginning January 1, 2024:

- Low-use provisions will be modified as follows:
    - Provide additional flexibility to fleets for vehicles designated as permanent low-use by allowing vehicles to qualify as low-use by averaging less than 600 hours of vehicle use over 3 consecutive years (3-year rolling average),
    - Remove the year-by-year low-use definition and compliance options,
    - Require submittal to CARB of hour-meter documentation used to verify low-use vehicle hours of operation, and
    - Requiring fleets to notify CARB if a vehicle's engine hour meter on a low-use vehicle has been replaced, changed, or altered in any way.
- Fleets will be prohibited from adding a vehicle with a Tier 0 engine as a vehicle designated as a dedicated snow removal vehicle, a vehicle used for emergency operations, or a job corps vehicle. In the last three reporting years (2019-2022), about

forty Tier 0 vehicles were added to fleets for these operations. Fleets would still be allowed to add used vehicles with Tier 1 or newer engines to their fleet for these operations, so there would be no technical or availability challenges with this provision.

Beginning January 1, 2028:

- Prohibit fleets from adding any MY 2028 or later engine or vehicle of any Tier to its fleet unless the engine is California-certified or certified to the California-equivalent emission standards applicable to MY 2028 and later equipment. Currently, U.S. EPA and CARB off-road engine standards are aligned, but CARB expects that CARB and U.S. EPA off-road engine standards will not remain aligned in the future past Tier 4 Final. This provision provides assurance that the cleanest engines continue to be used in California. This requirement also applies to MY 2028 and later replacement engines produced under the provisions of California Code of Regulations, title 13, section 2423, subdivision (j), and to federal replacement engines produced under the provisions of 40 Code of Federal Regulations part 1068.240. Except as required or allowed by federal law, this requirement does not apply to new engines smaller than 175 hp that are used in construction equipment or vehicles, or used in farm equipment or vehicles.

V. Feasibility

A. Availability of Tier 4 Final Off-Road Engines

The Proposed Amendments would phase out highly polluting vehicles with Tier 0, 1, and 2 engines, and require that any vehicle added to a fleet be equipped with a cleaner, higher-tier engine. Over successive phases of requirements, starting in 2024 and culminating in 2028, any vehicles added to a fleet would need to meet Tier 4 Final emission standards, which are the most stringent off-road standards in the country.

Engines that meet the Tier 4 Final standards emit 80 times less NOx than Tier 0 engines (100-175 hp). The emission standards are technologically neutral because they do not prescribe the type of technologies that are needed to meet the standards.

To meet Tier 4 Final standards, manufacturers are generally adding exhaust aftertreatment. Today, Selective Catalytic Reduction (SCR) and DPFs are commonly used to meet Tier 4 Final standards.[33] The technology is essentially the same as is used in all on-road heavy-duty trucks since 2010. Based on CARB's off-road certification database for MY 2020, more than half of the engine families (engines with similar characteristics that are grouped together for certification purposes) are able to meet Tier 4 Final standards without the use of DPFs. CARB

[33] Kubsh, J. (2017). Managing emissions from non-road vehicles. The International Council on Clean Transportation. Retrieved July 5, 2022, from *Managing emissions from non-road vehicles (theicct.org)*

continues to pursue additional reductions from off-road diesel engines and is currently developing more stringent emission standards for new off-road diesel engines.

As discussed in Chapter II of this Staff Report., TPEM allowed equipment manufacturers to install engines certified to previous tiers in new vehicles. Calendar year 2020 was the last year that equipment manufacturers were allowed to use this provision for engines with a hp range of 175-750, and calendar year 2021 was the last year for all other engine hp categories. Currently, all new vehicles are being sold with Tier 4 Final engines.

As of July 2022, data reported by fleets in DOORS (CARB's reporting tool for the Off-Road Regulation) indicate that engines receiving Tier 4 Final emission factors in accordance with Appendix A of the Off-Road Regulation comprise 54 percent of all reported diesel engines not reported with a non-standard engine and not designated as low use or in one of the four special use categories (Agricultural, Dedicated Snow Removal, Emergency, and Awaiting Sale). The composition of reported engines by Tier level are displayed in Table 7. Tier 4 Final vehicles are prevalent among all vehicle types that are subject to the Off-Road Regulation, and have power ratings 25 hp and up.

Table 7. Population of Diesel Engines of Each Tier Reported in DOORS, Excluding Non-standard Engines and Engines in Vehicles Designated as Low-use or in Special Use Categories.

Tier	Population	Percentage of Total
Tier 0	8,859	5.1%
Tier 1	13,567	7.8%
Tier 2	21,139	12.2%
Tier 3	13,721	7.9%
Tier 4 Interim	22,457	13.0%
Tier 4 Final	94,038	54.1%
Total	173,781	100%

If there is a delay in delivery of vehicles with Tier 4 Final engines, or if there are an insufficient number or insufficient range of makes and models with Tier 4 Final engines, the Current Regulation includes flexibility provisions for fleets. Those provisions allow for fleets (individually or as a group) to request that the CARB Executive Officer issue a compliance extension allowing the continued operation of the fleet's existing vehicles until replacement vehicles are delivered or are available. To date, only one fleet has requested compliance flexibility due to a delay in the availability of Tier 4 Final vehicles, and no fleets have

requested flexibility due to manufacturer or installer delays. Nevertheless, these existing flexibility provisions would extend to requirements of the Proposed Amendments. and provide relief to fleets if needed.

B. Technological Feasibility and Availability of Renewable Diesel

1. Technological Feasibility

Renewable diesel is a fuel substitute produced from non-petroleum renewable sources, including vegetable oils and animal fats. RD can be produced from renewable feedstocks in several different ways, including hydrotreating, synthesis of HCs through enzymatic reactions, and by partially combusting bio-mass feedstocks to produce CO and hydrogen and then utilizing the Fischer-Tropsch reaction to produce complex HCs.[34,35] RD production processes result in a comparatively cleaner burning, drop-in synthetic fuel with combustion characteristics superior to conventional petroleum-derived diesel, due to the higher cetane rating (consistently over 70).[36]

Renewable diesel conforms to the Standard Specification for Diesel Fuel (American Society for Testing Materials (ASTM) D975-21) and meets CARB's requirements for ULSD, so RD can be used interchangeably or combined in any proportion with conventional CARB ULSD in off-road engines. The storage-life characteristics of RD are not significantly different from conventional CARB ULSD and, because RD is chemically similar to conventional CARB ULSD, RD does not require infrastructure changes for storage, piping, or pumping, nor are there any diesel engine modifications required in order to use it as a fuel.

To clarify the differences between RD and biodiesel (BD), BD conforms to the Standard Specification for Biodiesel Blend Stock (B100) for Middle Distillate Fuels (ASTM D6751-18) which is a different standard than RD which, as noted previously, is subject to ASTM D975, the Standard Specification for Diesel Fuel, showing that RD and BD have different chemical properties, physical properties, and environmental attributes. BD can significantly reduce PM emissions, but is used as a blend stock rather than directly substituted for conventional diesel, as it can increase NOx emissions in some engines – a characteristic which limits its blend level in diesel fuel and requires the mitigation of excess NOx. Therefore, the Proposed Amendments require the use of RD99/100 and does not allow substitution with BD.

2. Availability

The 2022 Off-Road Inventory estimates that vehicles subject to the Off-Road Regulation use about 270 million gallons of diesel annually. According to the LCFS dashboard, more than

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[34] CalEPA. (2015). Staff Report: Multimedia Evaluation of Renewable Diesel. Retrieved June 2, 2022, from *Staff Report: Multimedia Evaluation of Renewable Diesel (ca.gov)*

[35] Valero. (n.d.). Renewable Diesel: Innovation and Unmatched Execution. Retrieved July 6, 2022, from *https://www.valero.com/renewables/renewable-diesel*

[36] CalEPA. (2015). Staff Report: Multimedia Evaluation of Renewable Diesel. Retrieved June 2, 2022, from *Staff Report: Multimedia Evaluation of Renewable Diesel (ca.gov)*

900 million gallons of RD were reported into the LCFS program in 2021[37] and production is continuing to grow significantly. It is expected that by January 1, 2024, when the proposed RD requirements would take effect, RD production facilities will be able to produce a sufficient supply of RD to meet the annual demand of the off-road vehicles subject to the Off-Road Regulation, as well as other sectors' fueling demands.

Renewable diesel is a commercial fuel produced in the United States and also imported from Asia, largely from production plants in Singapore. Per publicly available information, the following 5 plants produce RD in the United States and have a combined capacity of more than 900 million gallons of RD per year:[38]

- Renewable Energy Group in Geismar, Louisiana;[39]
- Valero in Norco, Louisiana;[40]
- East Kansas Agri-Energy in Garnett, Kansas;[41]
- CVR Energy in Wynewood, Oklahoma;[42] and
- Marathon Petroleum in Dickinson, North Dakota.[43]

There are several other plants in the United States that also produce RD but CARB staff could not find publicly available information that noted the exact capacity of these plants. These plants include:

- BP in Blaine, Washington;
- Wyoming Renewable Diesel Company in Sinclair, Wyoming;
- Kern Oil and Refining Company in Bakersfield, California; and
- World Energy in Paramount, California.

The U.S. Energy Information Administration (EIA) does not report RD production; however, U.S. EPA reports that the United States consumed over 960 million gallons of RD in 2020, so we know at least that much was available in 2020 for U.S. consumption.[44] Most domestically

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[37] CARB. (2022c). LCFS Data Dashboard: Figure 2. Retrieved August 12, 2022, from *https://ww2.arb.ca.gov/resources/documents/lcfs-data-dashboard*

[38] Bryan, T. (2021). Renewable Diesel's Rising Tide. Biodiesel Magazine. Retrieved August 12, 2022, from *https://biodieselmagazine.com/articles/2517318/renewable-diesels-rising-tide*

[39] Renewable Energy Group. (n.d.). Geismar. Retrieved July 13, 2022, from *REG biorefinery in Geismar, LA (regi.com)*

[40] Valero. (n.d.). Renewable Diesel: Innovation and Unmatched Execution. Retrieved July 6, 2022, from *https://www.valero.com/renewables/renewable-diesel*

[41] Business Wire. (2017). East Kansas Agri Energy and Pearson Fuels Announce an Exclusive Marketing Agreement to Distribute Renewable Diesel to the West Coast. Retrieved July 13, 2022, from *https://www.businesswire.com/news/home/20171205006275/en*

[42] Voegele, E. (2022). CVR's Wynnewood refinery begins renewable diesel production. Biodiesel Magazine. Retrieved July 13, 2022, from *https://biodieselmagazine.com/articles/2517010/cvr-energy-explores-renewable-diesel-production*

[43] Marathon. (n.d.). Renewable Fuels Portfolio. Retrieved July 13, 2022, from *Renewable Fuels (marathonpetroleum.com)*

[44] U.S. Department of Energy. (n.d.). Alternative Fuels Data Center: Renewable Hydrocarbon Biofuels. Retrieved July 6, 2022, from *https://afdc.energy.gov/fuels/emerging_hydrocarbon.html*

produced and imported RD is used in California due to the additional economic benefits under LCFS.[45] Due to RD's low CI, Federal and State programs provide substantial economic value to low-CI fuels for producers, importers, and blenders, through the use of market signals.

Production of RD is expected to grow in the coming years due to expansions of existing plants and the construction of new plants. Examples include:

- Phillips 66 announced in August 2020 that over the next three years, it will idle crude processing at its San Francisco Bay Area refinery to produce 52,000 barrels per day of renewable fuels, including RD, naphtha, and jet fuel.[46,47] Once operational, the converted plant would be the world's largest renewable fuels plant, producing more than 800 million gallons of renewable gasoline, diesel, and jet fuel.[48] Phillips 66 estimates the production of renewable fuels at this plant will result in 50 percent less carbon dioxide, 75 percent less sulfur dioxide, and fewer local emissions than the current crude oil refinery configuration;[49]
- Marathon Petroleum Corporation converted its Dickinson, North Dakota refinery into an RD facility in 2021 and is producing 184 million gallons of RD annually. The corporation began converting its Martinez, California refinery to a Renewable Fuels facility and plans to reach full capacity in 2023. At full capacity, Marathon would expect to produce about 730 million gallons per year of renewable fuels, primarily RD, from such bio-based feedstocks as animal fat, soybean oil, and corn oil;[50]
- Valero is the world's second largest RD producer, with a current annual production of 700 million gallons in Louisiana. Valero plans to build a new RD plant in Texas, increasing total annual production to 1.2 billion gallons in 2023;[51]
- World Energy announced that it will invest an additional $350 million to complete the conversion of its Paramount, California facility into one of the cleanest fuel refineries in

[45] Ibid.
[46] Blackburn, E. (2020). Phillips 66 to convert refinery to renewables. (2020). Argus Media. Retrieved July 6, 2022, from *Phillips 66 to convert refinery to renewables: Update | Argus Media*
[47] Fallas, B. (2020). Phillips 66 plans world's largest renewable fuels plant. Phillips 66. Retrieved August 12, 2022, from *https://www.phillips66.com/newsroom/rodeo-renewed*
[48] Phillips 66. (n.d.). San Francisco Refinery. Retrieved August 12, 2022, from *https://www.rodeorenewed.com/about*
[49] Green Car Congress. (2020). Phillips 66 to convert San Francisco Refinery into world's largest renewable fuels plant; 800M+ gallons per year. Retrieved August 12, 2022, from *https://www.greencarcongress.com/2020/08/20200813-rodeo.html*
[50] Marathon. (n.d.). Renewable Fuels Portfolio. Retrieved July 13, 2022, from *Renewable Fuels (marathonpetroleum.com)*
[51] Valero. (n.d.). Renewable Diesel: Innovation and Unmatched Execution. Retrieved July 6, 2022, from *https://www.valero.com/renewables/renewable-diesel*

the world. The project will enable World Energy to process 306 million gallons of renewable jet, diesel, gasoline, and propane annually;[52,53] and
- Global Clean Energy Holdings Inc. announced plans to convert its Bakersfield, California refinery into a RD production plant that will produce 210 million gallons of RD annually.[54]

There are other RD projects moving forward as well. Collectively, states that produce or have plans to produce RD include California, Kansas, Louisiana, Nevada, New Mexico, North Dakota, Oklahoma, Oregon, Texas, Washington, and Wyoming.[55] The total existing and new RD production of greater than five billion[56] gallons per year is sufficient to meet the total annual diesel demand from off-road vehicles subject to the Off-Road Regulation in California of 270 million gallons, as estimated in the 2022 Off-Road Inventory. However, additional RD imports from outside of the U.S. may make even greater volumes available, depending upon global demand.

Red-dyed diesel is often used in the vehicles subject to this regulation. Red dye is injected into the supplier's diesel stock at the time of pick-up. Red-dye RD is available in California and therefore the need for red-dyed diesel does not alter the ability of fleets to obtain RD for off-road vehicles.

VI. The Specific Purpose and Rationale of Each Adoption, Amendment, or Repeal

CARB has adopted regulations to control emissions from many different sectors, including the off-road diesel sector. However, the need for further emission reductions from the off-road diesel sector is still urgent. While all sources of PM and NOx emissions are important, the off-road diesel sector remains a large contributor of emissions in California. Numerous changes and additions to the Current Regulation, are necessary in order to increase the emission reductions from off-road diesel vehicles operating in California, to meet federal and State air quality and health goals and mandates.

Therefore, CARB staff is proposing that the Board approve for adoption of the Proposed Amendments to CCR, title 13, sections 2449 and 2449.1, pursuant to its authority under

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[52] World Energy. (2018). World Energy invests $350M to expand Paramount biofuel production. Biomass Magazine.com. Retrieved July 6, 2022, from *https://biomassmagazine.com/articles/15699/world%20energy%20invests%20350m%20to%20expand%20paramount-biofuel-production*

[53] Bioenergy International. (2018). World Energy to complete Paramount Refinery conversion to renewable fuels. Retrieved June 21, 2022, from *World Energy to complete Paramount Refinery conversion to renewable fuels | Bioenergy International*

[54] Global Clean Energy. (n.d.). Downstream: Developing next-generation alternative fuels to meet the world's growing energy needs. Retrieved August 12, 2022, from *https://www.gceholdings.com/operations/downstream*

[55] Bryan, T. (2021). Renewable Diesel's Rising Tide. Biodiesel Magazine. Retrieved August 12, 2022, from *https://biodieselmagazine.com/articles/2517318/renewable-diesels-rising-tide*

[56] Ibid.

Health and Safety Code sections 38501, 38505, 38510, 38551, 38560, 38566, 38580, 39002, 39003, 39600, 39601, 39602, 39602.5, 39650, 39658, 39659, 39667, 39730.8, 41511, 43000, 43000.5, 43013, 43018, and 43600.

The information in this chapter provides information regarding CARB staff's determination that each provision of the Proposed Amendments is: (1) reasonably necessary to carry out the purpose of the regulation; and (2) reasonably necessary to address the problem for which the regulation is proposed.

A. Global Amendments to Multiple Sections

Staff are proposing to modify "ARB" and "the ARB" to "CARB" and add "California" before "Air Resources Board" throughout the regulatory text. This global change is necessary to make the Off-Road Regulation consistent with how CARB is currently referring to itself. This amendment is non-substantive and will not change the meaning, interpretation, or implementation of the Proposed Amendments.

Staff also propose to modify the lettering and numbering sequencing throughout the regulatory text and make modifications to the regulatory text that reference these letters and numbers in order to have the references point to the correct language in the Proposed Amendments. This global change is necessary to update the sections where there are new, modified, or deleted lettering and numbering sections.

The Proposed Amendments would modify numbers throughout the regulatory text by changing written out numbers to numerals and numerals to written out numbers in several instances. This global change is necessary to maintain consistency between the Current Regulation and the Proposed Amendments where different numerical conventions were used in the Current Regulation compared to the Proposed Amendments in order to follow CARB's current numerical conventions which have changed since the Current Regulation was developed.

B. Section 2449(a) – Purpose

Purpose of Section 2449(a)

Staff proposes to remove the words "in-use off-road diesel-fueled" before "vehicles" and add "subject to this regulation" after "vehicles."

Rationale for Section 2449(a)

This amendment is necessary to clarify that the regulation only applies to vehicles "subject to this regulation," defined in section 2449(b), and to make this provision consistent with the rest of the regulatory text. The term "in-use off-road diesel-fueled" vehicles is an overarching term that could include diesel vehicles that are not subject to this regulation, so replacing

this with the phrase "vehicles subject to this regulation" more clearly identifies that only diesel vehicles that are subject to this regulation are being referenced.

C. Section 2449(b) – Applicability

Purpose of Section 2449(b)(2)(D)

Staff proposes to remove the phrase "This regulation applies to" and capitalize "any."

Rationale for Section 2449(b)(2)(D)

This amendment is necessary to improve readability and make the provision's word usage parallel to the rest of the provisions in section 2449(b)(2).

Purpose of Section 2449(b)(2)(E)

Staff proposes to make prime contractors subject to the Off-Road Regulation, except prime contractors who perform work for homeowners on their personal residence where the personal residence is not used for business purposes are exempt from being subject to this regulation.

Rationale for Section 2449(b)(2)(E)

This amendment is necessary to establish prime contractors as regulated entities under the regulation due to amended requirements impacting these entities. These amended requirements are necessary to ensure all parties who are responsible for hiring fleets subject to the regulation have a role in verification of compliance with the regulation. Extending verification compliance responsibilities to parties who have direct oversight over the fleets would expand CARB's ability to achieve compliance and ensure the emissions reductions of the regulation are achieved. CARB can achieve its implementation goals more effectively and these amendments would create an additional enforcement mechanism beyond inspections and audits performed by CARB staff. These goals include maintaining a level playing field for compliant vehicles conducting business in California and reducing the monetary advantage of noncompliant fleets and vehicle owners that try to circumvent the requirements of the Off-Road Regulation.

It is necessary to exempt prime contractors that perform work on personal residences because it is not CARB's intent to impose the prime contractor requirements and the potential monetary cost of compliance that comes with those requirements on California homeowners who are performing work on their personal residences. Vehicles operating on personal residences are traditionally smaller hp and so the emissions contributions from these operations are less than operations involving larger vehicles. Also, the vehicles used in these operations are still required to meet the requirements of the regulation so emission reductions will still be achieved. For these reasons, the requirement does not need to apply to work on personal residences.

Purpose of Section 2449(b)(2)(F)

Staff proposes to make public works awarding bodies subject to the Off-Road Regulation when awarding contracts that involve the operation of vehicles subject to the Off-Road Regulation in California.

Rationale for Section 2449(b)(2)(F)

This amendment is necessary to establish public works awarding bodies as regulated entities under the regulation due to amended requirements impacting these entities. These amended requirements are necessary to ensure all parties who are responsible for hiring fleets subject to the regulation have a role in verification of compliance with the regulation. Extending verification compliance responsibilities to public works awarding bodies who enter into contracts with fleets subject to this regulation would expand CARB's ability to achieve compliance and ensure the emissions reductions of the regulation are achieved. CARB can achieve its implementation goals more effectively and these amendments would create an additional enforcement mechanism beyond inspections and audits performed by CARB staff. These goals include maintaining a level playing field for compliant vehicles conducting business in California and reducing the monetary advantage of noncompliant fleets and vehicle owners that try to circumvent the requirements of the Off-Road Regulation.

Purpose of Subsection 2449(b)(2)(G) and (H)

Staff proposes to replace "in-use off-road diesel-fueled vehicles" with "vehicles subject to this regulation."

Rationale for Subsection 2449(b)(2)(G) and (H)

This amendment is necessary to clarify that the provision only applies to vehicles subject to this regulation, defined in section 2449(b), and to make this provision consistent with the rest of the regulatory text. The term "in-use off-road diesel-fueled" vehicles is an overarching term that could include diesel vehicles that are not subject to this regulation, so replacing this with the phrase "vehicles subject to this regulation" more clearly identifies that only diesel vehicles that are subject to this regulation are being referenced.

D. Section 2449(c) – Definitions

Purpose of Section 2449(c)(3)

Staff proposes to add a comma after "diesel fuel" before "as defined in title 13" and remove the word "reformulated" before diesel.

Rationale for Section 2449(c)(3)

This amendment is necessary for correct grammar, to improve readability of the provision. The word "reformulated" is removed because this term was incorrectly used and "reformulated" diesel does not exist.

Purpose of Section 2449(c)(7)

Staff proposes to add a definition of "CARB."

Rationale for Section 2449(c)(7)

This amendment is necessary because this acronym is used throughout the Current Regulation and the Proposed Amendments but was not previously defined, so this definition is necessary to clarify what this acronym means as used in the Off-Road Regulation.

Purpose of Section 2449(c)(13)

Staff proposes to add a definition of "Designated Official," and define it as "a person designated by the responsible official as the person that represents the fleet. The statements of the designated official to CARB under this regulation shall be deemed to be statements of the fleet."

Rationale for Section 2449(c)(13)

This amendment is necessary because the Current Regulation used the term "designee," which is not defined in the Current Regulation and so may be ambiguous. Therefore, the term "designee" is proposed to be changed to "designated official" throughout the Off-Road Regulation because that term is more descriptive of the role played by that entity, and thus clear to the regulated community, CARB proposes to add this definition to clearly establish what this entity is and does. The rationale for why these duties were selected for that official is given below.

Purpose of Section 2449(c)(17)

Staff proposes to add a definition for "DOORS fleet ID number" and define it as "the number CARB assigns to each fleet when a fleet initially reports to CARB, to identify the fleet."

Rationale for Section 2449(c)(17)

This amendment is necessary because the Current Regulation uses the phrase "DOORS fleet ID number," but did not define that phrase. The proposed definition is added to ensure fleets understand what the number is, its importance, and that it is issued by CARB upon initial reporting, all in one place.

Purpose of Section 2449(c)(18) and Subsections 2449(c)(18)(A) through (C)

Staff proposes to update the definition of "Emergency Operations." The definition in the Current Regulation is maintained, but staff propose to add additional situations that are also considered emergency operations. The first situation being added under this amendment is any activity for a project conducted during emergency, life-threatening situations, where a sudden, unexpected occurrence that poses a clear and imminent danger, requiring immediate action to prevent or mitigate the loss or impairment of life, health, property, or an essential public service; or in conjunction with any officially declared disaster or state of emergency, as declared by an authorized health officer, agricultural commissioner, fire protection officer, or other authorized health officer. The second situation proposed to be

added to this definition is any activity for a project conducted by essential service utilities to provide electricity, natural gas, telephone, water, or sewer during periods of service outages and emergency. Staff propose adding the phrase "operations including" to the beginning of subsection (c)(18)(C).

Rationale for Section 2449(c)(18) and Subsections 2449(c)(18)(A) through (C)

This amendment is necessary to provide additional situations that can be considered emergency operations, to ensure fleets have a better understanding of what operations are considered emergency operations. This is also needed to provide a clearer definition of emergency operations, so that there will be clearer guidelines about what constitutes an emergency operation and CARB will have stronger language to analyze the situation and ensure fleets are appropriately using the emergency operation exemptions. The first additional definition is proposed because it directly ties emergency operations to declarations of emergencies made by authorized officials which is a much clearer and widely understood mechanism for classifying an event as an emergency. This language is also proposed because it mirrors language included in California Public Contract Code Section 1102. The second additional definition is selected because continuing to provide essential services during outages and emergencies is critically important to safeguard California but the Current Regulation did not explicitly include these situations. Adding the phrase "operations including" to the beginning of subsection (c)(18)(C) is necessary for correct grammar to improve readability.

Purpose of Section 2449(c)(19)

Staff proposes to add a definition for "emission control label," and definite it to mean "the label which engine manufacturers are required to affix on each production engine (or piece of equipment) to provide the engine or equipment owner and service mechanic with information necessary for the proper maintenance of parts in customer use, as described in CCR, title 13, section 2424."

Rationale for Section 2449(c)(19)

This amendment is necessary because this term is not in the Current Regulation but the Proposed Amendments include a new requirement for fleets to request a replacement label be sent by the manufacturer when the emission control label is discovered to be not readable. This definition is necessary to identify which label this requirement pertains to, and to ensure fleets will be able to identify this label on their vehicles in order to comply with the new requirement of the Proposed Amendments.

Purpose of Section 2449(c)(24)

Staff proposes to change the definition of "fleet' to remove the phrase "all off-road vehicles and engines" to "all vehicles and engines subject to this regulation".

Rationale for Section 2449(c)(24)

This amendment is necessary to clarify that the regulation only applies to vehicles "subject to this regulation" instead of all off-road vehicles and engines, and to be consistent with the rest of the regulatory text.

Purpose of Section 2449(c)(33)

Staff proposes to delete the definition for "motor vehicle".

Rationale for Section 2449(c)(33)

This amendment is necessary because motor vehicle is never used in the regulation and so is not necessary.

Purpose of Section 2449(c)(36)

Staff proposes to update the reference from title 13, CCR, section 2421(a)(37) to title 13, CCR, section 2421(a)(38).

Rationale for Section 2449(c)(36)

This amendment is necessary because the referenced definition (37) incorrectly cites "Maximum Test Speed" instead of the intended (38) "Model Year" definition, and the update will reference the correct regulatory subdivision.

Purpose of Section 2449(c)(38)

Staff proposes to add a definition of "newly reported fleet" and define it as a fleet that reports to CARB for the first time.

Rationale for Section 2449(c)(38)

This amendment is necessary because the Proposed Amendments add newly reported fleets as applicable to the Current Regulation's new fleet requirements in section 2449(d)(4), so this definition is added to ensure fleets understand when they are considered a newly reported fleet for the purposes of the Off-Road Regulation.

Purpose of Subsection 2449(c)(43)(C)

Staff proposes to add the phrase "except as set forth in (F) below," and uncapitalize the word "once."

Rationale for Subsection 2449(c)(43)(C)

This amendment is necessary because staff is proposing a new requirement in section 2449(c)(43)(F) that alters the applicability of (C), so this language is needed to clarify that (C) now has a new proposed limitation in (F).

Purpose of Subsection 2449(c)(43)(F)

Staff proposes to add a new provision that establishes flexibility for fleets which allows them to use a three-year rolling average to comply with the permanent low-use provision, starting on January 1, 2024. The proposed language also describes the requirements for using the three-year rolling average flexibility.

Rationale for Subsection 2449(c)(43)(F)

This amendment is necessary to provide fleets additional flexibility when complying using the permanent low-use option. The Proposed Amendments sunset the year-by-year low-use option (the rationale for which is described in section 2449(e)(7)) which results in less flexibility for fleets using the low-use options, so adding the three-year rolling average to the permanent low-use option helps reintroduce flexibility for fleets using this provision. This flexibility is reasonable because it maintains the low hour limitations on these vehicles which ensures the emission reductions of the regulation are achieved, but provides the fleets some flexibility to continue their business operations if they have equipment that is used more sporadically.

A three-year time period is selected because the concept and process for a three-year rolling average existed in the Current Regulation in the year-by-year low-use provision that is proposed to be sunset in the Proposed Amendments, so fleets are already familiar with this flexibility and the requirements surrounding its use.

Purpose of Section 2449(c)(44)

Staff proposes to add a definition of "prime contractor" to mean "the entity that holds the contract for a project directly with the awarding authority or the owner of the project, to oversee all or part of a project in which vehicles subject to this regulation are operated."

Rationale for Section 2449(c)(44)

This amendment is necessary because the Proposed Amendments introduce new requirements applicable to prime contractors, so it is necessary to establish what defines that entity. The language defining prime contractor is selected because it is in agreement with how contractors are defined in the Business and Professions Code and it clearly identifies the metrics that determine if a contractor is considered the prime contractor.

Purpose of Section 2449(c)(45)

Staff proposes to add a definition of "public incentive funds" and "public incentive funding" to mean "any funding provided by one or more public entities via a grant, voucher, contract, or loan program that includes limitations on using the funding for regulatory benefit or credit."

Rationale for Section 2449(c)(45)

This amendment is necessary because the Current Regulation used the phrase "public funds" and "public funding" and it was not clear whether they referred to funding provided via incentives only, or to any funding coming from a public entity. To clarify this ambiguity, the phrase "public incentive funds" and "public incentive funding" is added under the Proposed Amendment and defined to remove the aforementioned ambiguity.

Purpose of Section 2449(c)(46)

Staff proposes to add a definition of "public works awarding body" to mean "any public agency (state, county, city, school board, water district, etc.), or official thereof, in the state

of California, that awards or enters into a contract for the erection, construction, alteration, repair, removal, or improvement of any public structure, building, road, or other public lands, property, or improvement of any kind."

Rationale for Section 2449(c)(46)

This amendment is necessary because the Proposed Amendments introduce new requirements applicable to public works awarding bodies, so it is necessary to establish what defines that entity. The language defining public works awarding body is selected because it uses language from the definition of a public works contract in Public Contract Code section 1101 which is known by the entities that this provision would apply to.

Purpose of Section 2449(c)(49)

Staff proposes to add a definition of "renewable diesel, R100 or R99" to mean "a diesel fuel substitute produced from non-petroleum renewable sources, including vegetable oils and animal fats, that meets both a) Title 40, Code of Federal Regulations, Part 79 – Registration of Fuels and Fuel Additives; and b) American Society for Testing Materials specification D975, which is also hereby incorporated by reference herein."

Rationale for Section 2449(c)(49)

This amendment is necessary because the Proposed Amendments include additional requirements that require the use of renewable diesel, so it is necessary to define this fuel to clarify exactly what fleets are required to use and it is also necessary so readers can understand the specifications of the fuel for this new requirement. The language defining renewable diesel is selected because it is scientifically accurate and is commonly defined as such in other regulations with similar renewable diesel usage requirements.

Purpose of Section 2449(c)(51)

Staff proposes to add a definition of "replacement emission control label" to mean "a label which is identical to the emission control label that was installed on the engine at the time of manufacture, meets the requirements of Title 13 CCR section 2424, and was approved at the time of certification."

Rationale for Section 2449(c)(51)

This amendment is necessary because the Proposed Amendments include a new requirement for fleets to request replacement emission control labels from the manufacturer when they discover that the emission control label on any of their vehicles is no longer readable, so it is necessary to define this label, so fleets know the specifications of the replacement label they will be receiving and so they can verify the accuracy of a replacement emission control label when they receive one. The language defining replacement emission control label is selected because this label must meet the specifications in the definition in order to comply with the labeling requirements in Title 13 CCR section 2424.

Purpose of Subsection 2449(c)(53)(C)

Staff proposes to add the words "United States Environmental Protection Agency" before the acronym "U.S. EPA".

Rationale for Subsection 2449(c)(53)(C)

This amendment is necessary to provide full reference information and clarify what the acronym "U.S. EPA" stands for.

Purpose of Section 2449(c)(57)

Staff proposes to add a definition of "subcontractor" to mean "any person or entity who has a contract with the prime contractor or another subcontractor, but does not have a contract directly with an awarding authority or owner, for work involving the operation of vehicles subject to this regulation."

Rationale for Section 2449(c)(57)

This amendment is necessary because the Proposed Amendments introduce new requirements applicable to public works awarding bodies and prime contractors, and these requirements are related to subcontractors, so it is necessary to establish what defines that entity. The language defining subcontractor is selected because subcontractors are known as such in the industry, and it is consistent with terminology used by the Contractors State License Board.

Purpose of Section 2449(c)(73)

Staff proposes to add new subsection 2449(c)(73)(E), which removes the year-by-year low-use designation beginning on January 1, 2024. It also updates the lettering of subsection 2449(c)(73)(E) to 2449(c)(73)(D) and makes non-substantive changes for grammar.

Rationale for Section 2449(c)(73)

This amendment is necessary to reinforce the sunsetting of the year-by-year low-use option (the rationale for which is described in section 2449(e)(7)). The updates to the lettering of section 2449(c)(73) are necessary because section 2449(c)(73)(E) was added, and the lettering for section 2449(c)(73)(D) was skipped in the Current Regulation.

Purpose of Section 2449(c)(74)

Staff proposes to add a definition of "zero-emission vehicle" to mean "a vehicle that produces zero exhaust emissions of any criteria pollutant (or precursor pollutant) or GHG under any and all possible operational modes and conditions."

Rationale for Section 2449(c)(74)

This amendment is necessary because the Current Regulation included some requirements applicable to electric vehicles, but the Proposed Amendments make changes and add requirements that are applicable to any zero-emission vehicle, so it is necessary to clearly define the requirements for what is considered a zero-emission vehicle, so fleets understand what type of technology is applicable to these new requirements.

E. Section 2449(d) – Performance Requirements

Purpose of Subsection 2449(d)(1)(B)2.c.

Staff proposes to add the phrase "or Zero-Emission Vehicles" after the term "Electric Vehicles."

Rationale for Subsection 2449(d)(1)(B)2.c.

This amendment is necessary to clarify that other forms of zero-emission vehicle technology, such as fuel cell technology, will be allowed to receive the same credit as electric vehicle technology in the amended subsection 2449(d)(1)(B)2.c.iv.

Purpose of Subsection 2449(d)(1)(B)2.c.iv.

Staff proposes to add this subsection to establish that ZEVs will be credited for the purposes of determining compliance with section 2449.1(a) of the regulation after January 1, 2024.

Rationale for Subsection 2449(d)(1)(B)2.c.iv.

This amendment is necessary because the Current Regulation only identified electric technology as receiving credit for the purposes of compliance with section 2449.1(a) and CARB believes other forms of zero-emission technology, such as fuel cell technology, will become a potentially viable technology for the vehicles subject to this regulation. This amended language establishes that if these other forms of zero-emission technology are adopted by a fleet then they will receive the same compliance credit as electric vehicle technology.

Purpose of Subsection 2449(d)(3)(A) through (C)

Staff proposes to replace the word "reporting" with "compliance" in the phrase "reporting date" and include references to 2449.1.

Rationale for Subsection 2449(d)(3)(A) through (C)

This amendment is necessary to clarify that the fleets are required to meet requirements by the "compliance" date, not the "reporting" date. The "compliance" date is January 1st of a given year in which a fleet has compliance requirements in section 2449.1, depending on fleet size, whereas the "reporting" date may be unclear, because fleets are required to report anytime between January 1st and March 1st of a given year, depending on fleet size.

Purpose of Section 2449(d)(4)

Staff proposes to add the phrase "and Newly-Reported" to the title of this section, so it would read "New and Newly-Reported Fleets."

Rationale of Section 2449(d)(4)

This amendment is necessary to clarify that the subsequent sections have been amended to apply to both new fleets and to fleets that are reporting to CARB for the first time.

Purpose of Subsection 2449(d)(4)(A) through (C)

Staff proposes to make several changes within sections 2449(d)(4)(A), (B), and (C), with the same changes and rationale for each section. This amendment would make the following changes:

1. Removes the term "new" from the caption of each subsection;

2. Changes each phrase that references "new fleets" to state "new and newly-reported fleets;"

3. Adds the phrase "and the tier phase-out requirements in section 2449.1(c)" to the sentence specifying with which requirements new and newly-reported fleets must come into compliance;

4. Adds language specifying that when a fleet reports to CARB for the first time, that fleet needs to come into compliance with the Off-Road Regulation;

5. Adds the phrase "whichever occurs first" when describing the situations in which new and newly-reported fleets must come into compliance;

6. Removes the language "on or after January 1, 2012" (this change is not made in 2449(d)(4)(C) because that language is not in that provision in the Current Regulation in (C)); and

7. Moves the word "or" in the text and adds additional commas.

Rationale for Subsection 2449(d)(4)(A) through (C)

1. This amendment is necessary to clarify that the subsections have been amended to apply to both new fleets and to fleets that are reporting to CARB for the first time.

2. This amendment is necessary to ensure the emissions reductions of the Off-Road Regulation are achieved. During implementation of the Current Regulation, some fleets reported with CARB for the first time but claimed they were not a new fleet because they have been in operation in California before the time of reporting and therefore did not need to come into immediate compliance with the regulation's requirements. The intent of these requirements is to ensure that any fleet that is reporting to CARB for the first time, either because they are a new fleet or because they did not report their previous operations and were noncompliant with the Current Regulation, must come into compliance with the regulation's requirements immediately upon entering California or reporting to CARB.

3. This amendment is necessary to ensure the emissions reductions of the tier phase-out requirements are achieved by clarifying that newly-reported fleets must immediately come into compliance with the tier phase-out requirements, in addition to the requirements of the Current Regulation.

4. The rationale for this section is identical to the rationale for 2, above, and provides additional clarity.

5. This amendment is necessary to establish that as soon as a fleet is identified as operating in California, then the fleet is required to immediately come into compliance with the regulation, thus ensuring the emissions reductions of the regulation are achieved.

6. This amendment is necessary to remove ambiguity and improve readability because the date has already passed and all requirements in these sections are in effect.

7. This amendment is necessary for correct grammar, to improve readability, because an additional item is added to the list.

Purpose of Subsection 2449(d)(5)(A)

Staff proposes to delete the unnecessary word "a" in the sentence "If ownership of a fleet 'a' or fleet portion...).

Rationale of Subsection 2449(d)(5)(A)

This amendment is necessary to correct a typo in the Current Regulation.

Purpose of Section 2449(d)(6)

Staff proposes to update the lettering of the range of requirements from "(A) through (C)" to "(A) through "(I)".

Rationale for Section 2449(d)(6)

This amendment is necessary because staff proposes to add six new adding vehicle requirements, (D) through (I), and the lettering needs to be updated to reflect these 6 new requirements.

Purpose of Subsection 2449(d)(6)(A)

Staff proposes to replace "the United States Environmental Protection Agency" with the abbreviated form, "U.S. EPA".

Rationale for Subsection 2449(d)(6)(A)

This amendment is necessary to reduce redundancy, because the acronym "U.S. EPA" was defined in its expanded form in Subsection 2449(c)(44)(C).

Purpose of Subsection 2449(d)(6)(D)

Staff proposes to add a provision prohibiting fleets from adding a vehicle with a Tier 3 engine beginning on January 1, 2024.

Rationale for Subsection 2449(d)(6)(D)

This amendment is necessary to achieve additional emissions reductions by limiting the addition of engines that are not the cleanest available technology. The cleanest engines available at the time the provision is implemented are Tier 4 Final engines. Preventing fleets from adding Tier 3 engines to their fleet will prevent additional vehicles that produce higher emissions than Tier 4 Final from being added to California fleets, achieving additional emission reductions beyond those from the Current Regulation. January 1, 2024, is proposed

as the implementation date because Tier 4 Final engines are readily available and January 1, 2024 is the earliest date that the regulation could become effective under California law (if adopted and approved by OAL).

Purpose of Subsection 2449(d)(6)(E)

Staff proposes to add a provision prohibiting fleets from adding a vehicle with a Tier 4 Interim engine beginning on January 1, 2024, for large and medium fleets, and on January 1, 2028, for small fleets.

Rationale for Subsection 2449(d)(6)(E)

This amendment is necessary to achieve additional emissions reductions by limiting the addition of engines that are not the cleanest available technology. The cleanest engines available at the time the provision is implemented is Tier 4 Final engines, and preventing fleets from adding Tier 4 Interim engines to their fleet will achieve additional emissions reductions from the Current Regulation by preventing additional vehicles that produce higher emissions than Tier 4 Final from being added to fleets and thus operated in California. January 1, 2024, is proposed as the implementation date for large and medium fleets because Tier 4 Final engines are readily available, January 1, 2024 is the earliest date that the regulation could become effective under California law (if adopted and approved by OAL), and because the first tier phase-out requirement for large fleets begins on January 1, 2024, so this ensures that when large fleets take action to comply with the tier phase-out requirements, they will add the cleanest available technology.

This requirement is proposed to begin on January 1, 2028, for small fleets because the first tier phase-out requirement for small fleets begins on January 1, 2028, and this ensures that when small fleets take actions to comply with the tier phase-out requirements, they will add the cleanest available technology. Although Tier 4 Final is readily available, giving small fleets additional time and flexibility before implementing the Tier 4 Interim vehicle adding ban achieves the necessary emission reductions of the Proposed Amendments while allowing for small fleets to comply with the Off-Road Regulation through more cost-effective actions.

Purpose of Subsection 2449(d)(6)(F)

Staff proposes to provide additional flexibility to fleets with 500 hp or less by delaying the effective date of the prohibition on adding vehicles with Tier 4 Interim engines for fleets with 500 hp or less to January 1, 2035, instead of January 1, 2028.

Rationale for Subsection 2449(d)(6)(F)

This amendment is necessary to provide appropriate flexibility to the adding vehicles limitations for fleets with 500 hp or less. Vehicles with Tier 4 Final engines are currently considered the cleanest available technology, but these vehicles have a higher capital cost compared to vehicles with Tier 4 Interim engines. Because of the higher cost of Tier 4 Final, the up-front cost burden of complying with the tier phase-out requirements might have been overly burdensome for a fleet with 500 hp or less. Therefore, CARB is proposing to allow these fleets the ability to purchase vehicles with Tier 4 Interim engines through January 1, 2035, to provide a cheaper compliance pathway for these potentially challenged fleets, while

still ensuring these fleets add technology that is much cleaner than Tier 0, 1, and 2. This particular date was selected because it strikes a balance between reducing cost and achieving the additional needed emissions reductions.

Purpose of Subsection 2449(d)(6)(G)

Staff proposes to add a provision prohibiting fleets from adding a vehicle with a MY 2006 or earlier on-road engine beginning on January 1, 2024, for large and medium fleets, and on January 1, 2028, for small fleets.

Rationale for Subsection 2449(d)(6)(G)

This amendment is necessary to ensure additional emissions reductions are achieved by limiting the addition of on-road engines that are not the cleanest available. Vehicles subject to this regulation can potentially operate using on-road engines, and MY 2006 and earlier on-road engines are similar in emissions levels and technology to that of Tier 4 Interim engines and older. This section prevents the addition to fleets of vehicles with those on-road engines that are similar to vehicles with Tier 4 Interim engines and older. This provision is intended to mirror the vehicle adding provisions for Tier 4 Interim engines identified in 2449(d)(6)(E) above and has an identical rationale for the beginning dates for that proposed provision.

Purpose of Subsection 2449(d)(6)(H)

Staff proposes to add a provision that prevents fleets from adding a vehicle with a Tier 0 engine as a dedicated snow removal vehicle, a vehicle used for emergency operations, or a Job Corps vehicle beginning on January 1, 2024.

Rationale for Subsection 2449(d)(6)(H)

This amendment is necessary to ensure additional emissions reductions are achieved by limiting the addition of vehicles with Tier 0 engines for certain special provisions. Although dedicated snow removal vehicles, vehicles used for emergency operations, and Job Corps vehicles are provided additional flexibility in the Current Regulation due to their unique circumstances and necessary operations, vehicles with Tier 0 engines are extremely high-polluting and outdated, and need to be prevented from being added to fleets as much as possible to reduce emissions. Tier 1 and cleaner engines are now readily available so allowing for the addition of Tier 0 engines is no longer needed for these unique circumstances. January 1, 2024 is proposed as the implementation date because January 1, 2024 is the earliest date that the regulation could become effective under California law (if adopted and approved by OAL).

Purpose of Subsection 2449(d)(6)(I)

Staff proposes to establish a requirement that any vehicle that is added to a fleet on or after January 1, 2028, must have a California-certified engine or have an engine that is certified to the California-equivalent emission standards applicable to MY 2028 and later equipment. This requirement also applies to model year 2028 and later replacement engines produced under the provisions of 40 CFR §1068.240. It also specifies that this requirement does not

apply to new engines smaller than 175 hp that are used in construction equipment or vehicles, or in farm equipment or vehicles.

Rationale for Subsection 2449(d)(6)(I)

This amendment is necessary to provide assurance that the cleanest engines continue to be used in California even if CARB and U.S. EPA off-road engine standards do not remain aligned in the future past Tier 4 Final. The main goal of the Proposed Amendments is to achieve additional emission reductions and ensuring the cleanest technology is utilized into the future helps achieve this goal. It is necessary to exempt new engines smaller than 175 Hp that are used in construction equipment or vehicles and in farm equipment or vehicles because, under the federal Clean Air Act, U.S. EPA generally adopts new engine standards for these engines.

Purpose of Subsection 2449(d)(8)(B)

Staff proposes to delete the word "an" before "applicable compliance requirements."

Rationale for Subsection 2449(d)(8)(B)

This amendment is necessary for correct grammar, to improve readability.

Purpose of Subsection 2449(d)(9)(A)

Staff proposes to delete the word "previous" and add "prior to the final target date" instead. Language is also proposed to be added that allows carryover credit to be earned after the final target date, to allow that credit to be used to meet the BACT requirements in subsequent years.

Rationale for Subsection 2449(d)(9)(A)

The first proposed amendment is necessary to clarify what is meant by "previous" years, which was intended to mean years "prior to the final target date". The second proposed amendment is necessary to provide flexibility to fleets by allowing fleets to generate credits after the final target date. CARB staff believes this flexibility is necessary because it will potentially ease the financial burden of compliance for some fleets that are taking steps to comply with the Off-Road Regulation in good faith, is necessary to help the Current Regulation and the Proposed Amendments overlay with each other in a way that is less burdensome to fleets, and will not overly hinder the Proposed Amendments ability to achieve additional emissions reductions. Due to the tier phase-out requirements included in these amendments, fleets will likely comply with those requirements by removing their vehicles with Tier 0, 1, and 2 engines after the final target date and stakeholders provided comments that those actions should be allowed to generate credits towards meeting their BACT requirements in section 2449.1(b). CARB staff agreed that this was a reasonable flexibility that should be added to the Proposed Amendments.

Purpose of Subsection 2449(d)(9)(B)

Staff proposes to add a requirement specifying what is required of fleets after the final target date, which includes that fleets must meet the tier phase out and RD requirements proposed

to be added in these amendments. This proposed amendment would also establish that vehicles that are exempt from BACT under section 2449.1(b)(2) and (3) are not exempt from the tier phase-out requirements.

Rationale for Subsection 2449(d)(9)(B)

This amendment is necessary to clearly identify what fleets must do to stay in compliance with the Off-Road Regulation after the final target date: comply with the tier phase out and RD requirements. This proposal will ensure continued compliance with the tier phase out and RD provisions, so that the additional emissions reductions achieved by those provisions continue to be achieved after the final target date. Further, the BACT exemptions under section 2449.1(b)(2) and (3) were only intended to provide exemptions to the BACT requirements, and CARB does not intend for these exemptions to apply to the tier phase-out requirements, so this amendment was necessary to clarify that distinction.

F. Section 2449(e) – Special Provisions/Compliance Extensions

Purpose of Section 2449(e)(3)

Staff proposes to add the requirement that vehicles used for emergency operations must meet the adding vehicle requirements in section 2449(d)(6)(H), add several commas, delete the word "and," and add "2449".

Rationale for Section 2449(e)(3)

These proposed amendments are necessary to clarify that the vehicle adding provision in 2449(d)(6)(H) is in effect for these types of vehicles, which is necessary to ensure additional emissions reductions are achieved by limiting the addition of vehicles with Tier 0 engines for vehicles used for emergency operations. Although these vehicles are provided additional flexibility in the Current Regulation due to their unique circumstances and necessary operations, vehicles with Tier 0 engines are extremely high-polluting and outdated and need to be prevented from being added to fleets as much as possible to reduce emissions. The addition of several commas and deleting the word "and" are necessary for correct grammar, to improve readability. Adding the number "2449" in front of the subsection references is necessary to match the style of the Current Regulation which includes the regulation's section number before each subsection reference.

Purpose of Section 2449(e)(4)

Staff proposes to add the requirement that snow removal vehicles must meet the adding vehicle requirements in section 2449(d)(6)(H), add several commas, delete the word "and," and add "2449".

Rationale for Section 2449(e)(4)

These proposed amendments are necessary to clarify that the vehicle adding provision in 2449(d)(6)(H) is in effect for these types of vehicles, which is necessary to ensure additional emissions reductions are achieved by limiting the addition of vehicles with Tier 0 engines for vehicles used for snow removal. Although these vehicles are provided additional flexibility in

the Current Regulation due to their unique circumstances and necessary operations, vehicles with Tier 0 engines are extremely high-polluting and outdated and need to be prevented from being added to fleets as much as possible to reduce emissions. The addition of several commas and deleting the word "and" are necessary for correct grammar, to improve readability. Adding the number "2449" in front of the subsection references is necessary to match the style of the Current Regulation which includes the regulation's section number before each subsection reference.

Purpose of Section 2449(e)(5)

Staff proposes to change "15%" to "15 percent".

Rationale for Section 2449(e)(5)

This amendment is necessary to follow CARB's current style conventions which have changed since the Current Regulation was developed, and matching this style is necessary to maintain consistency with the Proposed Amendments.

Purpose of Section 2449(e)(6)

Staff proposes to replace the word "extension" with "flexibility" and replace the phrase "will be excused from immediate compliance" with a description of the flexibility that will be applied when there are equipment manufacturer or installer delays. This description states that fleets are allowed to include the new vehicle in and remove the vehicle they plan to retire from their fleet average calculation, as well as continue operation of the vehicle they plan to retire, even if the vehicle does not meet the tier phase-out requirements in section 2449.1(c). This amendment also proposes to replace "as long as" with "and."

Rationale for Section 2449(e)(6)

This amendment is necessary to clarify the intended flexibility of this provision, as well as provide a more thorough explanation of the results to a fleet when this flexibility is utilized. The Current Regulation is unclear on what specific compliance requirements the fleet would be excused from and it also does not explain how the calculations are to be performed in this scenario; the proposed amendment would clarify these ambiguities. The amendment replacing "as long as" with "and" is necessary to clarify that the flexibility only applies where there is both manufacturing or installer delays and all of the specified conditions are met.

Purpose of Subsection 2449(e)(6)(B)

Staff proposes to add the phrase "or vehicle" after "equipment."

Rationale for Subsection 2449(e)(6)(B)

This amendment is necessary because the Off-Road Regulation uses the term "vehicle" throughout the regulatory text when identifying what is applicable to the regulation, so only referencing the term "equipment" could be ambiguous. This amendment removes that ambiguity and clearly establishes that this section applies to vehicles subject to the regulation.

Purpose of Subsection 2449(e)(6)(C)

Staff proposes to add a requirement that when new equipment or vehicles are placed into operation, the replaced vehicles must be removed from service within 30 days.

Rationale for Subsection 2449(e)(6)(C)

This amendment is necessary to ensure emissions reductions are achieved by requiring that replaced vehicles are removed in a reasonable amount of time and are not allowed to continue operating in California indefinitely.

Purpose of Subsection 2449(e)(6)(E)

Staff proposes to add a requirement that fleets taking advantage of the flexibility in section 2449(e)(6) need to retain evidence of when vehicles using this compliance flexibility are removed or put into service in the fleet, as well as provide this evidence to CARB upon request.

Rationale for Subsection 2449(e)(6)(E)

This amendment is necessary to ensure that the fleet has met the requirements of subsection 2449(e)(6)(C).

Purpose of Section 2449(e)(7)

Staff proposes to add language reinforcing that low-use vehicles must meet the Tier 0 phase-out requirements in section 2449.1(c)(4). This amendment also proposes to sunset the year-by-year low-use option on January 1, 2024, meaning that no vehicle will be considered year-by-year low-use after this date.

Rationale for Section 2449(e)(7)

The proposal to add the Tier 0 phase-out requirement language is necessary to clarify that low-use vehicles must meet the tier phase-out requirements in section 2449.1(c)(4) (the rationale for which is described in section 2449.1(c)(4)). The second amendment is necessary because implementation of the year-by-year low-use exemption would be infeasible to implement in conjunction with the tier phase-out requirements. The year-by-year low-use exemption allows fleets to move vehicles in and out of low-use on a year-to-year basis, but starting on January 1, 2024, when the first tier phase-out requirement goes into effect, if a fleet had a year-by-year low-use vehicle subject to the tier phase out and attempted to bring the vehicle out of low-use, the fleet would immediately become noncompliant. Because of the implementation complexity this would cause and the risk of fleets becoming noncompliant, this amendment removes the year-by-year option. January 1, 2024, was selected because that is the first year a tier phase-out requirement comes into effect and as described above, the year-by-year low-use exemption does not work properly when a tier phase out is in effect.

Purpose of Section 2449(e)(8)

Staff proposes to replace the administrative hearing process provisions in the Current Regulation with a reference to CARB's administrative hearing process regulations.

Rationale for Section 2449(e)(8)

This amendment is needed so that all of CARB's hearing procedures are in one place, CARB's administrative hearing regulations. Putting them all in one place reduces confusion about which procedures apply, making the law more clear. Though this proposal will remove some of the procedural options available under the Current Regulation that are not available under CARB's administrative hearing regulations, the existing hearing procedures have never been used, so this proposed change will have no impact.

Purpose of Section 2449(e)(10)

Staff proposes to update the conjunction word choice by replacing "nor" with "or," remove "or," add a comma and replace "all" with "the." Staff also proposes to add the requirement that vehicles awaiting sale must meet the sales disclosure requirements in section 2449(l).

Rationale for Section 2449(e)(10)

This amendment is necessary because "nor" is incorrectly used, grammatically, and "or" is the better grammatical choice to show the alternative. It is necessary to replace the conjunction "or" with a comma and insert a comma after "...while awaiting sale, or for maintenance purposes..." for correct grammar, to improve readability. It is necessary to replace "all" with "the" in the sentence "... or for maintenance purposes are exempt from 'the' requirements in section 2449, 2449.1 and 2449.2..." to specify what "all requirements" includes. The proposed amendment for vehicles awaiting sale to be subject to the sales disclosure requirements is necessary to ensure that when a fleet purchases an off-road vehicle, it will be notified that the vehicle may be subject to the Off-Road Regulation. This ensures transparency in all purchase transactions.

Purpose of Section 2449(e)(13)

Staff proposes to add the requirement that jobs corps vehicles must meet the adding vehicle requirements in section 2449(d)(6)(H) and the tier phase-out requirements in section 2449.1(c)(4). This amendment also proposes to add several commas, delete the word "and," and add "2449" to each subsection reference.

Rationale for Section 2449(e)(13)

These proposed amendments are necessary to clarify that the vehicle adding provision in 2449(d)(6)(H) is in effect for these types of vehicles, which is necessary to ensure additional emissions reductions are achieved by limiting the addition of vehicles with Tier 0 engines for Jobs Corps vehicles. Although these vehicles are provided additional flexibility in the Current Regulation due to their unique circumstances and necessary operations, vehicles with Tier 0 engines are extremely high-polluting and outdated, and need to be prevented from being added to fleets as much as possible to reduce emissions.

These proposed amendments are necessary to clarify that the Tier 0 phase out in 2449.1(c)(4) is in effect for these types of vehicles, which is necessary to ensure that the highest polluting engines are not allowed to operate even in a limited capacity as a jobs corps vehicle.

The addition of several commas and deleting the word "and" are necessary for correct grammar, to improve readability. Adding the number "2449" in front of the subsection references is necessary to match the style of the Current Regulation which includes the regulation's section number before each subsection reference.

Purpose of Section 2449(e)(14)

Staff proposes to add a requirement that a two-engine vehicle is not allowed to operate in California if either of its engines do not comply with the tier phase-out requirements in section 2449.1(c).

Rationale for Section 2449(e)(14)

This amendment is necessary to clarify how two-engine vehicles would comply with the tier phase-out requirements. It is necessary to apply these requirements to both engines of two engine vehicles subject to this regulation in order to ensure the emission reductions of the Proposed Amendments are achieved and because implementing the tier phase-out requirements differently by each engine on a two-engine vehicle would be extremely complex and difficult to ensure compliance.

Purpose of Section 2449(e)(16)

Staff proposes to add language to reinforce the flexibility for fleets with 500 hp or less, specifically describing that they have less stringent Tier 4 Interim phase-out requirements and Tier 4 Interim vehicle adding requirements, with references to the sections where those flexibilities are described in more detail in the Off-Road Regulation.

Rationale for Section 2449(e)(16)

This amendment is necessary to clarify the requirements for fleets with 500 hp or less. The Current Regulation described other optional compliance requirements for fleets with 500 hp or less in this section so referencing the other requirements that were added as part of the Proposed Amendments is necessary for consistency and to ensure all flexibility provisions applicable to fleets with 500 hp or less are described in the same area for reader clarity.

Purpose of Section 2449(e)(17)

Staff proposes to change the phrase "public funds" to "public incentive funds.".

Rationale for Section 2449(e)(17)

This amendment is necessary because the Current Regulation used the phrase "public funds" and "public funding" and it was not clear whether they referred to funding provided via incentives only, or to any funding coming from a public entity. To clarify this ambiguity, the phrase "public incentive funds" and "public incentive funding" is added under the Proposed Amendment and used here to remove the aforementioned ambiguity.

G. Section 2449(f) – Labeling

Purpose of Section 2449(f)(1)

Staff proposes to update the numbering of this subsection by entering "1" for the first subsection that was previously not numbered; replace "equipment identification number" with "EIN"; and add "a" in the sentence "CARB will issue 'a' unique EIN to the fleet owner..."

Rationale for Section 2449(f)(1)

This amendment is necessary to organize the section for easier navigation. It is necessary to remove "equipment identification number" for consistency, since the regulation uses EIN throughout, Finally, the proposal to add an "a" to "CARB will issue 'a' unique EIN to the fleet owner..." is necessary to make the sentence more grammatically correct.

Purpose of Subsection 2449(f)(1)(A) through (B)(6)

Staff proposes to change the subsection numbering "1" and "2" to lettering "A" and "B," and replace subsection lettering "A" through "F" with numbering "1" through "6".

Rationale for Subsection 2449(f)(1)(A) through (B)(6)

This amendment is necessary to organize the sections for easier navigation, and to maintain consistent numbering and lettering throughout the Off-Road Regulation.

Purpose of Section 2449(f)(2)

Staff proposes to add a provision establishing the requirement that when a fleet observes that an engine's emission control label is no longer visible or readable, then the fleet must contact the manufacturer within 10 days and request that the manufacturer affix a replacement emission control label on the engine. If the manufacturer is unable to affix the label within 30 days, then the fleet must request a replacement emission label be sent to the fleet by the manufacturer and affix it themselves according to the requirements in California Code of Regulations, title 13, section 2424.

Rationale for Section 2449(f)(2)

This amendment is necessary to improve the effectiveness of CARB's enforcement ability to enforce the Off-Road Regulation. While implementing the Current Regulation, CARB staff have been unable to read the emission control labels, which are required by CCR, title 13, section 2424 to be readable on the engine, which impedes CARB's ability to determine compliance of that engine with the Off-Road Regulation. This amendment will ensure that if the emission control label is not readable, a replacement label will be affixed to the engine, which will then improve CARB's ability to determine compliance in those situations.

H. Section 2449(g) – Reporting

Purpose of Section 2449(g)

Staff proposes to add language stating that any documentation that is submitted to CARB as part of a fleet's reporting is submitted under the penalty of perjury.

Rationale for Section 2449(g)

This proposed amendment is necessary to ensure that fleets fully understand that any documentation submitted to CARB must be accurate and truthful. Further, this proposed amendment helps increase the enforceability of the Off-Road Regulation by ensuring that fleets can be held responsible for submitting information to CARB that is untruthful or inaccurate, which will encourage fleets to submit only truthful and accurate information to CARB. As a result, CARB will be better able to rely upon information submitted by fleets, and better able to weed out those who are not complying, ensuring that the Off-Road Regulation is achieving its projected emissions reductions.

Purpose of Subsection 2449(g)(1)(A)(3) and (4)

Staff proposes to change the requirement for fleet owners to report to CARB their fleet's "taxpayer identification number" to require fleet owners to instead report their fleet's "federal employer identification number."

Rationale for Subsection 2449(g)(1)(A)(3) and (4)

This amendment is necessary because CARB does not want to receive personally identifiable information, such as taxpayer identification number, and instead is requesting the federal employer identification number for the purposes of this reporting. The federal employer identification number provides CARB with information that is unique to the fleet, is federally recognized, and provides a necessary tool to help determine ownership of a fleet to be able to determine compliance with the Off-Road Regulation, and so meets the original need of this reported information, while is not personally identifiable information.

Purpose of Subsection 2449(g)(1)(A)(6) and (7)

Staff proposes to change the phrase "responsible person name" to "the responsible official's name," and to change the phrase "responsible person title" to "the responsible official's job title."

Rationale for Subsection 2449(g)(1)(A)(6) and (7)

This amendment is necessary to provide clarity because the term "official" is more well defined than the term "person" and this change reduces confusion about who is intended to be reported under this requirement. Also, adding the term "job" to "title" provides additional clarity about the type of title that is requested under this provision: the official job title.

Purpose of Subsection 2449(g)(1)(C)

Staff proposes to add additional reporting requirements: that when a fleet has rebuilt an engine in the fleet, the fleet must, in addition to reporting the rebuilt engine, also report the date of the rebuild, the name of the entity that performed the rebuild, and the tier or emission level of the replacement engine. This amendment also deletes the language that required a fleet to only report if an engine was rebuilt to a more stringent emissions configuration.

Rationale for Subsection 2449(g)(1)(C)

This amendment is necessary to ensure CARB receives appropriate data regarding the actions of the fleets complying with the Off-Road Regulation. Under the Current Regulation, fleets would only report rebuild information when rebuilding to a more stringent emission configuration and, during implementation of the regulation, CARB discovered that receiving data on all rebuilds was critical to better understanding the actions of the fleets in order to make more educated policy decisions impacting these fleets. This same rationale applies to the additional information that is being requested to be reported when an engine is rebuilt. Reporting of the date of rebuild is necessary to understand the annual emissions impact of rebuilt engines within the fleets and the name of the entity performing the rebuild is important to understand the scope of the rebuild market in California that is providing services for off-road diesel fleets.

Purpose of Subsection 2449(g)(1)(E)

Staff proposes to add "zero-emission" to the list of technologies that must report under this provision and adds "section 2449(g)(1)(B)12." to the list of sections providing information that must be reported for non-diesel vehicles.

Rationale for Subsection 2449(g)(1)(E)

This amendment is necessary to clarify that ZEVs are intended to be applicable to these non-diesel vehicles reporting requirements. Previously, only electric, alternative fueled, and gasoline vehicles were listed in this section, but CARB believes other zero-emission technologies may be operated and be subject to this regulation, such as fuel cell technology, and this clarification ensures that those vehicles are appropriately reported in accordance with the reporting expected of all non-diesel vehicles which ensures compliance with the Off-Road Regulation. Section 2449(g)(1)(B)12. was added to the list of necessary fields because that reporting information applies to non-diesel vehicles and its absence from this list was an oversight in the Current Regulation. Section 2449(g)(1)(B)12. requests that a fleet state whether an electric vehicle replaced a diesel vehicle, which is clearly intended to apply to electric vehicles which are non-diesel vehicles.

Purpose of Subsection 2449(g)(1)(H) and subsections (1) and (2)

Staff proposes the following changes:

1. Change "public funds" to "public incentive funds" and "public funding" to "public incentive funding;"

2. Add a comma after "public incentive funds;"

3. Add language that states that this section's requirements apply when the funding contract includes criteria that limits funded projects from receiving regulatory benefit or credit; and

4. Adds the word "term" at the end of "public incentive funding contract."

Rationale for Subsection 2449(g)(1)(H) and subsections (1) and (2)

1. This amendment is necessary because the Current Regulation used the phrase "public funds" and "public funding" and it was not clear whether they referred to funding provided via incentives only, or to any funding coming from a public entity. To clarify this ambiguity, the phrase "public incentive funds" and "public incentive funding" is added under the Proposed Amendment and used here to remove the aforementioned ambiguity.

2. This amendment is necessary for correct grammar, to improve readability.

3. This amendment is necessary to clarify that these requirements also apply when a funding program's contract has limitations on receiving regulatory benefit or credit and not only when the program's guidelines include that limitation. This clarification is needed to ensure that if a program's contract has limitations on receiving regulatory benefit or credit that appropriate information is reported to CARB in accordance with the Current Regulation.

4. This amendment is necessary to clarify what is meant by the start and end dates of a funding contract. The dates on which the public incentive funding contract begin and end could be ambiguous, especially when the project start and end dates are also an important milestone in these types of contracts, but are different from the contract start and end dates. Adding the word "term" provides additional clarity that the start and end date is specific to the terms of the contract and providing this clarity is necessary to ensure CARB receives accurate and pertinent information.

Purpose of Subsection 2449(g)(2)

Staff proposes to add language stating that any alterations made to pre-printed information on forms submitted by a fleet as part of the annual reporting process will be invalid and the alterations will not be considered effective if the fleet submits the form with any changes to the pre-printed information.

Rationale for Subsection 2449(g)(2)

This amendment is necessary to clarify that the forms CARB provides the fleets for reporting purposes are not intended to be modified by the fleets and CARB will not consider any alterations made by fleets to the pre-printed information CARB provides on the fleets. During implementation of the Current Regulation, some fleets altered forms by crossing out required regulatory language on the CARB forms, making their reporting ineffective under the Current Regulation and hindering CARB's ability to implement the reporting requirements, so this amendment is necessary to address this issue. Therefore, if a fleet submits a CARB form with cross-outs of pre-printed information to comply with its reporting requirement under the Off-Road Regulation, it will be as though those cross-outs were not made.

Purpose of Subsection 2449(g)(2)(A)

Staff proposes to make the following changes to this subsection:

1. Change "designee" to the phrase "designated official" throughout,

2. Deletes the word "thereof,"

3. Add the word "particular" in the phrase "This written statement designating the designated official must only be attached the first time a particular designated official signs the affirmation of reporting",

4. Change the word "new" to "different" in the phrase "If a new designee is appointed,"

5. Change "a new" to "the new," and

6. Change the phrase "these fleets" to "all of the fleets or fleet portions."

Rationale for Subsection 2449(g)(2)(A)

1. This amendment is necessary to clarify who the intended entity is that is being referenced in this section by using the defined term "designated official" rather than the more generic "designee."

2. This amendment is necessary to correct grammar to improve readability and reflect changes to the language necessitated by using the defined term "designated official" rather than the more generic "designee.".

3. This amendment is necessary to clarify that the first time any unique designated official signs the affirmation of reporting they must submit the written statement designating them as the designated official. The word "particular" ensures this applies to each unique designated official, which is necessary so CARB gets a new written statement each time a new designated official is appointed.

4. This amendment is necessary to correct the regulation's grammar, to improve readability.

5. This amendment is necessary to clarify that any change to a different designated official must be accompanied by another written statement by the responsible official and not only if the designated official is considered new. This is necessary to ensure CARB is appropriately notified when the designated official changes for any reason, even if it is changing back to a previous designated official, and to ensure the written statement is received by CARB in that situation.

6. This amendment is necessary to clarify that a designated official may submit a single affirmation for all fleets or fleet portions, which is the original intent of the language, but was ambiguous in the Current Regulation.

Purpose of Subsection 2449(g)(2)(C)

Staff proposes to add a requirement that when fleets report the hour meter readings of their low-use equipment, which is required under the Current Regulation, they now have to create a date-stamped photograph of the engine hour meter from the time the hour meter reading

is gathered and maintain the photograph in accordance with the recordkeeping requirements of the Current Regulation. This amendment also proposes flexibility where if a fleet does not have access to a camera, then the fleet can document the reading by creating a written log of the reading that includes the vehicle's EIN, the hour meter reading at the time it was gathered, and a signature on and date of the day that the hour meter reading was gathered in place of the date-stamped photograph. Such a log, if create, must also maintained in accordance with the recordkeeping requirements in section 2449(h).

Rationale for Subsection 2449(g)(2)(C)

This amendment is necessary to ensure the emissions reductions of the regulation are achieved and to improve CARB's ability to verify compliance with the regulation. The Current Regulation requires fleets to report engine-hour information for low-use vehicles, but this proposed amendment would require fleets to take and maintain records of photographs of the engine hour meter at the time of the reading, which can be used by CARB to verify that the fleet is utilizing the low-use provisions appropriately. This helps ensure that fleets are not using their low-use equipment beyond the limited annual hours that are required in the regulation, which could cause the release of additional harmful emissions. The flexibility for a fleet to use a written hour log in place of a photograph is necessary to provide a compliance pathway for fleets that may not have access to a camera; this ensures that any fleet will have the ability to comply with these requirements.

Purpose of Subsection 2449(g)(2)(C)1.

Staff proposes to add the subsection title "1. Year-by-Year Low-Use Vehicles Reporting Requirements."

Rationale for Subsection 2449(g)(2)(C)1.

This amendment is necessary to improve readability of the regulation, and to help separate out the year-by-year low-use and permanent low-use reporting requirements, for ease of understanding.

Purpose of Subsection 2449(g)(2)(C)1.b.

Staff proposes to add a provision stating that the year-by-year low-use option sunsets on January 1, 2024, meaning no year-by-year low-use vehicle reporting will be permitted on or after January 1, 2024.

Rationale for Subsection 2449(g)(2)(C)1.b.

This amendment is necessary to clarify that because the year-by-year low-use option sunsets on January 1, 2024 (the rationale for which is described in section 2449(e)(7)), the reporting for year-by-year low-use will not be needed after January 1, 2024, and thus CARB will not accept such reports. This makes reporting obligations more clear for the regulated community, and reduces CARB's burden of having to review unnecessary reporting.

Purpose of Subsection 2449(g)(2)(C)2.

Staff proposes to add the subsection title "2. Permanent Low-Use Vehicles Reporting Requirements."

Rationale for Subsection 2449(g)(2)(C)2.

This amendment is necessary to improve readability of the regulation, and to help separate out the year-by-year low-use and permanent low-use reporting requirements, for ease of understanding.

Purpose of Subsection 2449(g)(2)(C)2.a.

Staff proposes to make the following changes to this subsection:

1. Change the phrase "report one engine hour meter reading from on or before" to "report one engine hour meter reading that is taken within 30 days of" throughout, and

2. Establish low-use hour reporting requirements for fleets that elect to use the three-year rolling average proposed to be added to the permanent low-use option under these Proposed Amendments. This proposed amendment would require a fleet to report an hour meter reading on January 1 of the first year of the three-year period and an hour meter reading on December 31 of the third year of the three-year period, with flexibility to obtain the hour meter reading within 30 days before or after those specific dates.

Rationale for Subsection 2449(g)(2)(C)2.a.

1. This amendment is necessary to clarify what dates the hour meter readings are intended to be gathered. The Current Regulation only stated before January 1 and after December 31, which is ambiguous, because many dates could meet those requirements and the exact timing expected by CARB is unclear. Adding language specifying that the hour meter readings must be gathered within 30 days of those dates provides clarity to fleets that the January 1 and December 31 readings must be gathered no more than 30 days before January 1 and 30 days after December 31, respectively, which will ensure CARB receives data that is more accurate and useful for verifying compliance with the annual low-use provision.

2. This amendment is necessary to clarify for fleets what reporting is required to utilize the three-year rolling average that is being proposed to be added to the permanent low-use option under these Proposed Amendments. This amendment is also necessary to improve CARB's ability to verify compliance with the permanent low-use requirements, which ensures the emissions reductions of the regulation are achieved. The 30-day window to obtain the hour meter reading is necessary to provide fleets a more feasible compliance timeline, where requiring the fleet to obtain readings on one specific day could be difficult for fleets to do. Hour meter readings taken at both of those specific times are necessary to report in order to accurately calculate the average hour use over the three year time period.

Purpose of Subsection 2449(g)(2)(C)3.

Staff proposes to add the subsection title "3. Other Low-Use Reporting Requirements."

Rationale for Subsection 2449(g)(2)(C)3.

This amendment is necessary to improve the readability of the regulation by providing title language that would help a reader follow the regulation.

Purpose of Subsection 2449(g)(2)(C)3.b.

Staff proposes to establish reporting requirements for fleets where the hour meter on any permanent or year-by-year low-use vehicle in the fleet is replaced or altered. When this replacement or alteration is made, the fleet must report this change to CARB as part of its next engine hour reporting, and specify the date the alteration was made, the hour meter reading of the replaced meter at the time of the replacement, and the hour meter reading of the new meter at the time the reading is reported.

Rationale for Subsection 2449(g)(2)(C)3.b.

This amendment is necessary to improve CARB's ability to verify compliance with the low-use requirements of the Off-Road Regulation. It has been discovered that fleets have the ability to replace or alter the engine hour meter on their vehicles and when they would report annual hour information to CARB per the Current Regulation on low-use reporting, the information would have substantial discrepancies due to these replacements and alterations. This amendment resolves these implementation issues by requiring fleets to provide engine hour information related to the replacement or alteration, so CARB's reported information would no longer have discrepancies.

Purpose of Subsection 2449(g)(2)(C)4.

Staff proposes to add the subsection title "4. Agricultural Operations Reporting Requirements" and delete the section number "(2)".

Rationale for Subsection 2449(g)(2)(C)4.

This amendment is necessary to improve readability of the regulation by providing title language that would help a reader follow the regulation.

Purpose of Subsection 2449(g)(2)(D)

Staff proposes to establish reporting requirements related to compliance with the RD requirements that are proposed to be added in these Proposed Amendments. Fleets would have to submit, in their already-required annual reporting, an attestation that they are compliant with the RD requirements in section 2449.1(e).

Rationale for Subsection 2449(g)(2)(D)

Requiring the fleets to actively sign an attestation that they are compliant with the RD requirements provides CARB with additional verification tools to ensure fleets are compliant, ensuring achievement of the emissions reductions that come with the use of RD.

I. Section 2449(h) – Record Keeping

Purpose of Section 2449(h)(10)

Staff proposes to establish recordkeeping requirements specific to the RD requirements that are proposed to be added under these Proposed Amendments. This language requires each fleet to document its fuel purchases for each vehicle subject to the regulation in the fleet and requires the documents to demonstrate compliance with the proposed RD requirements. The language specifies that documentation could include documents such as receipts of fuel purchases and fueling contracts. The language also specifies that fleets must maintain these records for three calendar years from the date the transaction was completed, and must maintain the records in accordance with section 2449.1(e)(3), which is further language that is also proposed to be amended to define additional documentation that must be maintained when a fleet is unable to procure RD.

Rationale for Section 2449(h)(10)

This amendment is necessary to ensure the effectiveness of the proposed RD requirements by ensuring fleets comply with those requirements, which helps achieve the emissions reductions of the proposed RD amendments. This language also provides examples of acceptable documentation (receipts of fuel purchases and fueling contracts) fleets can use, among others, to demonstrate compliance with the RD requirements to provide additional clarity by describing specific documents that will meet the requirements of this section. However, using the terms "which could include" signals that this is not an exhaustive list, which allows fleets flexibility to submit other types of documentation that meet these same goals, which is necessary to ensure that a fleet that may not have one of the listed examples has a feasible pathway to meet these requirements. Lastly, maintaining the documents for three calendar years is necessary to ensure these documents can be used as an appropriate enforcement tool to verify compliance allowing CARB enough time to access the records while balancing the burden on prime contractors of having to keep the records.

Purpose of Section 2449(h)(11)

Staff proposes to extend the record retention requirements from January 1, 2030, to January 1, 2037, add the word "until," and add several commas.

Rationale for Section 2449(h)(11)

Extending the record retention requirements is necessary to ensure records are continued to be maintained through full implementation of the Proposed Amendments, which propose to have additional performance requirements through January 1, 2036. The word "until" and several commas are added to make the sentences grammatically correct, to improve readability.

J. Section 2449(i) – Contracting Requirements

Purpose of Section 2449(i)

Staff proposed to establish new contracting requirements that begin on January 1, 2024 applicable to prime contractors and public works awarding bodies.

Rationale for Section 2449(i)

Overall, these amendments are necessary to ensure all parties who are responsible for hiring fleets subject to the Off-Road Regulation only hire fleets that are compliant with the Off-Road Regulation. Requiring this of parties who have direct oversight over the fleets helps achieve the emission reductions of the Off-Road Regulation, increases compliance, maintains a level playing field for compliant vehicles conducting business in California, and reduces the monetary advantage of noncompliant fleets and vehicle owners that try to circumvent the requirements of the Off-Road Regulation. An implementation start date of January 1, 2024, was proposed because January 1, 2024 is the earliest date that the regulation could become effective under California law (if adopted and approved by OAL).

Purpose of Section 2449(i)(1)

Staff proposes to establish the requirement that, for projects involving the use of vehicles subject to the Off-Road Regulation, prime contractors and public works awarding bodies must obtain valid Certificates of Reported Compliance for each fleet they wish to select for the job and its listed subcontractors prior to entering into or renewing a contract with that fleet.

Rationale for Section 2449(i)(1)

This amendment is necessary to ensure that all parties that are responsible for hiring fleets subject to the Off-Road Regulation are checking that each fleet they are contracting with and its listed subcontractors have valid Certificates of Reported Compliance, which CARB issues annually to each compliant fleet, before hiring them, which helps prevent these parties from hiring fleets that are not compliant with the Off-Road Regulation (in conjunction with the requirements in section 2449(i)(2)). This amendment will thus help achieve the goals outlined in the rationale for section 2449(i).

Purpose of Section 2449(i)(2)

Staff proposes to prohibit prime contractors and public works awarding bodies from entering into a contract with a fleet where the prime contractor or public works awarding body, as applicable, did not first obtain valid Certificates of Reported Compliance for the fleet and its listed subcontractors before entering into or renewing a contract with that fleet.

Rationale for Section 2449(i)(2)

This amendment is necessary to make explicit that parties cannot enter into or renew contracts with fleets without first getting valid Certificates of Reported Compliance from the fleet and its listed subcontractors. This is necessary to ensure that all parties that are responsible for hiring fleets subject to the Off-Road Regulation are checking that each fleet

they are contracting with has a valid Certificate of Reported Compliance, which CARB issues annually to each compliant fleet, before entering into a new or renewed contract with them, which helps prevent these parties from hiring fleets that are not compliant with the Off-Road Regulation (in conjunction with the requirements in section 2449(i)(2)). This amendment will thus help achieve the goals outlined in the rationale for section 2449(i).

Purpose of Section 2449(i)(3)

Staff proposes to establish the requirement that all records prime contractors and public works awarding bodies collect to comply with the requirements in sections 2449(i) must be maintained for a minimum of three years after project completion. These records must also be provided to CARB within 5 business days of a request from CARB for the records.

Rationale for Section 2449(i)(3)

This amendment is necessary to clarify the timeframe for which prime contractors and public works awarding bodies must retain documents. Maintaining the documents for three calendar years is necessary to ensure these documents can be used as an appropriate enforcement tool to verify compliance, allowing CARB enough time to access the records while balancing the burden on prime contractors and public works awarding bodies of having to keep the records. Providing documents within 5 business days of CARB's request is necessary to ensure that CARB staff will receive critical documentation from the prime contractors and public works awarding bodies when performing audits or investigations but also provide time for prime contractors and public works awarding bodies to gather the necessary documents.

Purpose of Section 2449(i)(4)

Staff proposes to add an exemption from the contracting requirements in sections 2449(i)(1) through 2449(i)(3) for emergency operations projects on which vehicles are being operated solely for emergency operations. To use this exemption, prime contractors and public works awarding bodies must retain records that verify the vehicles were operated for emergency operations only. These records include documents that identify the nature and location of the emergency and an attestation that the vehicles were used for emergency operations only.

Rationale for Section 2449(i)(4)

This amendment is necessary to ensure that the contracting requirements allow the operation of vehicles needed for true emergency operations. Requiring records that verify emergency operations is necessary to ensure that CARB has the ability to verify that the operations were appropriately needed for emergency operations, and were used only for that purpose, so that no one tries to use this exemption to avoid compliance requirements. The list specifying what pieces of information are needed for prime contractors and public works awarding bodies to include in the records is necessary to provide enough information for CARB to reasonably conclude that the project was truly an emergency operation, that operations were appropriately needed for emergency operations, and that the vehicles were used on the project only for that purpose.

K. Section 2449(j) – Prime Contractor Requirements

Purpose of Section 2449(j)

Staff proposes to establish additional requirements applicable to prime contractors that begin on January 1, 2024.

Rationale for Section 2449(j)

Overall, these amendments are necessary to ensure that prime contractors are verifying compliance with the Off-Road Regulation and are taking additional steps beyond the contracting requirements in section 2449(i) to discourage noncompliance with the Off-Road Regulation. Applying verification compliance responsibilities to parties who have direct oversight over the fleets would expand CARB's ability to achieve compliance and ensure the emissions reductions of the regulation are achieved. This will also allow CARB to achieve its implementation goals more effectively, including maintaining a level playing field for compliant vehicles conducting business in California and reducing the monetary advantage of noncompliant fleets and vehicle owners that try to circumvent the requirements of the Off-Road Regulation. An implementation start date of January 1, 2024, was proposed because January 1, 2024 is the earliest date that the regulation could become effective under California law (if adopted and approved by OAL).

Purpose of Section 2449(j)(1)

Staff proposes to establish the requirement that a prime contractor must collect new Certificates of Reported Compliance between March 1 and June 1 of each year for each fleet with which the prime contractor has an ongoing contract as of March 1 of that year, and prohibit prime contractors from contracting around this requirement.

Rationale for Section 2449(j)(1)

This amendment is necessary to ensure that a prime contractor will check the Certificates of Reported Compliance for every fleet with which it is under contract, and ensure that every fleet is maintaining its compliance with the Off-Road Regulation, each year during which a fleet is continuing to do work for the prime contractor. This is necessary in addition to the initial Certificate check before contracting because a project may go over two or more years, and this ensures that a fleet does not cease to comply with the Off-Road Regulation after being hired. Between March 1 and June 1 of each year was selected because Certificates of Reported Compliance are issued to fleets after March 1 of each year and the time between March 1 and June 1 provides ample time for fleets to receive new certificates and provide them to the prime contractor. This amendment also helps achieve the goals outlined in the rationale for section 2449(j).

Purpose of Section 2449(j)(2)

Staff proposes to establish the requirement that a prime contractor can only allow fleets with valid Certificates of Reported Compliance on the job site.

Rationale for Section 2449(j)(2)

This amendment is necessary to ensure that prime contractors are not allowing noncompliant fleets to operate in the State, undermining CARB's ability to achieve the expected emission reductions of the Off-Road Regulation. This amendment also achieves the goals outlined in the rationale for section 2449(j).

Purpose of Section 2449(j)(3) and Subsections 2449(j)(3)(A) through (H)

Staff proposes to establish the requirement that if a prime contractor discovers that any fleet intending to operate vehicles subject to the regulation for the prime contractor does not have a valid certificate of reported compliance, or if the prime contractor observes any vehicle that is not compliant with the Off-Road Regulation on the prime contractor's job site, then the prime contractor must report specific information to CARB within five business days of making that discovery. This proposed amendment would also list the specific information that must be included in the report, which is:

1. The date on which the prime contractor discovered the fleet's lack of a valid Certificate of Reported Compliance or observed the noncompliant vehicle,

2. The fleet's Responsible Party name,

3. The fleet's business address,

4. The fleet's business email, if known,

5. The fleet's business phone number, if known,

6. The DOORS ID of the fleet, if known,

7. The location of the job site on which the fleet or the noncompliant vehicle is operating or had operated, if applicable, and

8. A statement specifying whether the fleet or vehicle is continuing to operate at the job site, if applicable.

Rationale for Section 2449(j)(3) and Subsections 2449(j)(3)(A) through (H)

This amendment is necessary to create an additional mechanism for CARB to become aware of and investigate situations in which fleets do not have valid Certificates of Reported compliance and in which vehicles are noncompliant, which is necessary to meet the goals outlined in the rationale for 2449(j). The phrase "intending to operate vehicles", for the purpose of this provision, is meant to capture fleets that seek a contract with a prime contractor and intend to work for the prime contractor, which is needed so CARB staff can be notified of situations in which a noncompliant fleet attempted to contract with a prime contractor and perform an appropriate investigation. This amendment is also necessary to clearly define every piece of information that a prime contractor must report to CARB under this requirement, so the prime contractors understand what is required to be reported. The five business day timeline for reporting was chosen to provide appropriate time for a prime contractor to gather the necessary information, in a short enough timeframe that CARB can begin investigating the situation quickly. This amendment is also necessary to meet the goals

outlined in the rationale for section 2449(j). Each piece of requested information is necessary for the following reasons:

1. To ensure CARB staff can verify when the prime contractor became aware of the issue and ensure the prime contractor reported the issue within five business days, per the requirement. This also allows CARB to determine when the violation may have taken place.

2. through 6. To ensure CARB staff can correctly identify and contact the fleet that did not have a valid certificate or had a noncompliant vehicle and conduct an appropriate investigation.

7. To ensure CARB staff know the location of the potential noncompliant operations so a field investigation or other appropriate action to implement and enforce the Off-Road Regulation can be performed, if necessary.

8. To ensure CARB staff know if the fleet is continuing to operate in potential noncompliance which will help CARB staff decide if a field investigation or other appropriate action to implement and enforce the Off-Road Regulation is warranted.

Purpose of Section 2449(j)(4)

Staff proposes to establish the requirement that prime contractors must immediately disclose to CARB the name and contact information of each responsible party for all vehicles subject to the regulation that is operating at the job site or for the prime contractor.

Rationale for Section 2449(j)(4)

This amendment is necessary to ensure that CARB staff will receive critical information related to responsible parties from the prime contractors when performing inspections at job sites operating vehicles subject to the Off-Road Regulation, so that CARB work implementing and enforcing the Off-Road Regulation is effective. This amendment is also necessary to meet the goals outlined in the rationale for section 2449(j).

Purpose of Section 2449(j)(5)

Staff proposes to establish the requirement that a prime contractor must post a sign on their job site that displays information about the applicability of the Off-Road Regulation, a description of key requirements of the Off-Road Regulation, and a description of the method and information needed to notify CARB when noncompliance is observed. This proposed amendment would also establish the requirements of where the sign must be posted and guidance on the physical requirements of the sign. There is also a proposed exemption for projects that last seven or fewer calendar days. The sign also includes a list of what information must be reported when noncompliance is observed, which is:

1. The name of the party that is responsible for the vehicle that was observed to be noncompliant;

2. The Business's name;

3. The job site location (including address, city, and Zip, or coordinates);

4. The following information for the vehicle that was observed to be noncompliant: EIN, if observed, a description of the vehicle type if the EIN is unknown, and photos of the vehicle, where possible; and

5. A description of the noncompliance that was observed.

Rationale for Section 2449(j)(5)

This amendment is necessary to provide information to employees and the public at each job site about what would be considered noncompliant with the Off-Road Regulation, to encourage these entities to report to CARB when they observe noncompliance, in order to increase compliance and achieve the Off-Road Regulation's emissions reductions. Requiring a sign that lists noncompliant behavior and a description of how to report this to CARB will result in the public being better informed of the Off-Road Regulation, so there will be a higher likelihood that noncompliance will be reported to CARB because there is a greater chance that someone from the public will observe the noncompliance, realize they are seeing a noncompliance, and know how to report this to CARB. This amendment would also achieve the goals outlined in the rationale for section 2449(j).

The detailed description of the physical requirements of the sign and the location the sign must be posted is necessary to clearly define what the prime contractor must do in order to comply with this requirement and makes it likelier that people will see the information more easily.

An exemption is proposed for projects that last seven or fewer calendar days to limit the burden on prime contractors in situations where the sign would only be posted for a short amount of time and likely achieve fewer benefits as a result of the short time period.

Each proposed piece of requested information in the report is necessary for the following reasons:

1. and 2. To ensure CARB staff can correctly identify and contact the fleet that was potentially operating a noncompliant vehicle and conduct an appropriate investigation or other appropriate action to implement and enforce the Off-Road Regulation.

3. To ensure CARB staff know the location of the potential noncompliant operations so a field investigation or other appropriate action to implement and enforce the Off-Road Regulation can be performed if necessary.

4. To ensure CARB can correctly identify the vehicle or vehicles that were observed to be noncompliant by the prime contractor.

5. To ensure CARB staff understand what potential noncompliance was observed so they can target their efforts appropriately and more effectively investigate the issue or take other appropriate action to implement and enforce the Off-Road Regulation.

L. Section 2449(m) – Penalties

Purpose of Section 2449(m)

Staff proposes to add sections 43027, 43028, 43029, and 43030 of the Health and Safety Code to the list of sections for civil penalties.

Rationale for Section 2449(m)

This proposed amendment is necessary because it updates the civil penalty provisions to include additional provisions that may apply to violations of the Off-Road Regulation, and reflects penalties that could be applicable to additional violations possible under the Proposed Amendments.

M. Section 2449(n) – CARB Certificate of Reported Compliance

Purpose of Section 2449(n)

Staff proposes to add the word "that" in the sentence "...if the report and affirmation indicate 'that' the fleet is in compliance..."

Rationale for Section 2449(n)

This amendment is necessary to make the sentence more grammatically correct, so it is clear.

N. Note on Authority Cited in Section 2449

Purpose of Authority and Reference for Section 2449

Staff proposes to add Health and Safety Code sections 39003, 39602.5, 39730.8(c), and 43600, and Government Code section 11400.20 to the list of authorities for California Code of Regulations, title 13, section 2449. Staff also proposes to add Health and Safety Code sections 39000, 39003, 39602.5, 39730.8(c), 43600, 43865, and 43866, and Government Code section 11400.20 to the list of references for California Code of Regulations, title 13, section 2449.

Rationale for Authority and Reference for Section 2449

Staff proposes to add these sections to the list of authorities for section 2449 because they, in addition to the authorities already listed in the Current Regulation, provide implied or explicit authority for CARB to adopt these Proposed Amendments. Section 39003 states that CARB is responsible for attaining and maintaining the NAAQS, researching causes of and solutions to air pollution, and for attacking the serious problems caused by motor vehicles, which gives CARB implied authority to regulate motor vehicles that affect air quality in the State, like off-road vehicles. Section 39002 provides that CARB is responsible for the control of vehicular sources, of which off-road vehicles are one and which these Proposed Amendments would do. Section 39602.5 requires CARB to adopt rules and regulations to achieve the federal NAAQS, and these Proposed Amendments are one of the regulations that will help achieve the emission reductions needed for California to meet the PM and

ozone NAAQS. Section 39730.8(c) requires CARB to "consider and, as appropriate, adopt policies and incentives to significantly increase the sustainable production and use of renewable gas," giving CARB explicit authority to adopt the RD provisions proposed as part of this rulemaking. Section 43600 requires CARB to adopt and implement necessary and technologically feasible emission standards for used motor vehicles to control their emissions, giving CARB explicit authority to adopt the Off-Road Regulation, which include emission standards for in-use off-road vehicles. Finally, Government Code section 11400.20 allows agencies to adopt interim or permanent regulations to govern an adjudicative proceeding under Government Code sections 1400 et seq. And 1500 et seq., which gives CARB additional authority to adopt the proposed administrative hearing procedures in section 2449.1(e)(8).

Staff proposes to add these sections to the list of references for section 2449 because they, in addition to the references already listed in the Current Regulation, provide additional background or related information about CARB's authority to adopt, and the need for, these Proposed Amendments.

O. Section 2449.1 – Performance Requirements

Purpose of Section 2449.1

Staff proposes to add language stating that each fleet must comply with the tier phase-out requirements in section 2449.1(c) and the RD requirements in section 2449.1(e), both of which begin on January 1, 2024.

Rationale for Section 2449.1

This amendment is necessary to reinforce the additional requirements being added under the Proposed Amendments. This section previously only said fleets must comply with (a) and (b), so this language makes it abundantly clear that fleets now have additional requirements in the specified sections. This amendment is necessary because it maintains consistency with the Current Regulation by mirroring the structure of listing the general performance requirements at the beginning of section 2449.1.

P. Section 2449.1(b) – BACT Requirements

Purpose of Subsection 2449.1(b)(3)(C)

Staff proposes to remove the existing section 2449.1(b)(3)(C) from the regulation, and re-letter the existing 2449.1(b)(3)(D) as 2449.1(b)(3)(C).

Rationale for Subsection 2449.1(b)(3)(C)

This amendment is necessary to remove a section that is no longer valid and that had unintended consequences as part of the Current Regulation. The original language was developed under the assumption that VDECS technology would be more prevalent after the Current Regulation was adopted, so this language would have allowed vehicles that did not have the highest-level VDECS available to continue operating in small fleets. After adopting

the Current Regulation, VDECS technology did not develop as expected and, therefore, this language does not have the intended result because a fleet could potentially abuse this language to not take actions under the Off-Road Regulation which would prevent emission reductions from being achieved. Because of this, the language is being removed. The re-lettering is necessary to reflect that (C) is being removed, while keeping the successive lettering convention.

Purpose of Subsection 2449.1(b)(3)(E)

Staff proposes to add the word "the" before the word "time" in two places, and to re-letter the existing 2449.1(b)(3)(E) as 2449.1(b)(3)(D).

Rationale for Subsection 2449.1(b)(3)(E)

This amendment is necessary for correct grammar, to improve readability. The re-lettering is necessary to reflect that (C) is being removed and (D) re-lettered, while keeping the successive lettering convention.

Purpose of Subsection 2449.1(b)(11)(A)1.

Staff proposes to add two commas in the phrase "If, in an applicable compliance year, no BACT credit.".

Rationale for Subsection 2449.1(b)(11)(A)1.

This amendment is necessary for correct grammar, to improve readability.

Purpose of Subsection 2449.1(b)(11)(A)3.

Staff proposes to change "towards" to "to" and delete the word "for."

Rationale for Subsection 2449.1(b)(11)(A)3.

These amendments are necessary for correct grammar, to improve readability.

Purpose of Section 2449.1(b)(14)

Staff proposes to add "2449.1(b)" to the subsection references in the text for subsections 2449.1(b)(16) and 2449.1(b)(13).

Rationale for Section 2449.1)(b)(14)

This amendment is necessary because adding "2449.1(b)" in front of the subsection references matches the style of the Current Regulation which includes the regulation's section number before each subsection reference.

Q. Section 2449.1(c) – Tier Phase-Out Requirements

Purpose of Section 2449.1(c)

Staff proposes to establish that all fleets must comply with the tier phase-out requirements detailed in subsequent sections, and describes that special provision vehicles must be

designated as such by December 31 of the year prior to the tier phase-out's effective date for that vehicle and fleet.

Rationale for Section 2449.1(c)

Overall, these amendments are necessary to achieve additional emissions reductions beyond the reductions achieved via the Current Regulation. This section describes the requirements and implementation timing of phasing out the Tier 0, 1, and 2 engines, and this strategy was selected because it achieves necessary emissions reductions in a cost-effective way that is easier to implement and enforce compared to other alternatives. The description related to special provision vehicles is necessary to ensure CARB and the fleet can accurately assess the compliance of these vehicles with respect to the tier phase-out.

Purpose of Section 2449.1(c)(1)

Staff proposes to add the subsection title "(1) Tier Phase-Out for Large Fleets".

Rationale for Section 2449.1(c)(1)

This amendment is necessary to improve readability of the regulation by providing title language that would help a reader follow the regulation.

Purpose of Section 2449.1(c)(1)(A) through (C)

Staff proposes to establish the implementation timing of the tier phase-out requirements for large fleets, which is January 1, 2024, for Tier 0 and MY 1994 or earlier on-road engines, January 1, 2026, for Tier 1 and MY 1999 or earlier on-road engines, and January 1, 2028, for Tier 2 and MY 2003 or earlier on-road engines.

Rationale for Section 2449.1(c)(1)(A) through (C)

This amendment is necessary to establish the dates by which certain equipment will no longer be allowed to operate in California, to achieve the emissions reductions goals outlined in the rationale for section 2449.1(c). The specific years for implementation were selected to gradually phase in the requirements while ensuring that all the tier phase-out requirements would be fully implemented by all fleet sizes by 2032 to meet the additional emission reductions goals outlined in the Proposed 2022 State SIP Strategy. The large fleet Tier phase out schedule is earlier than other fleet sizes because the Current Regulation's fleet average target requirements are earlier for large and medium fleets compared to small fleets, so including requirements for large fleets first is consistent with the timing of implementation of the Current Regulation. Large fleet's final fleet average target is on January 1, 2023, so that is why the tier phase-out requirements were chosen to begin on January 1, 2024, to start implementation after this date and because January 1, 2024, is the earliest date that the regulation could become effective under California law (if adopted and approved by OAL).

Purpose of Section 2449.1(c)(2)

Staff proposes to add the subsection title "(2) Tier Phase-Out for Medium Fleets".

Rationale for Section 2449.1(c)(2)

This amendment is necessary to improve readability of the regulation by providing title language that would help a reader follow the regulation.

Purpose of Section 2449.1(c)(2)(A) through (C)

This amendment establishes the implementation timing of the tier phase-out requirements for medium fleets, which is January 1, 2026, for Tier 0 and MY 1994 or earlier on-road engines, January 1, 2028, for Tier 1 and MY 1999 or earlier on-road engines, and January 1, 2030, for Tier 2 and MY 2003 or earlier on-road engines.

Rationale for Section 2449.1(c)(2)(1)(A) through (C)

This amendment is necessary to establish the dates by which certain equipment will no longer be allowed to operate in California, to achieve the emissions reductions goals outlined in the rationale for section 2449.1(c). The specific years for implementation were selected to gradually phase in the requirements while ensuring that all the tier phase-out requirements would be fully implemented by all fleet sizes by 2032 to meet the additional emission reductions goals outlined in the Proposed 2022 State SIP Strategy. The medium fleet Tier phase out schedule is between large and small fleet sizes because although the Current Regulation's fleet average target requirements are earlier for large and medium fleets compared to small fleets, CARB staff believes medium fleets may require additional time to plan for compliance with the tier phase-out requirements compared to large fleets, so their phase in schedule is two years after large fleets. The necessary emission reductions will still be achieved while allowing this two-year delay compared to large fleets.

Purpose of Section 2449.1(c)(3)

Staff proposes to add the subsection title "(3) Tier Phase-out for Small Fleets".

Rationale for Section 2449.1(c)(3)

This amendment is necessary to improve readability of the regulation by providing title language that would help a reader follow the regulation.

Purpose of Section 2449.1(c)(3)(A) through (C)

Staff proposes to establish the implementation timing of the tier phase-out requirements for small fleets, which is January 1, 2028, for Tier 0 and MY 1994 or earlier on-road engines, January 1, 2030, for Tier 1 and MY 1999 or earlier on-road engines, and January 1, 2032, for Tier 2 and MY 2003 or earlier on-road engines.

Rationale for Section 2449.1(c)(3)(A) through (C)

This amendment is necessary to establish the dates in which certain equipment will no longer be allowed to operate in California, to achieve the emissions reductions goals outlined in the rationale for section 2449.1(c). The specific years for implementation were selected to gradually phase in the requirements while ensuring that all the tier phase-out requirements would be fully implemented by all fleet sizes by 2032 to meet the additional emission reductions goals outlined in the Proposed 2022 State SIP Strategy. The small fleet Tier phase

out schedule is later than other fleet sizes because the Current Regulation's fleet average target requirements are later for small fleets compared to large and medium fleets, so including requirements for small fleets last is consistent with the timing of implementation of the Current Regulation. Small fleet's final fleet average target is on January 1, 2028, so that is why the tier phase-out requirements were chosen to begin on January 1, 2028, to start implementation on this date.

Purpose of Section 2449.1(c)(4)

Staff proposes to establish the requirement that, beginning January 1, 2036, fleets shall not be able to operate vehicles with Tier 0 engines or MY 1994 or earlier on-road engines as permanent low-use or jobs corps vehicle.

Rationale for Section 2449.1(c)(4)

This amendment is necessary to ensure that the highest polluting engines are not allowed to operate even in a limited capacity as a permanent low-use vehicle or as a jobs corps vehicle. This amendment helps achieve the emissions reductions goals outlined in the rationale for section 2449.1(c). January 1, 2036 is proposed in order to provide ample time for fleets to make adjustments to accommodate the removal of these vehicles and in order to provide additional emission reductions specifically in support of the 2037 midterm attainment years for NAAQS for ozone and PM2.5.

Purpose of Section 2449.1(c)(5)

Staff proposes to establish a more lenient implementation timing for the tier phase-out of Tier 2 engines and MY 2003 or earlier on-road engines for fleets that are 500 hp or less. Instead of implementing this phase-out on January 1, 2032, fleets that are 500 hp or less must comply on January 1, 2036, if they comply with the requirements in 2449(e)(16).

Rationale for Section 2449.1(c)(5)

This amendment is necessary to provide the smallest fleets subject to the Off-Road Regulation with additional time to comply with the Tier 2 phase-out, which gives them more time to plan their fleet purchasing decisions into the future, as well as potentially have a cheaper compliance cost in 2036 due to having additional used equipment options available at that time, because they have the most need for this additional flexibility than all the other fleets subject to the Off-Road Regulation. Additionally, under the Current Regulation, these fleets can comply with the optional compliance schedule for ultra-small fleets, which provides flexibility for these fleets to comply with the Current Regulation by phasing in Tier 2 or higher vehicles between 2019 and 2029. By January 1, 2029 these fleets must operate 100 percent Tier 2 or higher vehicles. This proposed amendment allows them to continue to operate those Tier 2 vehicles purchased to comply with this flexibility provision beyond what is allowed for small fleets.

R. Section 2449.1(d) – Delay of Tier Phase-outs for Addition of Zero-Emission Vehicles

Purpose of Section 2449.1(d)

Staff proposes to establish voluntary requirements that provide flexibility by delaying the tier phase-out requirements outlined in section 2449.1(c) when a fleet adopts zero-emission technology. Specifically, a fleet is allowed to continue to operate a vehicle with a Tier 1 or Tier 2 engine for two additional years after the tier phase-out date when a similar zero-emission vehicle is added to the fleet after January 1, 2024, if the specified conditions are met, as discussed below.

Rationale for Section 2449.1(d)

This amendment is necessary to encourage fleets to adopt zero-emission technology by providing additional compliance flexibility to that fleet. The need to support deployment of zero-emission technology is described in more detail in Chapter III, and this amendment is necessary to address this need. The flexibility of operating a vehicle with a Tier 1 or Tier 2 engine two additional years was the selected strategy because it provides fleets a few extra years to keep the older vehicle as a backup while testing out the ability of the zero-emission vehicle to meet their needs, but also ensures that after the two years of flexibility, the higher polluting vehicles will still be removed from operation. Two years flexibility was chosen because it provides an appropriate balance between the benefit to fleets described above with the need to remove the higher polluting vehicles from operation.

Purpose of Section 2449.1(d)(1) and Subsections 2449.1(d)(1)(A) through (F)

Staff proposes to establish the list of requirements a fleet's zero-emission vehicle must meet in order for the fleet to use the addition of the zero-emission vehicle for compliance flexibility, as allowed by 2449.1(d). The proposed requirements are that the zero-emission vehicle is performing work equivalent to that of a vehicle that is subject to the regulation and similar to the vehicle with the Tier 1 or Tier 2 engine that is receiving the compliance flexibility, that the zero-emission vehicle is compliant with the regulation, and that the zero-emission vehicle is added to the fleet prior to the date in which the fleet is seeking compliance flexibility.

Rationale for Section 2449.1(d)(1) and Subsection 2449.1(d)(1)(A) through (F)

This amendment is necessary to ensure that the zero-emission vehicle is replacing the work of a diesel equivalent and therefore reducing the emissions of the diesel fleet, the zero-emission vehicle is replacing a similar Tier 1 or Tier 2 vehicle to meet the intent of the flexibility described in the rationale for section 2449.1(d), the zero-emission vehicle is compliant with the regulation so it is properly reported and allowed to operate, and the zero-emission vehicle is added before the compliance date the fleet is seeking flexibility for so the fleet properly receives the flexibility before they become noncompliant.

Purpose of Section 2449.1(d)(2) and Subsections 2449.1(d)(2)(A) through (L)

Staff proposes to establish the list of zero-emission vehicle information that must be reported to CARB to use the compliance flexibility described in 2449.1(d), and specifies that the report must be submitted to CARB by December 31 of the year prior to the year in which the tier phase-out for which the fleet is seeking compliance flexibility will take effect.

Rationale for Section 2449.1(d)(2) and Subsections 2449.1(d)(2)(A) through (L)

This amendment is necessary to ensure CARB receives data to track utilization of the requirements, and to determine compliance with the regulation. Each piece of data requested is necessary to confirm that the fleet is eligible for, and complying with, the tier phase-out compliance flexibility. The report must be submitted by December 31 of the year prior to the year in which the tier phase-out will take effect in order to ensure CARB can properly track the compliance flexibility before the fleet would otherwise be noncompliant with the tier phase-out requirement.

Purpose of Section 2449.1(d)(3)

Staff proposes to establish the requirement that a fleet must verify that the information provided under section 2449.1(d)(2) is accurate on an annual basis, and a fleet must annually report any changes to that information in accordance with the annual reporting requirement in section 2449(g)(2).

Rationale for Section 2449.1(d)(3)

This amendment is necessary to ensure CARB has accurate information on the ZEVs reported under section 2449.1(d)(2) and, if any changes occur, then CARB will be notified during the annual reporting process, in order to track utilization with the requirements and confirm that each fleet using the flexibility is eligible for, and complying with, the tier phase-out compliance flexibility. CARB selected annual reporting so that it coincides with existing reporting timelines, reducing the reporting burden on fleets.

Purpose of Section 2449.1(d)(4)

Staff proposes to establish the requirement that a fleet must designate the specific vehicle with a Tier 1 or Tier 2 engine for which it would like to receive the compliance flexibility, and that the fleet must do this before the tier phase-out requirement takes effect for that vehicle. This language also specifies that the fleet cannot designate a vehicle with a Tier 1 or Tier 2 engine to receive the compliance flexibility unless it was reported in the fleet prior to January 1, 2023, in order to be eligible for the compliance flexibility.

Rationale for Section 2449.1(d)(4)

This amendment is necessary to ensure CARB properly tracks which vehicles are receiving compliance flexibility and to ensure the compliance flexibility is appropriately implemented. The language specifying that the vehicle must have already been reported in the fleet prior to January 1, 2023, is necessary to provide certainty that the zero-emission vehicle is providing compliance flexibility for a vehicle that was already operating in the fleet prior to the tier phase-out requirements going into effect.

S. Section 2449.1(e) – Alternate Compliance Pathway for Transition to Zero-Emission

Purpose of Section 2449.1(e)

Staff proposes to establish an alternate compliance pathway for fleets that commit to transitioning a large percentage of their fleet to zero-emission operations. It proposes to state that a fleet may request to follow the requirements outlined in this section 2449.1(e), and if the fleet meets these requirements, then that fleet does not need to comply with the requirements in sections 2449.1(a), (b), and (c). It also proposes to state that if a fleet requests to use the pathway in section 2449.1(e), but at any point does not meet the requirements of section 2449.1(e), then the fleet must come into compliance with the requirements in sections 2449.1(a), (b), and (c) by January 1 of the subsequent calendar year.

Rationale for Section 2449.1(e)

This amendment is necessary to encourage fleets to adopt zero-emission technology by providing additional compliance flexibility to the fleets that do. The need to support deployment of zero-emission technology is described in more detail in Chapter III, and this amendment is necessary to address this need. The flexibility provided in this section is different than in section 2449.1(d) in that a fleet would no longer need to meet the requirements in section 2449.1(a), (b), and (c) if they meet the specified requirements. The requirements for participation in section 2449.1(e) are substantial but provide more flexibility to the fleet. The goal of this amendment is to provide a compliance pathway for a fleet that would rather invest its resources in a significant fleet-wide transition to zero-emission operations, which will require a substantial amount of time, effort, and monetary investment by the fleet, in place of following the compliance path set forward in sections 2449(a), (b), and (c).

The backstop requirement stating that if a fleet does not meet the requirements of section 2449.1(e) then they must come into compliance with section 2449.1(a), (b), and (c) is necessary to ensure that a fleet that is no longer meeting the requirements in 2449.1(e), and is therefore no longer appropriately utilizing the alternate pathway, comes into compliance with the other pieces of the regulation to ensure the emissions reductions associated with those provisions are achieved in the absence of the fleet successfully transitioning to a minimum of 50 percent zero-emission operations. January 1 of the subsequent year was selected to provide adequate time for the fleet to take actions to come into compliance with sections 2449.1(a), (b), and (c) and to align with the compliance dates of those requirements.

Purpose of Section 2449.1(e)(1) and Subsection 2449.1(e)(1)(A), (B), and (C)

Staff proposes to establish the base requirements for a fleet to be eligible to request the alternate compliance pathway for transitioning to zero-emission. These requirements include being in compliance with sections 2449 and 2449.1(a), (b), (c), and (f) at the time of the request to comply using this alternate compliance pathway, maintaining compliance with 2449 and 2449.1(f), and committing to complete the ZETA project.

Rationale for Section 2449(e)(1) and Subsections 2449.1(e)(1)(A), (B), and (C)

This amendment is necessary to ensure that only fleets who are currently in compliance with the regulation are allowed to request and use this flexibility. It is also necessary to clarify that even when using this alternate compliance pathway, a fleet must still meet the general requirements in section 2449 and the RD requirements in 2449.1(f). Fleets are not given an exemption from the RD requirements in 2449.1(f) because the intended flexibility is focused on the capital cost and planning efforts related to the replacement of vehicles, and because there are substantial near-term emissions reductions that can still be achieved at a minimal cost for fleets when using RD for the diesel vehicles that continue to operate in the fleet. The fleet must also commit to completing the ZETA project in order to affirm that the fleet understands their requirements involved with utilizing the alternate compliance pathway detailed in section 2449.1(e). Requiring the fleets to actively attest that they will complete the ZETA project provides CARB with additional verification tools to ensure fleets are compliant, ensuring achievement of the emission reductions that come with the ZETA project.

Purpose of Section 2449.1(e)(2)

Staff proposes to establish requirements for the Zero-Emission Transition Application (ZETA), which is the application a fleet would have to submit to CARB in order to request and use the compliance flexibility described in section 2449(e) above. A fleet would also be required to complete the ZETA project as described in their application.

Rationale for Section 2449.1(e)(2)

This amendment is necessary to clearly define what must be submitted to CARB in order to utilize the alternate compliance pathway, as well as to ensure fleets understand that if they participate in this alternate path, they will be required to follow through on what they submit in their ZETA. The ZETA must be submitted to CARB in order to provide CARB with an additional verification tool to ensure the fleets qualify for the alternate compliance pathway and will follow through on their commitment, which is necessary to ensure achievement of the emission reductions that come with the ZETA project.

Purpose of Section 2449.1(e)(2)(A)

Staff proposes to establish that the ZETA must include a description of the actions the fleet will take in order to transition to zero-emission operations and in what timeframe. It also specifies that, at a minimum, the fleet must remove at least 50 percent of the fleet's total hp and replace it with either ZEVs or technology that creates zero combustion emissions at the job site by January 1, 2035.

Rationale for Section 2449.1(e)(2)(A)

This amendment is necessary to ensure that the ZETA will provide CARB staff with the necessary information to understand the actions being taken by the fleet, in order to ensure the fleet is appropriately eligible for this alternate compliance pathway. The fleet's actions are necessary to transition the fleet to zero-emission operations which is the desired outcome of this alternate compliance pathway and which achieves emission reductions. The actions of

the fleet are allowed to be developed by the fleet because transitioning to zero-emission operations is a unique and complex process for each fleet and it is necessary to allow each fleet the flexibility to decide what transitional actions will work for their operations while still meeting the minimum goal of 50 percent turnover to zero-emission operations.

It is also necessary to include a detailed description of the fleet's proposed actions in the ZETA, because the fleet will be required to complete these actions and it is critical to ensure that the fleet's commitments are clear and ensure CARB has this information as a verification tool to ensure the fleet qualifies for the alternate compliance pathway and will follow through on their commitment. The minimum of 50 percent fleet turnover is necessary to ensure the goal of having a fleet make a significant fleet wide transition to zero-emission operations is achieved. CARB staff believes 50 percent is an appropriate balance between what is feasible and what is something that is truly transitional for a fleet's operations, which is the goal of this alternate compliance pathway. January 1, 2035, was selected as the final date to implement a ZETA project because the Governor's EO N-70-20 highlights the need for the off-road sector to move to zero-emission operations by 2035, so requiring these projects be complete by that timeframe helps achieve this goal by incentivizing more fleets to turn over to zero-emissions by 2035.

Purpose of Section 2449.1(e)(2)(B)

Staff proposes to add a requirement that the ZETA include a list of all vehicles, including EINs, that will be removed from operation.

Rationale for Section 2449.1(e)(2)(B)

This amendment is necessary to ensure that the ZETA will provide CARB staff with the necessary information to understand the actions being taken by the fleet in order to appropriately use this alternate compliance pathway, and to ensure that a minimum of 50 percent of the fleet's total hp is replaced with either ZEVs or zero-emission technology.

Purpose of Section 2449.1(e)(2)(C)

Staff proposes to add this provision, requiring that the ZETA must include a list of ZEVs that the fleet proposes to add to its fleet, including each vehicle's manufacturer and model, if known, or a detailed description of the technology with which the fleet proposes to replace the diesel vehicles.

Rationale for Section 2449.1(e)(2)(C)

This amendment is necessary to ensure that the ZETA will provide CARB staff with the necessary information to understand the actions being taken by the fleet, in order to ensure the appropriate use of this alternate compliance pathway in a way that meets the requirements and achieves the needed emissions reductions.

Purpose of Section 2449.1(e)(2)(D)

Staff proposes to add this provision, requiring that the ZETA include an attestation that the fleet meets and agrees to all eligibility requirements outlined in section 2449.1(e)(1).

Rationale for Section 2449.1(e)(2)(D)

This amendment is necessary to ensure fleets are complying with the eligibility requirements of this provision. Requiring the fleets to actively attest that they meet the ZETA requirements provides CARB with additional verification tools to ensure fleets are compliant, ensuring achievement of emission reductions.

Purpose of Section 2449.1(e)(2)(E)

Staff proposes to add this provision, requiring that the ZETA must include a list of all known entities that the fleet plans to partner with to complete its ZETA project, as well as a description of the role that entity will have in the fleet's ZETA project.

Rationale for Section 2449.1(e)(2)(E)

This amendment is necessary to ensure that the ZETA will provide CARB staff with the necessary information to understand the actions being taken by the fleet in order to appropriately use this alternate compliance pathway. This particular information is needed to provide CARB staff with additional verification tools to ensure the fleet is adequately prepared to complete their ZETA project, where ensuring a fleet follows through on their ZETA project is necessary to achieve the emission reductions associated with the ZETA project.

Purpose of Section 2449.1(e)(2)(F)

Staff proposes to add this provision, requiring that the ZETA must include a description of the total power need or other fueling needs of the -ZEVs or technology, as necessary, to complete the ZETA project.

Rationale for Section 2449.1(e)(2)(F)

This amendment is necessary to ensure that the ZETA will provide CARB staff with the necessary information to understand the actions being taken by the fleet in order to appropriately use this alternate compliance pathway. This particular information is needed to provide CARB staff with additional verification tools to ensure the fleet is adequately prepared to complete their ZETA project, where ensuring a fleet follows through on their ZETA project is necessary to achieve the emission reductions associated with the ZETA project.

Purpose of Section 2449.1(e)(2)(G) and Subsections 2449.1(e)(2)(G)1. through 10.

Staff proposes to add this provision, requiring that the ZETA must include a detailed list of milestones and expected completion dates for implementing the actions the fleet will take in order to transition to zero-emission operations. This amendment would also include a detailed list of each milestone that must be included, which is:

1. Identification of all permits necessary to achieve completion of the ZETA, if applicable,
2. Submission of permit applications identified above, if applicable,
3. Approval of permit applications identified above, if applicable,

4. Utility or other fueling infrastructure engagement, including a report on power quality from the utility if the project includes the need for electric vehicle supply equipment,

5. Entering contracts or other agreements with technology providers or other partners,

6. Making vehicle purchase orders,

7. Vehicle deployments,

8. Start of infrastructure installation,

9. Completion of infrastructure installation, and

10. Removal of diesel vehicles from fleet operations

Rationale for Section 2449.1(e)(2)(G) and Subsections 2449.1(e)(2)(G)1. through 10.

This amendment is necessary to ensure that the ZETA will provide CARB staff with the necessary information to understand the actions being taken by the fleet in order to appropriately use this alternate compliance pathway. It is also necessary to include these milestones, as they play a critical role in the implementation of the ZETA projects as well as CARB's review of the annual updates that are required to be submitted by the fleets. The list of each milestone that must be included is necessary to clearly define what is expected to be submitted by the fleets. The necessity for each milestone is:

1. through 3. To ensure all permitting is considered, planned for, and completed in the ZETA, which is needed to successfully complete the ZETA project. This information is also necessary to submit to CARB so progress towards completion of the ZETA project can be tracked though the annual updates that are required (the rationale for which is described in section 2449.1(e)(2)(H)2. below).

4. To ensure the utility or fueling needs of the ZETA project have been considered and are included in the ZETA, which is needed to successfully complete the ZETA project. This information is also necessary to submit to CARB so progress towards completion of the ZETA project can be tracked though the annual updates that are required (the rationale for which is described in section 2449.1(e)(2)(H)2. below).

5. To ensure the fleet has plans to work with other entities as necessary to successfully complete the ZETA project. This information is also necessary to submit to CARB so progress towards completion of the ZETA project can be tracked though the annual updates that are required (the rationale for which is described in section 2449.1(e)(2)(H)2. below).

6. and 7. To ensure zero-emission vehicles are purchased and deployed, which is needed to successfully complete the ZETA project. This information is also necessary to submit to CARB so progress towards completion of the ZETA project can be tracked though the annual updates that are required (the rationale for which is described in section 2449.1(e)(2)(H)2. below).

8. and 9. To ensure the infrastructure needs have been considered, planned for, and completed in the ZETA, which is needed to successfully complete the ZETA project. This information is also necessary to submit to CARB so progress towards completion of the ZETA

project can be tracked though the annual updates that are required (the rationale for which is described in section 2449.1(e)(2)(H)2. below).

10. To ensure the diesel vehicles are removed from operation, which is needed to ensure the emission reductions associated with the ZETA project are achieved. This information is also necessary to submit to CARB so progress towards completion of the ZETA project can be tracked though the annual updates that are required (the rationale for which is described in section 2449.1(e)(2)(H)2. below).

Purpose of Section 2449.1(e)(2)(H) and Subsection 2449.1(e)(2)(H)1.

Staff proposes to add this provision, requiring that the ZETA include a commitment that the fleet will replace all Tier 0, 1, and 2 vehicles by the end of completion of the ZETA project, or by January 1, 2035, whichever occurs first

Rationale for Section 2449.1(e)(2)(H) and Subsection 2449.1(e)(2)(H)1.

This amendment is necessary to ensure that by the time the ZETA project is completed, at a minimum, the Tier 0, 1, and 2 vehicles are removed from the fleet. This is needed as a backstop to ensure the emission reductions attributed to the removal of these vehicles is achieved by 2035 as part of this alternate compliance pathway, which is needed to achieve the emission reductions of the Proposed Amendments. January 1, 2035, was selected as the final date to implement a ZETA project because the Governor's EO N-70-20 highlights the need for the off-road sector to move to zero-emission operations by 2035, so requiring these projects be complete by that timeframe helps achieve this goal by incentivizing more fleets to turn over to zero-emissions by 2035.

Purpose of Subsection 2449.1(e)(2)(H)2.

Staff proposes to add this provision, setting out the process and requirements for a fleet to submitting annual updates to CARB during implementation of the ZETA projects. It specifies what must be included in the annual update, when the annual update must be submitted to CARB, the process for submitting the annual update to CARB, and CARB's timing for review of the annual updates.

Rationale for Subsection 2449.1(e)(2)(H)2.

This amendment is necessary to clearly define the process that a fleet must follow in order to comply with these requirements and what must be included in the updates to CARB so the fleet knows what is expected of them. It is necessary for CARB to receive these updates annually as a verification tool to ensure the fleets remain on track to complete the ZETA project, where once a year is an appropriate balance between not requiring overly burdensome reporting efforts while being frequent enough for CARB to track progress towards completion throughout the life of the project. It is necessary to include descriptions and evidence of the actions taken to meet each milestone outlined in the ZETA because this information is critical to determining the outcome for the fleet as a result of CARB's review of the annual update (see Subsection 2449.1(e)(2)(H)2.a. through c. for more information on these outcomes). The annual updates must be submitted by January 31 for the previous year's information in order to provide an adequate amount of time for the fleet to gather the

necessary information and documents required in the annual update. The process for submittal and review is the same as in section 2449(e)(3), in order to keep the process as simple as possible and not require fleets to understand and utilize multiple different processes. CARB will review the annual updates by April 30 of each year, which is necessary to give CARB staff adequate time to review all submitted annual updates.

Purpose of Subsections 2449.1(e)(2)(H)2.a. through c.

Staff proposes to add this provision, establishing the potential outcomes that could result from CARB's review of the annual updates that are submitted by the fleets taking advantage of the alternate compliance pathway. The first potential outcome is if all milestones have been met for that calendar year, then the ZETA project continues as is. The second potential outcome is if all milestones for that year have not been completed but actions have been taken towards completion of each milestone and are described in the annual update or at least one milestone has been completed for that calendar year, then CARB and the fleet will make adjustments to the milestones to ensure the ZETA project is successful. The third potential outcome is if there is any milestone within that calendar year for which the fleet has taken no actions towards completion and no milestones for that calendar year have been completed, then CARB shall revoke ZETA approval. In the third case, the fleet must immediately come into compliance with the requirements in section 2449.1(a), (b), and (c).

Rationale for Subsections 2449.1(e)(2)(H)2.a. through c.

This amendment is necessary to clearly define the metrics CARB will be using to review the annual updates, to clearly define all potential outcomes that might occur as a result of CARB's review, and to assign specific metrics that determine which outcome will occur. This amendment is also necessary to provide CARB with mechanisms to adjust the ZETA plan in cases where the fleet is making progress but may need some timing adjustments to keep moving forward (the second case described above), as well as provide a mechanism to revoke ZETA approval if no progress is being shown (the third case described above). In the case of the fleet that is not making progress, it is important that the fleet come into compliance with the requirements in section 2449.1(a), (b), and (c) by January 1 of the subsequent year to ensure the emissions reductions associated with those provisions are achieved in the absence of the fleet successfully transitioning to a minimum of 50 percent zero-emission operations.

Purpose of Section 2449.1(e)(3)

Staff proposes to add this provision, establishing the process for a fleet to submit a ZETA to CARB, as well as the process for CARB's review of a ZETA.

Rationale for Section 2449.1(e)(3)

This amendment is necessary to clearly define the process, so a fleet can understand how to submit a ZETA and will therefore be able to properly utilize this provision. It is also necessary to explain CARB's review of the ZETA, so a fleet can understand what to expect.

Purpose of Section 2449.1(e)(3)(A)

Staff proposes to add this provision, requiring that the ZETA include all the elements outlined in section 2449.1(e)(2) and stating that CARB will not accept or consider ZETA that do not include all these elements.

Rationale for Section 2449.1(e)(3)(A)

This amendment is necessary to ensure a complete ZETA is submitted and to notify fleets that if any element is missing then it will not be considered, to avoid wasting CARB resources considering a ZETA that does not have all the information CARB needs to ensure compliance.

Purpose of Section 2449.1(e)(3)(B)

Staff proposes to add this provision, requiring that the fleet submit its ZETA at least four months prior to the next compliance date for which the fleet is looking to receive compliance flexibility for section 2449.1(a), (b), or (c).

Rationale for Section 2449.1(e)(3)(B)

This amendment is necessary to clearly define the process and timing required when submitting a ZETA to CARB. Four months prior to the next compliance date was selected to allow 60 days for CARB's review and to provide enough additional lead time to ensure a fleet would not become noncompliant in case the fleet is not compliant with section 2449.1(e)(1) or the ZETA does not meet the requirements of section 2449.1(e)(2).

Purpose of Section 2449.1(e)(3)(C) and Subsections 2449.1(e)(3)(C)1. And 2.

Staff proposes to add this provision, requiring fleets to submit a ZETA by mail or by email, and providing a mailing address and email address that fleets can utilize to submit the ZETA.

Rationale for Section 2449.1(e)(3)(C) and Subsections 2449.1(e)(3)(C)1. And 2.

This amendment is necessary to clearly define where a fleet can submit a ZETA in order to properly utilize this provision, and email and mail were chosen because they are common methods of communicating.

Purpose of Section 2449.1(e)(3)(D)

Staff proposes to add this provision, requiring CARB to review the ZETA within 60 days of submittal by the fleet.

Rationale for Section 2449.1(e)(3)(D)

This amendment is necessary so fleets know when to expect a response from CARB when submitting a ZETA. 60 days was chosen to give CARB enough time to do a thorough review and discuss it with the fleet, if needed, but not so much time that fleets do not know how they must comply with the Off-Road Regulation.

Purpose of Section 2449.1(e)(3)(E)

Staff proposes to add this provision, requiring that if a fleet meets the requirements in section 2449.1(e)(1) and 2449.1(e)(2), then CARB's Executive Officer shall issue a letter approving the ZETA. This amendment would also list what information will be included in the letter from the Executive Officer, which includes a statement that the fleet is not subject to section 2449.1(a), (b), and (c) as long as it adheres to section 2449.1(e); a schedule for annual updates; a statement that if the approved ZETA's milestones are not met, then CARB may adjust the milestones and timelines or revoke the ZETA approval; and a statement that if CARB revokes the ZETA approval, then the fleet must immediately come into compliance with sections 2449.1(a), (b), and (c).

Rationale for Section 2449.1(e)(3)(E)

This amendment is necessary to provide documentation to the fleet that clearly describes what they are no longer subject to, as well as what they must adhere to in order to maintain compliance with the alternate compliance pathway. It is also necessary to appropriately notify the fleet if their ZETA has been approved so they understand what actions must be taken to comply with the regulation in either case of approval or disapproval. The contents of the letter will list the requirements of section 2449.1(e) above, the rationales are which are also described above.

T. Section 2449.1(f) – Renewable Diesel Requirements

Purpose of Section 2449.1(f)

Staff proposes to add the subsection title "(f) Renewable Diesel Requirements."

Rationale for Section 2449.1(f)

This amendment is necessary to improve readability by providing title language that would help a reader follow the regulation.

Purpose of Section 2449.1(f)(1)

Staff proposes to add this provision, requiring that, beginning January 1, 2024, all fleets must use RD99/100 in all vehicles subject to the regulation that the fleets are operating in California, with some exemptions proposed for inclusion in subsequent sections.

Rationale for Section 2449.1(f)(1)

This amendment is necessary to achieve additional emissions reductions beyond the reductions achieved via the Current Regulation. January 1, 2024 was selected because CARB expects a sufficient supply of RD99/100 to be available to a majority of fleets in that timeframe, and because implementing this requirement as quickly as possible will achieve immediate and substantial emissions reductions.

Purpose of Section 2449.1(f)(2) and Subsections 2449.1(f)(2)(A) and (B)

Staff proposes to add this provision, establishing two exemptions to the RD99/100 requirement in section 2449.1(f)(1). These exemptions would be for any fleet that is a captive attainment area fleet and for any fleet that is comprised entirely of vehicles with Tier 4 Final engines, MY 2010 or newer on-road engines, or ZEVs.

Rationale for Section 2449.1(f)(2) and Subsections 2449.1(f)(2)(A) and (B)

The amendment that exempts captive attainment area fleets is necessary to provide additional flexibility to fleets that operate in regions that do not face the same air quality challenges as the non-attainment areas of California, such that not as many emission reductions are needed there. The amendment that exempts fleets with Tier 4 Final, MY 2010 or newer, or ZEVs, is necessary because studies have shown that the use of RD99/100 has less of an emissions reduction impact when used in these types of technologies, so it is appropriate that fleets that are comprised entirely of these technologies should be exempt from these requirements, as there would be minimal emissions reduction benefits.

Purpose of Section 2449.1(f)(3) and Subsections 2449.1(f)(3)(A) through (C)

Staff proposes to add this provision, establishing flexibility requirements for situations in which a fleet is unable to procure RD99/100. This proposed amendment states that a fleet is not subject to the RD99/100 requirements in section 2449.1(f)(1) if it is unable to procure RD99/100 via its normal refueling methods, as long as the fleet maintains proper documentation of its inability to procure RD99/100. The necessary documentation to use this flexibility requirement is then proposed to be described in detail, and proposed to include a description of the fleet's normal refueling method, a description of the fleets attempts to obtain RD99/100, and documentation showing the inability to procure RD99/100.

Rationale for Section 2449.1(f)(3) and Subsections 2449.1(f)(3)(A) through (C)

This amendment is necessary to ensure that fleets who attempt to comply with the RD requirement in section 2449.1(f)(1), but are unable to comply due to external circumstances are able to stay in compliance with the Off-Road Regulation. This proposed amendment is also necessary to clearly define what documentation must be maintained by the fleet in order to use these flexibility requirements. The list of necessary documentation defines what the documents must show and provides several examples of acceptable forms of documentation, but due to the fact that each fleet has unique fueling needs and methods, the list of required documents aims to define what must be shown in the documents to allow fleets flexibility in obtaining specific documents that are appropriate for their unique fueling circumstances. For the purpose of this provision, normal refueling method means whatever fueling method a fleet typically uses in its normal course of business.

Purpose of Section 2449.1(f)(4)

Staff proposes to add this provision, requiring rental companies and rental vehicles to take specified steps to comply with the RD requirements, as well as clearly describing the liability of the rental company and the renter in these situations. This provision would also require rental companies include language in their contract stating the lessee is required to comply

with the RD requirements, and if CARB staff has a good faith reason to believe that a vehicle was not compliant with the RD requirements, then the rental company must disclose the previous lessee's company name and business contact information to CARB within five days' of CARB's request.

Rationale for Section 2449.1(f)(4)

This amendment is necessary to establish that the RD requirements are the responsibility of the lessee and not the rental company. In many cases the rental company does not have direct control over what fuel is put into their equipment when rented by a lessee, so it should be the lessee's responsibility to adhere to the RD requirements as they have direct control of the fueling. It is also necessary to require the rental company include language in their contracts specifying that the lessee must comply with the RD requirements both to ensure the lessee is aware of their requirements and as a verification tool for CARB staff to use when investigating any potential noncompliance in this type of situation. It is also necessary to clarify the expected responsibilities and duties of fleets in rental situations, as well as to clearly describe how implementation of the RD requirements will work in rental situations. It is necessary to require the rental company to disclose information to CARB if potential noncompliance is discovered so CARB can perform an appropriate investigation of noncompliance. Name and contact information are necessary so CARB staff can correctly identify and contact the fleet that was potentially not compliant with the RD requirements and five days is selected so CARB staff can quickly investigate the issue. All of these requirements are necessary to ensure the reductions of the RD requirements are achieved.

U. Note on Authority Cited in Section 2449.1

Purpose of Authority and Reference for Section 2449.1

Staff proposes to add Health and Safety Code sections 39003, 39602.5, 39730.8(c), and 43600 to the list of authorities for California Code of Regulations, title 13, section 2449.1. Staff also proposes to add Health and Safety Code sections 39000, 39003, 39602.5, 39730.8(c), 43600, 43865, and 43866to the list of references for California Code of Regulations, title 13, section 2449.1.

Rationale for Authority and Reference for Section 2449.1

Staff proposes to add these sections to the list of authorities for section 2449.1 because they, in addition to the authorities already listed in the Current Regulation, provide implied or explicit authority for CARB to adopt these Proposed Amendments. Section 39003 states that CARB is responsible for attaining and maintaining the NAAQS, researching causes of and solutions to air pollution, and for attacking the serious problems caused by motor vehicles, which gives CARB implied authority to regulate motor vehicles that affect air quality in the State, like off-road vehicles. Section 39002 provides that CARB is responsible for the control of vehicular sources, of which off-road vehicles are one and which these Proposed Amendments would do. Section 39602.5 requires CARB to adopt rules and regulations to achieve the federal NAAQS, and these Proposed Amendments are one of the regulations that will help achieve the emission reductions needed for California to meet the PM and

ozone NAAQS. Section 39730.8(c) requires CARB to "consider and, as appropriate, adopt policies and incentives to significantly increase the sustainable production and use of renewable gas," giving CARB explicit authority to adopt the RD provisions proposed as part of this rulemaking. Finally, section 43600 requires CARB to adopt and implement necessary and technologically feasible emission standards for used motor vehicles to control their emissions, giving CARB explicit authority to adopt the Off-Road Regulation, which include emission standards for in-use off-road vehicles.

Staff proposes to add these sections to the list of references for section 2449.1 because they, in addition to the references already listed in the Current Regulation, provide additional background or related information about CARB's authority to adopt, and the need for, these Proposed Amendments.

V. Section 2449.2 – Surplus Off-Road Opt-In for NOx (SOON) Program

Purpose of Section 2449.2(a)

Staff proposes to remove the words "in-use off-road diesel-fueled" before "vehicles" and add "subject to this regulation" after "vehicles."

Rationale for Section 2449.2(a)

This amendment is necessary to clarify that the regulation only applies to vehicles "subject to this regulation," defined in section 2449(b), and to make this provision consistent with the rest of the regulatory text. The term "in-use off-road diesel-fueled" vehicles is an overarching term that could include diesel vehicles that are not subject to this regulation, so replacing this with the phrase "vehicles subject to this regulation" more clearly identifies that only diesel vehicles that are subject to this regulation are being referenced.

Purpose of Section 2449.2(d)(1)(C)

Staff proposes to add the sentence "In years subsequent to 2023, the 2023 target rate shall be used."

Rationale for Section 2449.2(d)(1)(C)

This amendment is necessary to clarify which target rate should be used in years after 2023. The Current Regulation includes a table with target rates from 2011 through 2023 and specifies which target rate should be used between those years, but it did not clearly explain which target rate should be used in years after 2023. This addition clarifies that the 2023 target rate should be used for all years after 2023.

VII. Air Quality

A. Objective

The Proposed Amendments are intended to help California meet the federal NAAQS for ozone and PM, and further protect the health of California's residents by reducing diesel engine emissions from diesel-fueled off-road equipment operating in California. This chapter summarizes the potential air quality impacts in California in response to the Proposed Amendments and includes the following elements: an overview of the updated baseline emission inventory; a description of the methodology CARB used to estimate the emission benefits of the Proposed Amendments; and a summary of health analyses. For a detailed explanation of the specific benefits resulting from the air quality impacts of the Proposed Amendments, see Chapter VIII of this Staff Report.

B. 2022 CARB Construction, Industrial, Mining and Oil Drilling Emissions Inventory (2022 Off-Road Inventory)

CARB staff used the 2022 CARB Construction, Industrial, Mining and Oil Drilling Emissions Inventory (2022 Off-Road Inventory) to estimate emissions for the baseline, as well as to forecast the number of in-use equipment each year, from 2023 through 2038, for which there are direct costs or benefits associated with the Proposed Amendments. CARB's previous in-use off-road inventory model was released in 2010. The 2022 updates are being implemented to support the new proposed regulatory amendment efforts, including emissions and cost analyses. An overview of the updates in the 2022 Off-Road Inventory and the proposed methodology was discussed at the December 14, 2021, and May 16, 2022, public workshops for the Proposed Amendments, where attendees had the opportunity to submit comments. In addition, CARB staff conducted several meetings with stakeholders to discuss the draft of the 2022 Off-Road Inventory directly. An updated inventory methodology document is included in Appendix F to this Staff Report, and contains detailed information on the data sources and methodology used in the 2022 Off-Road Inventory.

The updates incorporate the most recent information available, including the following:

- Vehicle and engine data from the DOORS online reporting system as of 2020;
- Activity hours profiles created from the results of the 2020 Off-Road Activity Survey, an optional survey conducted in 2020 via the DOORS online reporting system about fleets' vehicle and engine activity from January 1, 2019, to December 31, 2019;
- Yearly fuel used adjustment, created using information from the U.S. Energy Information Administration (EIA) and the California State Board of Equalization (BoE) fuel reports;
- Survival and purchasing curves developed from the age distribution of equipment reported in DOORS; and

- Emission factors developed in 2017 for the Mobile Source Emissions Inventory[57, 58.]

The 2022 Off-Road Inventory used in this analysis is based on a 2020 baseline, and forecasts emissions for each equipment category and pollutant in future years. The emissions for any given year are a function of the population, hours of engine activity, engine hp, load factors, emission factors, and fuel correction factors, as shown in the following equation:

Emissions = Population x Activity x hp x LF x EF x FCF

Where:

Population = Count of equipment

Activity = Time the engine is running in hours

hp = Maximum brake horsepower of the engine

LF = Load factor (Average fraction of max power rating of engine during normal operations)

EF = Emission Factor (grams per horsepower-hour) specific to horsepower, engine build year, and the specific pollutant. Includes a deterioration factor.

FCF = fuel correction factor, based on calendar year

C. Anticipated Emission Benefits

CARB staff used the 2022 Off-Road Inventory to estimate the emissions reductions that would result from the requirements of the Proposed Amendments. The 2022 Off-Road Inventory provides the expected number of off-road diesel vehicles operating in California and includes information on the tier-level and low-use exemption status, as well as the emissions associated with these vehicles, for each calendar year under the Current Regulation. The 2022 Off-Road Inventory also takes into account the continued lowering of the fleet average target due to the Current Regulation, with the final set of fleet average targets taking effect in 2023 for large and medium fleets, and in 2028 for small fleets. Building off the 2022 Off-Road Inventory as a baseline, CARB staff made adjustments to the populations of the different tiers of engines and their associated statewide emissions to account for the actions taken to comply with the Proposed Amendments. As older Tiers of vehicles are phased out, their populations, and their associated emissions, are reduced, while the population of newer vehicles with lower emission factors, but higher activity levels, are

[57] Emission factors are based on manufacturer information and have gone through an extensive public process as part of several other CARB rulemakings (Portable Engine Air Toxics Control Measure, Cargo Handling Equipment Regulation to name a few), the agricultural inventory update, and the December 2021 workshop on the Proposed Amendments.

[58] CARB. (2017b). MSEI - Documentation - Off-Road - Diesel Equipment. Retrieved July 6, 2022, from *MSEI - Documentation - Off-Road - Diesel Equipment | California Air Resources Board*

added in as replacements. A more complete description of the emissions calculations is provided in Appendix F.

The Proposed Amendments are expected to reduce NOx and PM emissions from in-use off-road diesel-fueled vehicles operating in California beyond what would be achieved under the Current Regulation[59]. The first emission reductions are expected to occur in 2024, when the requirement to use RD fuel, the tier phase-out for uncontrolled Tier 0 engines in large fleets, and the prohibition on adding Tier 4 Interim and older engines in large and medium fleets begin. After successive phases, the regulation culminates with all fleets of any size subject to the phase-out of Tier 2 and older engines, the continuation of the RD requirement, the prohibition on adding engines certified to a tier lower than Tier 4 Final, and the retirement of all remaining Tier 0 engines, including those designated as low-use, by 2036.

Using the 2022 Off-Road Inventory, staff estimated the reductions from the tier phase-out provisions to be realized from a combination of retiring the older vehicle or placing the older vehicle into low-use, as well as a combination of purchasing a new or used vehicle to replace the older vehicle, or simply downsizing the fleet. The likelihood of each option, and the average age of used vehicles purchased, were determined based on responses to the October 2021 Cost Survey, a survey conducted at the suggestion of stakeholders after the October 2021 workgroup meeting. More information about the October 2021 Cost Survey is provided in Appendix D, and information about the incorporation of the results of the survey into the results is provided in Appendix F.

The Proposed Amendments also include the introduction of additional restrictions on adding vehicles, which would bolster the emissions benefits from the tier phase-out provision by lowering the average age of used vehicles being added to the fleets as replacements; and the requirement to use RD, which is estimated to generate a 10 percent reduction in NOx and a 30 percent reduction in PM emitted from engines that are Tier 4 Interim and older.[60] Finally, in estimating the emissions reductions from the 2036 Tier 0 low-use phase-out, because vehicles with Tier 0 engines would be at least 37 years old by 2036, and because they would have already been designated as low-use for a minimum of 8 years, staff assumed that generally, they would not be replaced.

Staff estimate that from 2024 through 2038, the Proposed Amendments would reduce cumulative statewide emissions by approximately 31,087 tons of NOx and 2,717 tons of PM beyond expected emissions reductions from the Current Regulation. Table 8 shows the estimated annual NOx and PM emission reductions that would result from the Proposed Amendments from 2024 through 2038 (total may not add due to rounding); Figure 15 and

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[59] As the engines impacted by the requirements of this regulation are not subject to GHG certification standards, no GHG analysis was completed for the replacement of these engines. CARB staff did not analyze a potential GHG benefit from the voluntary zero-emission compliance flexibility provision as the degree to which it will be employed will depend on individual fleets' decisions. Furthermore, any GHG benefit derived from the use of renewable diesel is already accounted for in the LCFS and is not evaluated here.

[60] CalEPA. (2015). Staff Report: Multimedia Evaluation of Renewable Diesel. California Air Resources Board. Retrieved June 2, 2022, from *Staff Report: Multimedia Evaluation of Renewable Diesel (ca.gov)*

Figure compare the overall emissions under the baseline and Proposed Amendments scenarios for NOx and PM, respectively.

Table 8. Estimated Annual NOx and PM Emission Reductions Resulting from the Proposed Amendments from 2024 through 2038 Beyond the Baseline Emission Reductions

Year	NOx (tons)	PM (tons)
2024	2,592	276
2025	2,333	249
2026	2,673	250
2027	2,380	223
2028	2,905	242
2029	2,532	213
2030	2,485	201
2031	2,179	177
2032	1,958	157
2033	1,713	141
2034	1,501	124
2035	1,320	108
2036	1,678	132
2037	1,498	118
2038	1,340	105
Total	31,087	2,717

Figure 15. Statewide NOx Emissions from Off-Road Diesel Vehicles under the Baseline and Proposed Amendments from 2022 through 2038

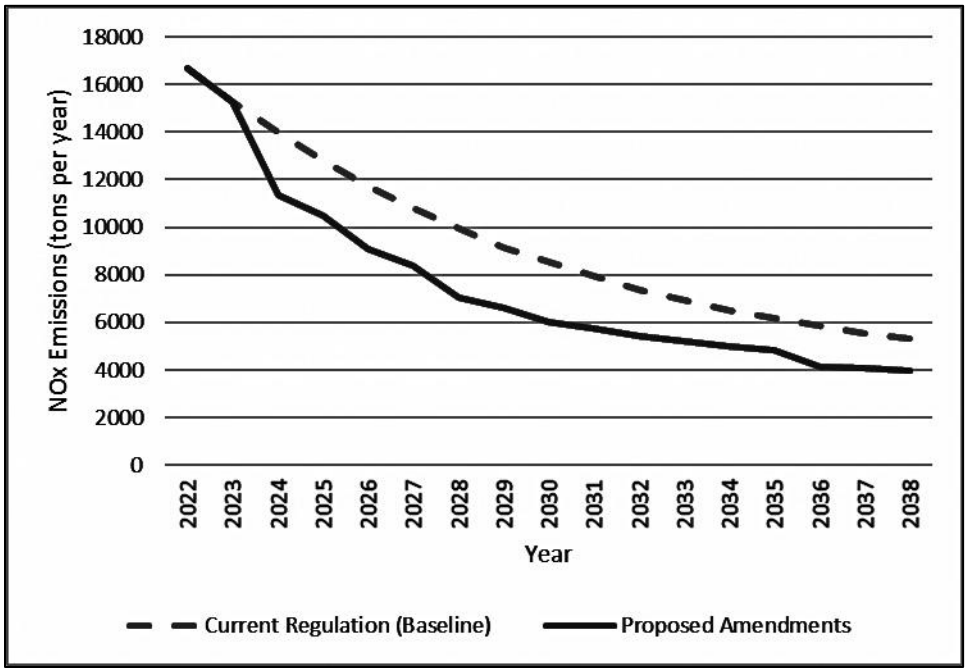
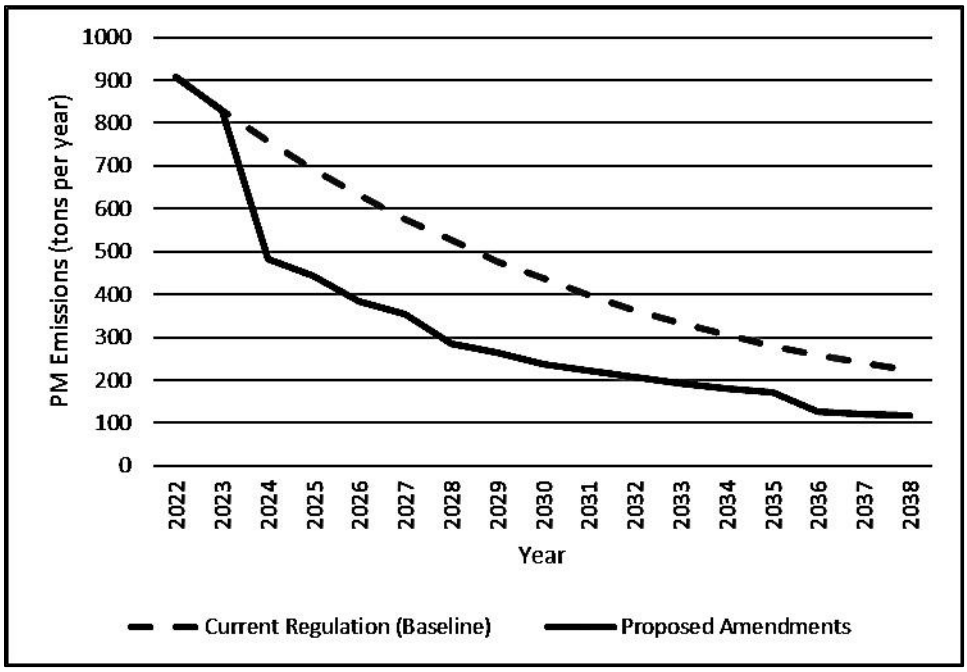


Figure 16. Statewide PM Emissions from Off-Road Diesel Vehicles under the Baseline and Proposed Amendments from 2022 through 2038



The Current Regulation, or baseline scenario, has been effective in reducing emissions, and will continue to generate emissions reductions even beyond the final fleet average targets due to the Current Regulation's prohibition of adding older engines that are Tiers 0, 1, and 2

into the fleet, even for future replacements needed due to natural turnover. The overall emissions under the baseline scenario are displayed as a dashed blue line in Figure 15 and Figure 16, and the continued emissions reductions are shown by the line's continued downward slope.

Despite these substantial reductions, further reductions are still needed, especially in the near-term, to achieve the emissions reductions necessary to protect communities from toxic emissions from off-road diesel equipment, and to meet CARB's NOx and PM emissions reductions commitment that is included in the Proposed 2022 State SIP Strategy in the timeframe needed for federal PM2.5 and ozone standard attainment. The Proposed Amendments address the need for further near-term reductions, and through its provisions, are expected to generate the emissions reductions shown in Table 8, which result in overall emissions falling much more rapidly than in the baseline scenario. The extent of the divergence of the solid orange line, representing the emissions under the Proposed Amendments scenario, from the dashed blue line, representing the baseline scenario, in ES Figure and Figure 15, reflects this accelerated and augmented emissions reduction. In fact, about half of the additional NOx and PM reductions from the Proposed Amendments between 2024 and 2038 are expected to be realized within the first five years of implementation.

VIII. Benefits Anticipated from the Regulatory Action, Including the Benefits or Goals Provided in the Authorizing Statute

A. Air Quality Benefits

The Off-Road Regulation reduces emissions of NOx and PM by requiring that fleets meet declining fleet emission targets through by replacing or retiring older vehicles, replacing older engines in vehicles, or installing VDECS. The Proposed Amendments will further reduce emissions of NOx and PM by introducing a mandatory tier phase-out on uncontrolled Tier 0 engines and engines certified to Tier 1 and Tier 2 standards, requiring the use of RD, and prohibiting the addition of engines certified to a standard older than Tier 4 Final standards. Finally, the Proposed Amendments will improve reporting and enforceability, to achieve a more level playing field among the regulated community and ensure the projected emissions reductions are being achieved.

NOx is a precursor to ozone and secondary PM formation. Exposure to ozone and PM2.5 is associated with increases in premature death, hospitalizations, visits to doctors, use of medication, and ER visits due to the exacerbation of chronic heart and lung diseases and other adverse health conditions. California's South Coast air basin has the highest ozone pollution levels in the nation. The San Joaquin Valley has some of the highest levels of PM2.5 in the nation. Reducing this pollution would benefit Californians by reducing ER and doctor's office visits for asthma, hospitalizations for worsened heart diseases, and premature deaths. This, in turn, would result in reduced asthma-related school absences, reduced sick days off

from work, reduced health care costs and increased economic productivity. Furthermore, the Proposed Amendments are expected to reduce diesel off-road emissions statewide, which will benefit disadvantaged communities that already bear a disproportionate health burden.

Cumulatively, from 2024 through 2038, corresponding to the year of the first set of requirements and ending with the second year after the final set of requirements take effect in 2036, the Proposed Amendments are expected to reduce statewide emissions from off-road diesel-fueled vehicles by approximately 31,087 tons of NOx and 2,717 tons of PM beyond the reductions expected from the Current Regulation. The additional emissions reductions from the Proposed Amendments are expected to reduce the concentration of ozone and PM in the communities in which these vehicles operate, benefitting both local residents and the operators of the vehicles alike. An overview of the emissions reductions by air basin is given in Table 9. Note that totals in the tables in Chapter VIII of this Staff Report may not add due to rounding.

Table 9. Cumulative emissions reductions expected upon implementation of the Proposed Amendments by air basin from 2024 through 2038.

Air Basin	Cumulative NOx Reductions (tons)	Cumulative PM Reductions (tons)
Great Basin Valleys	34	3
Lake County	53	3
Lake Tahoe	62	5
Mountain Counties	407	35
Mojave Desert	3,781	323
North Coast	195	17
North Central Coast	386	26
Northeast Plateau	60	4
South Coast	9,604	846
South Central Coast	772	63
San Diego	1,991	172
San Francisco Bay	3,544	316

Air Basin	Cumulative NOx Reductions (tons)	Cumulative PM Reductions (tons)
San Joaquin Valley	7.081	637
Salton Sea	304	26
Sacramento Valley	2,814	241
Statewide	31,087	2,717

The Proposed Amendments will also introduce additional reporting requirements, specifically for prime contractors and public works awarding bodies. These changes are intended to enhance enforcement of the regulation, to better ensure that the emissions reductions expected from the Current Regulation and the Proposed Amendments will be realized.

B. Health Benefits

U.S. EPA has also determined a causal relationship between non-fatal cardiovascular effects and short- and long-term exposure to PM2.5, and a likely causal relationship between non-mortality respiratory effects and short- and long-term PM2.5 exposures[61]. These outcomes lead to hospitalizations and ER visits, and are included in this analysis.

CARB staff evaluated a limited number of statewide non-cancer health benefits associated with reductions in exposure to PM2.5 and NOx emissions resulting from the Proposed Amendments. NOx includes NO2, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled[62]. However, the most serious quantifiable impacts of NOx emissions occur through the conversion of NOx to fine particles of ammonium nitrate aerosol through chemical processes in the atmosphere. PM2.5 formed in this manner is termed secondary PM2.5. Both directly emitted (primary) PM2.5 and secondary PM2.5 are associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and ER visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these adverse health outcomes.

1. Reduction in Adverse Health Impacts

CARB staff estimated the reduction in adverse health outcomes associated with reduced emissions of PM2.5 and NOx due to the Proposed Amendments. These health outcomes

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[61] U.S. EPA. (2019). Integrated Science Assessment (ISA) for Particulate Matter (Final Report, Dec 2019). U.S Environmental Protection Agency. Retrieved March 15, 2022, from *https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=347534#tab-3*

[62] U.S. EPA. (2016). Integrated Science Assessment for Oxides of Nitrogen - Health Assessment. Retrieved July 6, 2022, from *http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=526855*

include reductions in cardiopulmonary mortality, hospital admissions for cardiovascular and respiratory illnesses, and ER visits for asthma. Based on the analysis, staff estimates that the total reduction in the number of cases statewide due to the implementation of the Proposed Amendments from 2024 to 2038 would be as follows:

- 571 fewer premature deaths (446 to 699, 95 percent confidence interval),
- 82 fewer hospital admissions for cardiovascular illnesses (0 to 161, 95 percent confidence interval),
- 98 fewer hospital admissions for respiratory illnesses (23 to 173, 95 percent confidence interval), and
- 277 fewer ER visits for asthma (175 to 379, 95 percent confidence interval).

Table 10 shows the estimated reductions and 95 percent confidence intervals in adverse health outcomes resulting from the Proposed Amendments by air basin from 2024 through 2038. The biggest health benefits are expected to occur in the South Coast, San Joaquin Valley, and San Francisco Bay Area air basins.

Table 10. Total Reductions in Health Outcomes as a Result of the Proposed Amendments (2024 through 2038)

Air Basin[63]	Cardiopulmonary Mortality	Cardiovascular Hospital Admissions	Respiratory Hospital Admissions	Asthma ER Visits
Mojave Desert	13 (10 - 16)	2 (0 - 4)	2 (1 - 4)	5 (3 - 7)
Mountain Counties	3 (3 - 4)	0 (0 - 1)	0 (0 - 1)	1 (1 - 2)
North Central Coast	2 (1 - 2)	0 (0 - 1)	0 (0 - 1)	1 (1 - 1)
North Coast	1 (1 - 1)	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	25 (19 - 31)	3 (0 - 5)	3 (1 - 6)	10 (6 - 13)
Salton Sea	1 (1 - 2)	0 (0 - 0)	0 (0 - 0)	1 (0 - 1)
San Diego County	29 (23 - 36)	4 (0 - 7)	4 (1 - 8)	12 (8 - 17)
San Francisco Bay Area	51 (40 - 62)	8 (0 - 15)	9 (2 - 16)	29 (18 - 39)
San Joaquin Valley	83 (65 - 101)	9 (0 - 17)	11 (2 - 19)	31 (19 - 42)

[63] Air Basins not listed have no quantifiable reductions in health outcomes as a result of the Proposed Amendments.

Air Basin[63]	Cardiopulmonary Mortality	Cardiovascular Hospital Admissions	Respiratory Hospital Admissions	Asthma ER Visits
South Central Coast	6 (5 - 8)	1 (0 - 2)	1 (0 - 2)	3 (2 - 4)
South Coast	356 (278 - 435)	56 (0 - 110)	67 (16 - 118)	184 (117 - 252)
Total	571 (446 - 699)	82 (0 - 161)	98 (23 - 173)	277 (175 - 379)

Although the estimated health outcomes presented in this report are based on a well-established methodology, they are subject to uncertainty. The uncertainty is reflected in the 95 percent confidence intervals, enclosed within parentheses, following the central estimates. These confidence intervals take into account uncertainties in translating air quality changes into health outcomes.

Other sources of uncertainty include the following:

- The relationship between changes in pollutant concentrations and changes in pollutant or precursor emissions is assumed to be proportional, although this is an approximation;
- Emissions are reported at an air basin resolution, and do not capture local variations;
- Future population estimates are subject to increasing uncertainty, as they are projected further into the future; and
- Baseline incidence rates can experience year-to-year variation.

2. Monetization of Health Impacts

In accordance with U.S. EPA practice, CARB staff monetized health outcomes by multiplying the number of incidences by a standard value derived from economic studies[64]. Table 11 shows the valuation per incident avoided health outcome in 2020 U.S. Dollars (2020$). The valuation for avoided premature mortality is based on willingness to pay[65]. This value is a statistical construct based on the aggregated dollar amount that a large group of people would be willing to pay for a reduction in their individual risk of dying in a year, such that one death would be avoided in the year across the population. This is not an estimate of how much any single individual would be willing to pay to prevent a certain death of any particular

[64] U.S. EPA. (2010). Appendix B: Mortality Risk Valuation Estimates. Retrieved July 6, 2022, from *Guidelines for Preparing Economic Analyses: Mortality Risk Valuation Estimates (Appendix B)*

[65] U.S. EPA. (2000). SAB Report on EPA's White Paper Valuing the Benefits of Fatal Cancer Risk Reduction. Retrieved July 6, 2022, from *Document Display | NEPIS | US EPA*

person[66], nor does it consider any specific costs associated with mortality, such as hospital expenditures.

Unlike premature mortality valuation, the valuation for avoided hospitalizations and ER visits is based on a combination of typical costs associated with hospitalization and the willingness of surveyed individuals to pay to avoid adverse outcomes that occur when hospitalized. These include hospital charges, post-hospitalization medical care, out-of-pocket expenses, lost earnings for both individuals and family members, lost recreation value, and lost household protection (e.g., valuation of time losses from inability to maintain the household or provide childcare). These costs are most closely associated with specific cost savings to individuals and costs to the healthcare system.

Table 11. Valuation per Incident Avoided Health Outcomes (2020$)

Outcome	Valuation per Incident
Avoided Premature Deaths	$10,030,076
Avoided Hospital Admissions for Cardiovascular Illnesses	$59,247
Avoided Hospital Admissions for Respiratory Illnesses	$51,678
Avoided ER Visits for Asthma	$848

The statewide valuation of health benefits is calculated by multiplying the number of avoided adverse health outcomes by valuation per incident. Staff quantified the annual and total statewide valuation of avoided adverse health outcomes from 2024 through 2038, as shown in Table 12 and Table 13, respectively. The statewide distribution of these benefits follows the distribution of emission reductions and avoided adverse health outcomes; therefore, most benefits to individuals will occur in the South Coast, San Joaquin Valley, and San Francisco Bay Area air basins.

Table 12. Annual Statewide Avoided Adverse Health Outcomes and Valuation as a Result of the Proposed Amendments from 2024 through 2038

Year	Avoided Premature Deaths	Avoided Hospitalizations	Avoided ER Visits	Valuation (million 2020$)
2024	50	14	25	$500.1
2025	45	13	22	$456.0

[66] U.S. EPA. (n.d.-b). Mortality Risk Valuation – What does it mean the place a value on a life? Retrieved July 6, 2022, from *Mortality Risk Valuation | US EPA*

Year	Avoided Premature Deaths	Avoided Hospitalizations	Avoided ER Visits	Valuation (million 2020$)
2026	49	15	24	$489.9
2027	44	13	22	$443.2
2028	51	16	25	$512.3
2029	45	14	22	$454.6
2030	44	14	21	$441.8
2031	39	13	19	$393.0
2032	35	11	17	$355.1
2033	32	11	15	$318.2
2034	28	9	13	$281.8
2035	25	9	12	$250.1
2036	31	11	15	$310.5
2037	28	9	13	$279.0
2038	25	9	12	$251.5
Total	571	180	277	$5,737.2

Table 13. Total Statewide Valuation of Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2024 through 2038

Outcome	Valuation (million 2020$)
Avoided Premature Deaths	$5,727.0
Avoided Hospital Admissions for Cardiovascular Illnesses	$4.9
Avoided Hospital Admissions for Respiratory Illnesses	$5.1

Outcome	Valuation (million 2020$)
Avoided ER Visits for Asthma	$0.2
Total	$5,737

C. Benefits to Typical Businesses

The Proposed Amendments will provide air quality benefits that will benefit the health of not only people residing or working near where off-road diesel vehicles are operated but will also benefit the employees of the companies using these vehicles as they are the ones most exposed to the emissions associated with operating these vehicles. These health benefits for their employees would translate into reduced healthcare costs and reduced lost productivity from sickness associated with exposure to diesel emissions.

The increased demand for newer vehicles due to the tier phase-out requirements would also increase sales of off-road diesel vehicles, resulting in additional income for businesses involved in the manufacture and distribution of off-road diesel vehicles, including vehicle and parts manufacturers, dealers, financial institutions, as well as consultant companies that advise companies on compliance with the regulation's changes.

Often fleets see increased efficiencies from the use of newer off-road vehicles. Some vehicles have increased versatility due to the numerous attachments available, increasing the type of work a single machine can do. Newer off-road vehicles often incorporate advancements that increase worker comfort, have more precise operations that decrease fuel use (e.g., telematics and electronic throttles for precision control), and newer engines that may reduce fuel consumption through optional modes that reduce engine speed without reducing power, as examples.

Finally, businesses using off-road diesel vehicles would be provided with a more level playing field through the enhanced enforcement and reporting provisions of the Proposed Amendments, which would ensure that compliant fleets would not be subjected to unfair competition by fleets that have chosen not to comply.

D. Benefits to Small Businesses

Certain businesses mentioned in the previous section, Benefits to Typical Businesses, may also be small businesses, primarily among vehicle dealers and consultants. These businesses serve an important function in providing access to the vehicles that operators need to run their businesses and to provide guidance in understanding the regulation across the state and will most likely see benefits similar to those described for typical businesses as a result of the Proposed Amendments.

E. Benefits to Individuals

The Proposed Amendments will benefit California residents by lowering cancer risks and cardiopulmonary illnesses and other noncancer health impacts through reducing exposure to both primary PM generated from diesel combustion in off-road vehicles, as well as to ozone and PM2.5 formed in secondary reactions with NOx. While these benefits would apply to individuals in large swathes of the state, especially in non-attainment regions where facilities and job sites utilizing off-road diesel vehicles operate, residents of communities directly adjacent to where the equipment are being used, as well as those directly employed in these facilities and job sites and who operate the equipment, would see the largest impacts, as they are nearest to the equipment's operations for the longest duration of time. For additional benefits on reducing worker exposure see below.

F. Reducing Worker Exposure

The proposed amendment will reduce NOx and DPM emissions, resulting in health benefits to workers that utilize in-use off-road diesel vehicles at their job. Older in-use off-road diesel vehicles are not equipped with exhaust gas aftertreatment systems, exposing workers to disproportionate amounts of DPM and NOx. While NOx emissions are harmful, NOx is also a precursor to ozone, which can cause irritation and damage lung tissue, worsen asthma and chronic illnesses, including obstructive pulmonary disease and reduce lung function[67].

DPM is classified as a toxic air contaminant and is carcinogenic to humans[68]. It is also a part of PM2.5; DPM contributes to the same non-cancer health effects as PM2.5 exposure. These effects include premature death, hospitalizations and emergency department visits for exacerbated chronic heart and lung disease, including asthma, increased respiratory symptoms, and decreased lung function in children[69].

Groups occupationally exposed to diesel-powered vehicles, such as those working in construction, have increased exposure to DPM and NOx, putting them at greater risk for developing health problems. In California alone, it is estimated that 150,000 people are occupationally exposed to off-road heavy-duty diesel vehicles. This includes, but is not limited to, those working as construction equipment operators, construction laborers, highway maintenance workers, and surface miners[70]. In a study conducted on the effects of worker exposure to air pollutants, it was found that occupational exposure to diesel exhaust

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[67] CARB (n.d.-c) Nitrogen Dioxide & Health. Retrieved August 12, 2022, from *https://ww2.arb.ca.gov/resources/nitrogen-dioxide-and-health*

[68] IARC. (2012b). IARC: Diesel Engine Exhaust Carcinogenic. Retrieved July 5. 2022, from *pr213_E.pdf (who.int)*

[69] CARB. (n.d.-a). Overview: Diesel Exhaust & Health. Retrieved August 12, 2022, from *Overview: Diesel Exhaust & Health | California Air Resources Board*

[70] U.S. Bureau of Labor Statistics. (2021) May 2021 State Occupational Employment and Wage Estimates. Retrieved June 17, 2022, from *California - May 2021 OEWS State Occupational Employment and Wage Estimates (bls.gov)*

is associated with an increased risk of ischemic heart disease[71]. In this study, diesel exhaust was associated with the highest increased risk for ischemic heart disease compared to all other harmful gases, dusts, and fumes found in construction sites[72]. A clinical review additionally demonstrated that diesel exhaust exposure is linked to higher rates of esophageal cancer, ovarian cancer, and lung cancer[73]. In addition to these carcinogenic effects, workers that experienced significant indoor diesel exposure demonstrated slowness of response, memory loss, and disordered sleep suggestive of neurobehavioral impairment[74]. Occupational air pollutant exposure, especially exposure to diesel exhaust is an urgent issue; the health implications to workers are long-lived and can even lead to death. Keeping workplace air pollutant exposure as low as possible is vital to protect worker's health.

This amendment will play an important role in reducing the amount of DPM and NOx emissions, that workers are exposed to. The expected results are improved working conditions, less lost workdays, and long-term health benefits for workers.

G. Benefits from Enhanced Enforceability of the Regulation

The Proposed Amendments introduce additional requirements for prime contractors and public works awarding bodies. These changes will ensure that prime contractors and public works awarding-bodies only enter into contracts with compliant fleets making it harder for noncompliant fleets to inappropriately operate in California and applying additional pressure to these fleets to come into compliance if they wish to contract with these entities. These changes support implementation and enforcement goals of maintaining a level playing field for compliant vehicles conducting business in California and reducing the monetary advantage of noncompliant fleets and vehicle owners that try to circumvent the requirements of the Current Regulation and the Proposed Amendments.

Ensuring that parties who have direct oversight over hiring the fleets are only hiring fleets that are compliant with the Off-Road Regulation would expand CARB's ability to achieve compliance and ensure the emissions reductions of both the Current Regulation and the Proposed Amendments are achieved. This co-benefit will also allow CARB to achieve its implementation goals more effectively than through CARB enforcement efforts alone.

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[71] Toren, K. et al. (2007). Occupational exposure to particulate air pollution and mortality due to ischaemic heart disease and cerebrovascular disease. Occupational & Environmental Medicine. Retrieved July 6, 2022, from *https://oem.bmj.com/content/64/8/515*

[72] Ibid.

[73] Krivoshto, I. N. et al. (2008). The Toxicity of Diesel Exhaust: Implications for Primary Care. Journal of the American Board of Family Medicine. Retrieved July 6, 2022, from *https://www.jabfm.org/content/21/1/55#:~:text=On%20an%20equal%20horsepower%20basis%2C%20diesel%20exhaust%20is,1%25%20of%20new%20American%20cars%20have%20diesel%20engines*

[74] Ibid.

H. Benefits from Additional Zero-Emission Penetration

The State is committed to accelerating the introduction and deployment of ZEVs to meet California's long term air quality, carbon neutrality, petroleum reduction, and climate change goals. Governor Newsom's EO N-79-20 is a directive that 100 percent sales of new passenger vehicles and trucks in the State be zero-emission by 2035, all drayage trucks to be zero-emission by 2035, off-road vehicles and equipment be zero-emission by 2035 where feasible, and all other vehicles in the medium- and heavy-duty fleet transition to zero-emission by 2045.

Although the Proposed Amendments are not a driver for the deployment of ZEVs, voluntary provisions have been included to promote this objective. These provisions offer some compliance flexibility for the deployment of zero-emission off-road vehicles. Currently, zero-emission technology in the off-road sector is at a less mature stage of development than the on-road sector, as discussed in Chapter III of this Staff Report. The voluntary provisions support increasing the population of currently available zero-emission off-road vehicles which in turn will improve fleet experience with these vehicles and facilitate expansion of the technology into additional off-road vehicle categories.

ZEVs produce zero exhaust emissions of any criteria pollutant (or precursor pollutant) or GHG under any and all possible operational modes and conditions. The most common ZEVs are battery-electric vehicles and fuel-cell electric vehicles. The deployment of ZEVs supports the State in its goals to:

- Meet the federal health-based ambient air quality standards for ozone by 2023 and 2031 as well as the fine PM2.5 air quality standards. The NAAQS for 2 criteria pollutants, ozone and PM2.5, are particularly relevant in California. California suffers some of the worst air pollution in the nation. The South Coast and San Joaquin Valley air basins are the only 2 regions in the country classified as 'Extreme', which is the highest classification, for nonattainment of the federal ozone standard of 70 ppb. These areas also suffer some of the worst levels of PM2.5 pollution. Advancing the deployment of ZEVs is an integral part of California's strategy to address these pressing public health needs.[75]
- Achieve carbon neutrality as soon as possible, and no later than 2045, and to achieve and maintain net negative emissions thereafter (EO B-55-18). To date, California and many other regions have focused on reducing GHG emissions from the industrial and energy sectors. As defined in statute, the state's 2020 and 2030 targets include all in-state sources of GHG emissions and those emissions associated with imported power that is consumed in the state.

[75] CARB. (2022d). Public Hearing to Consider the Proposed Advanced Clean Cars II Regulations. Staff Report: Initial Statement of Reasons. Retrieved July 22, 2022 from *https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2022/accii/isor.pdf*

- Reduce petroleum usage to support carbon neutrality efforts. In CARB's Draft 2022 Climate Change Scoping Plan[76], staff is recommending a target of 91 percent statewide petroleum reduction in 2045 from 2022 levels. The proposed target would give lead time for clean technology and fuel deployment and would allow for technologies to scale and be deployed at lower costs.
- Reduce emissions of TACs and criteria air pollutants in communities affected by a high cumulative exposure burden, consistent with AB 617 (C. Garcia, Chapter 136, Statutes of 2017). In response to AB 617, CARB established the Community Air Protection Program. The Program's focus is to reduce exposure in communities most impacted by air pollution. Communities around the State are working together to develop and implement new strategies to measure air pollution and reduce health impacts.
- Reduce GHG emissions to 1990 levels by 2020 consistent with AB 32 (Núñez, Chapter 488, Statutes of 2006) and to 40 percent below 1990 levels by 2030 consistent with SB 32 (Pavley, Chapter 249, Statutes of 2016).
- Reduce emissions of methane and black carbon to 40 percent and 50 percent, respectively, below 2013 levels by 2030 as called for in CARB's 2017 *Short-Lived Climate Pollutant Reduction Strategy*.[77]

There are additional benefits from the use of zero-emission technology that are inherent to the nature of the technology. Electric drivetrains are less mechanically complicated than internal combustion alternatives, resulting in fewer moving parts and less friction. This leads to less need for maintenance and less opportunity for mechanical failure.[78] ZEVs provide an exhaust-free experience and are significantly quieter than diesel vehicles, benefitting both vehicle operators and those nearby.

I. Benefits from the Use of Renewable Diesel

Requiring the use of RD99/100 will achieve immediate NOx and PM emission reductions, resulting in health benefits for workers and residents. Additionally, substituting conventional petroleum-derived CARB ULSD with RD99/100 will reduce the State's GHG emissions and help California achieve its climate targets. RD99/100 has been shown to decrease emissions of GHGs, PM, HCs, CO, and NOx.[79] Engine dynamometer testing of on-road heavy-duty engines without emission controls showed a reduction of NOx emissions of approximately 10 percent and a reduction in PM emissions of approximately 30 percent using RD99/100

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[76] CARB. (2022e). Draft 2022 Scoping Plan Update. Retrieved July 6, 2022, from *Draft 2022 Scoping Plan Update (ca.gov)*

[77] CARB. (2017a). Short-Lived Climate Pollutant Reduction Strategy. Retrieved July 5, 2022, from *https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf*

[78] Idaho National Laboratory. (n.d.). How Do Gasoline & Electric Vehicles Compare? Retrieved July 6, 2022, from *https://avt.inl.gov/sites/default/files/pdf/fsev/compare.pdf*

[79] CARB. (2015). Proposed Regulation on the Commercialization of Alternative Diesel Fuels. Staff Report: Initial Statement of Reasons. Retrieved June 22, 2022, from *https://www.arb.ca.gov/regact/2015/adf2015/adf15isor.pdf*

compared to the use of conventional CARB ULSD.[80,81] A recent study comparing RD99/100 to CARB reference diesel when used in a legacy off-road engine also showed approximately 30 percent reduction in PM when compared to the CARB reference fuel.[82] Due to RD99/100's emissions reductions, RD99/100 has health benefits over conventional CARB ULSD such as: reduced ambient PM levels, reduced potential cancer risk, reduced population impacted by potential cancer risk, along with reduced incidents of premature death, hospital admissions, ER visits, and other noncancer health outcomes. The additional reductions and associated improvements to air quality are designed to help protect all communities and would be of particular benefit in environmental justice communities frequently located in areas with increased exposure to air pollution and toxics from off-road equipment.

The Proposed Amendments may result in financial benefits to many different industries whose products will be needed to comply with the Proposed Amendments, such as RD producers and distributors.

Users of RD have reported additional benefits from the use of RD as fuel, including reduced oil consumption and less DPF regenerations and filter replacements[83]. Additionally, engine manufacturers have announced support for the use of RD in their engines. In 2015, Volvo Trucks North America was the first engine manufacturer to endorse the use of RD fuel.[84] Volvo announced that its customers can substitute RD for petroleum diesel in all Volvo diesel engines, with no risk of losing warranty coverages. Soon after, Mack Trucks made a similar announcement.[85] The Mack press release noted "Renewable diesel fuel delivers performance similar to diesel refined from petroleum, but with several additional customer benefits, including reduced GHG and particulate emissions, as well as decreased maintenance costs."[86]

Another benefit is when engines equipped with DPFs use RD fuel. Because RD significantly reduces PM emissions, DPFs require less frequent regeneration. The result – as reported by

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[80] Ibid.

[81] Durbin, T. D. et al., (2011). Final Report: CARB Assessment of the Emissions from the Use of Biodiesel as a Motor Vehicle Fuel in California "Biodiesel Characterization and NOx Mitigation Study". California Air Resources Board. Retrieved August 9, 2022, from *CARB Document: CARB Document: https://www.arb.ca.gov/fuels/diesel/altdiesel/20111013_carb final biodiesel report.pdf*

[82] Durbin, T. D. et al., (2021). Final Report: Low Emission Diesel (LED) Study: Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines. California Air Resources Board. Retrieved July 6, 2022, from *Low Emission Diesel (LED) Study: Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines - Final Report (ca.gov)*

[83] Huff, A. (2021). Innovators: Titan Freight exec plans to bridge the divide to zero-emissions. CCJ by Randall Reilly. Retrieved August 15, 2022, from *https://www.ccjdigital.com/ccj innovators/article/15042784/titan freight executive aims for alternative power for fleet#:~:text=Innovators%3A%20Titan%20Freight%20exec%20plans%20to%20bridge%20the,2023%2C%20and%20increase%20the%20supply%20of%20renewable%20f*

[84] Volvo Trucks. (2015). Volvo Trucks Approves Use of Renewable Diesel Fuel for Proprietary Engines. Retrieved August 15, 2022, from *Renewable Diesel for Volvo Truck Engines | Volvo Trucks USA*

[85] Mack Trucks. (2016). Mack Trucks Green-Lights Renewable Diesel Fuel for Use in Mack Engines. Retrieved August 15, 2022, from *Mack Trucks Green-Lights Renewable Diesel Fuel for Use in Mack Engines | Mack Trucks*

[86] Ibid.

the City of Knoxville[87] and other RD end users – is that engines with DPF systems do not require as much maintenance when using RD compared to petroleum diesel, and DPF life may be extended. DPF maintenance will decrease with RD and will lessen the need to regenerate, repair, or replace DPFs as often.

J. Benefits to Environmental Justice Communities

The purpose and intent of the Proposed Amendments are to further reduce NOx and DPM from in-use off-road diesel vehicles statewide, reducing harmful emissions from all communities in California, which is consistent with CARB's environmental justice goal of reducing exposure to air pollutants and reducing adverse health impacts from TACs in all communities, including low-income communities and communities of color.

Additionally, NOx and PM emission reductions contribute to meeting California's SIP obligations for attainment and help achieve environmental justice goals in all communities located within affected air basins, and further exercise authority given to CARB in HSC § 39660 et seq. and 43013[88] et seq. The Proposed Amendments will provide emission reductions and associated improvements beyond the Current Regulation to air quality that will help protect all communities and would be a benefit in environmental justice communities frequently located in areas with increased exposure to air pollution and toxics from in-use off-road diesel vehicles. For additional information on Environmental Justice see Chapter X of this Staff Report.

IX. Environmental Analysis

A. Introduction

This chapter provides the basis for CARB's determination that the Proposed Amendments are exempt from the requirements of the California Environmental Quality Act (CEQA). A brief explanation of this determination is provided in section B below. CARB's regulatory program, which involves the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans for the protection and enhancement of the State's ambient air quality, has been certified by the California Secretary for Natural Resources under Public Resources Code section 21080.5 of CEQA (Cal. Code Regs., tit. 14, § 15251, subd. (d)). 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. CARB, as a lead agency, prepares a substitute environmental document (referred to as an "Environmental Analysis" or "EA") as part of the Staff Report prepared for a proposed

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[87] City of Knoxville Fleet Services. (2017). Renewable Diesel Test: Testing an Alternative Fuel in the City of Knoxville Fleet. Tennessee Clean Fuels. Retrieved July 6, 2022, from *Microsoft Word -Renewable-Diesel-Report_City-of-Knoxville_6-15-17 (tncleanfuels.org)*

[88] Health and Safety Code - HSC§ 43013 et seq., Division 26, General Provisions. (2009). California Legislative Information. Retrieved July 6, 2022, from *https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=43013.&lawCode=HSC*

action to comply with CEQA (17 CCR 60000-60008). If the Proposed Amendments are finalized, a Notice of Exemption may be filed with the Office of the Secretary for the Natural Resources Agency for public inspection.

B. Analysis

CARB has determined that the Proposed Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation are exempt from CEQA under the general rule or "common sense" exemption (14 CCR 15061(b)(3)). CEQA Guidelines states "[t]he activity is covered by the common sense exemption that CEQA applies only to projects which have the potential for causing a significant effect on the environment. Where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment, the activity is not subject to CEQA". The proposal is also categorically exempt from CEQA under the "Class 8" exemption (14 CCR 15308) because it is an action taken by a regulatory agency for the protection of the environment. The Proposed Amendments would not result in any significant adverse impacts on the physical environment or alter the use of existing public or private structures or facilities. The Proposed Amendments will only impact the off-road diesel fleets that are subject to the Current Regulation as well as public works awarding bodies and prime contractors that have newly proposed requirements to check a fleet's Certificate of Reported Compliance prior to entering contracts with a fleet. The Proposed Amendments aim to achieve PM and NOx emission reductions by restricting the addition of older off-road diesel-powered vehicles and accelerating the turnover of older, higher-emitting vehicles. The likely result of these requirements will be increased demand for Tier 4 Final off-road vehicles, but Tier 4 Final technology is currently mature and produced at large scales, so it is not expected to create the need for new engine or vehicle manufacturing facilities. The Proposed Amendments also include a requirement for fleets to utilize RD99/100 in California, but the current supply of RD99/100 is expected to be sufficient to supply the off-road diesel fleets, therefore no additional RD production facilities will need to be developed as a result of this requirement. RD production is already growing as the result of the LCFS and other factors that are driving increased production of low-carbon fuels.

CARB has determined that the Proposed Amendments are categorically exempt from CEQA under the "Class 8" exemption (14 CCR 15308) because it is an action taken by a regulatory agency for the protection of the environment. The Proposed Amendments aim to achieve NOx and PM emission reductions statewide, ensuring that fleets have consistent compliance obligations and that communities are protected from toxic emissions from off-road equipment in construction and other sector sources. Achieving further PM and NOx reductions from the off-road sector is critically important to providing public health protection for the millions of Californians who still breathe unhealthy air, to reducing community exposure to air toxics, and to helping meet current health based ambient air quality standards across California. Over the course of the fourteen-year implementation period, the Proposed Amendments' measures will lead to substantial PM and NOx reductions from one of the largest sources of emissions today and help avoid hundreds of premature deaths and pollution-related health impacts in communities across the state.

Based on CARB's review it can be seen with certainty that there is no possibility that the Proposed Amendments would result in a significant adverse impact on the environment. Further, the proposed action is designed to protect the environment and CARB found no substantial evidence indicating the proposal could adversely affect air quality or any other environmental resource area, or that any of the exceptions to the exemption applies (14 CCR 15300.2). Therefore, this activity is exempt from CEQA.

X. Environmental Justice

State law defines environmental justice as the fair treatment and meaningful involvement of people of all races, cultures, incomes, and national origins, with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies (Gov. Code, § 65040.12, subd. (e)(1)). Environmental justice includes, but is not limited to, all of the following: (A) The availability of a healthy environment for all people. (B) The deterrence, reduction, and elimination of pollution burdens for populations and communities experiencing the adverse effects of that pollution, so that the effects of the pollution are not disproportionately borne by those populations and communities. (C) Governmental entities engaging and providing technical assistance to populations and communities most impacted by pollution to promote their meaningful participation in all phases of the environmental and land use decision making process. (D) At a minimum, the meaningful consideration of recommendations from populations and communities most impacted by pollution into environmental and land use decisions (Gov. Code, § 65040.12, subd. (e)(2)). The Board approved its Environmental Justice Policies and Actions (Policies) on December 13, 2001, to establish a framework for incorporating environmental justice into CARB's programs consistent with the directives of State law. These policies apply to all communities in California, but are intended to address the disproportionate environmental exposure burden borne by low-income communities and communities of color. Environmental justice is one of CARB's core values and fundamental to achieving its mission.

A. Background

California has made significant progress in improving air quality. However, disparities in air pollution exposure, susceptibility, and health, still exist, particularly for people of color and low-income communities. In 2012, Senate Bill (SB) 535 (De León, Chapter 830, Statutes of 2012) established initial requirements for minimum funding levels to "Disadvantaged Communities" (DACs). The legislation also gives CalEPA the responsibility for identifying those communities, stating that CalEPA's designation of disadvantaged communities must be based on "geographic, socioeconomic, public health, and environmental hazard criteria". In 2016, AB 1550 (Gomez, Chapter 369, Statutes of 2016) directed CalEPA to identify DACs and also established the currently applicable minimum funding levels that apply to all California Climate Investment Programs, which includes CORE and the Community Air Protection Incentives Program discussed in Chapter II of this ISOR:

- At least 25 percent of funds must be allocated toward DACs

- At least 5 percent must be allocated toward projects within low-income communities or benefiting low-income households
- At least 5 percent must be allocated toward projects within and benefiting low-income communities, or low-income households, that are outside of a CalEPA-defined DAC but within ½ mile of a disadvantaged community.

AB 617 (Garcia, Chapter 136, Statutes of 2017) was signed into law in July 2017 to further environmental justice efforts in California. AB 617 requires CARB to address community-scale air pollution through new community-focused and community-driven actions to reduce emissions and exposure to air pollution and improve public health in environmental justice communities. These communities experience disproportionate cumulative burdens from exposure to air pollutants, including DPM.

The purpose and intent of the Proposed Amendments are to further reduce NOx and DPM from in-use off-road diesel vehicles, which is consistent with CARB's environmental justice goal of reducing exposure to air pollutants and reducing adverse health impacts from TACs in all communities. DPM has been identified as a TAC by CARB, and it poses a significant public health risk. NOx includes NO2, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled. However, the most serious quantifiable impacts of NOx emissions occur through its conversion to secondary PM2.5 which is associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and ER visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these adverse health outcomes. The health benefits associated with the Proposed Amendments are discussed in more detail in Chapter VIII of this ISOR, and include 277 fewer ER visits for asthma. The vehicles subject to Proposed Amendments operate in a variety of industries including construction, warehousing, oil and gas operations, aggregate and mining operations, to name a few, exposing the communities directly surrounding these operations to potentially dangerous levels of emissions and higher rates of pollution-related illness such as asthma.

As part of CARB's policy on environmental justice, CARB is committed to engaging with community members to provide them with the best possible information about the air they breathe, and working with them to improve air quality in their communities. To achieve this, as part of this rulemaking, CARB staff held 6 different public workshops and workgroups to discuss the Proposed Amendments. Staff posted announcements to CARB's Environmental Justice Blog, inviting community groups from disadvantaged communities to participate in the amendment process and give feedback on how CARB could minimize any negative impacts and maximize benefits to the community. These workshops and workgroups were also advertised through several of CARB's GovDelivery topic lists, including the Environmental Justice Stakeholders Group. These workshops and workgroups were help virtually, with 4 of the 6 recorded and posted to CARB's webpage for on-demand viewing. CARB Staff established the Proposed Amendments email, ordamendments@arb.ca.gov, so that any person or organization that wanted to reach out to CARB staff for more information could do so at any time. CARB participated in over 30 informal meetings and phone calls at the request of stakeholders and attended 1 site visit at the request of stakeholders. A more detailed description of CARB's public process is described in Chapter XIV of this Staff Report.

These workshops and workgroups provided an opportunity for community groups to participate and collaborate on how CARB could reduce emissions for the vehicles subject to the Proposed Amendments and minimize the associated health impacts. Stakeholder feedback was incorporated into a proposed regulatory concept and then further refined into proposed regulatory language that was posted on CARB's website for comment in advance of the workshops where the documents were presented and discussed. The Proposed Regulation reflects many comments made by stakeholders. Additional alternatives provided to CARB are discussed in Chapter XII of this Staff Report.

B. Impacted Communities

Disadvantaged communities across California continue to experience environmental and health inequities from air pollution despite statewide efforts to reduce pollution. For example, communities near ports, rail yards, warehouses, and freeways, continue to experience a higher burden of air pollution than other areas due to the cumulative impact of multiple sources of pollution. Many of the same communities also experience air pollution impacts from stationary facilities such as oil refineries, chrome platers, metal recycling facilities, and oil and gas operations. Residents in these communities are often more vulnerable to environmental impacts as the result of health disparities, socio-economic inequities, and poor land use decisions. To address these inequities,17 communities have been selected under AB 617 to develop and implement a CERP and/or a Community Air Monitoring Plan (CAMP) since September 2018. The CERPs identify each community's air pollution concerns and a suite of strategies to reduce emissions from the identified sources. These strategies can include new regulations, new incentive grant funding, and new exposure reduction resources and tools. Ten of the AB 617 community steering committees identified in-use off-road diesel equipment and/or activities and facilities that utilize in-use off-road diesel equipment as a top concern in their communities, and would directly benefit from the Proposed Amendments as described in Table 14.

Additionally, many of the AB 617 communities, including those in the Bay Area, South Coast, San Joaquin Valley and San Diego have listed ports and/or railyards as a top community concern. Although much of the equipment at these locations is subject to CARB's CHE Regulation, there is some equipment used for nonroutine work, such as off-road diesel vehicles from construction activities, that would be subject to the Proposed Amendments.

Emission inventories were developed by Air District and CARB staff for the CERPs. Per CARB's Community Air Protection Blueprint[89] and supporting guidance[90] for emission inventories, the base year and data vintage for the development of each community inventory varies depending on when a community was selected under the AB 617 program. Best efforts were made to estimate the emissions attributable to vehicles subject to the

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[83] CARB. (2018). Community Air Protection Blueprint: For selecting Communities, Preparing Community Emissions Reduction Programs, Identifying Statewide Strategies, and Conducting Community Air Monitoring. Retrieved July 11, 2022, from *Community Air Protection BLUEPRINT, October 2018 (ca.gov)*

[84] CARB. (2020b). AB 617 Community Planning Emission Inventory: Inventory Years. Retrieved July 11, 2022, from *Microsoft Word - AB 617 Calendar Years for Community Planning Emission Inventories 2020-02-26.docx*

Proposed Amendments for these AB 617 communities. In order to ascertain the emission contributions for vehicles subject to the Proposed Amendments, assumptions were made concerning rule applicability. These assumptions were based on the best available data, but result in some uncertainties. For more details on these inventories, please see Appendix E of this Staff Report.

Table 14. List of AB 617 Communities (as of January 2022) and the In-use Off-road Diesel Equipment Activity Concerns Identified by Community Members in Each CERP

AB 617 Community	In-Use Off-Road Diesel Community Concerns
Arvin, Lamon	Construction equipment
Calexico, El Centro, Herber	Off-road equipment, industrial energy production, waste disposal
East Los Angeles, Boyle Heights, West Commerce (ELABHWC)	Metal processing facilities, waste transfer stations, rendering facilities, general industrial facilities
Portside Environmental Justice Neighborhoods	Manufacturing and industrial operations, power plants, and aggregate facilities
San Bernardino, Muscoy (SBM)	Concrete batch plants, asphalt, and aggregate plants; warehouses
South Central Fresno	Biomass power facilities, glass manufacturing plants
South Los Angeles (SLA)	Off-road equipment, construction sites, general industrial facilities, metal recycling facilities
Southeast Los Angeles (SELA)	Rendering facilities, metal recycling facilities, and general industrial facilities
Stockton	Wood products processing operations, cement and concrete products operations, biomass power facilities
West Oakland	Metal recycling, metal foundries, wastewater treatment plants

1. Arvin, Lamont[91]

The main sources of air pollution emissions identified in the published Arvin Lamont AB 617 CERP were heavy-duty vehicles, medium-duty vehicles, and passenger cars, off-road equipment, and stationary sources. Based on the 2019 base year emission inventory

[91]Arvin/Lamont AB 617 Community Steering Committee and San Joaquin Valley Air Pollution Control District. (2022). Draft Arvin/Lamont Community Emissions Reduction Program. Retrieved July 5, 2022, from *https://community.valleyair.org/media/3918/arvinlamont-cerp-draft_may-18.pdf*

developed for the Arvin, Lamont CERP, it is estimated that vehicles subject to the Off-Road Regulation contributed to 6 percent of NOx emissions and 12 percent of DPM emissions.

2. Calexico, El Centro, Herber[92]

The main sources of air pollution emissions identified in the published Calexico, El Centro, Herber AB 617 CERP were agricultural activities, animal feeding operations, off-road equipment, on-road vehicles, unpaved roads, industrial energy production, and off-highway vehicles. Based on the 2017 base year emission inventory developed for the Calexico, El Centro, Heber CERP, it is estimated that vehicles subject to the Off-Road Regulation contributed to 6 percent of NOx emissions and 21 percent of DPM emissions.

3. East Los Angeles, Boyle Heights, West Commerce[93]

The main sources of air pollution emissions identified in the published ELABHWC AB 617 CERP were on-road traffic, trains, off-road equipment, and certain industrial activities. DPM was the main air toxic pollutant, coming mostly from on-road and off-road mobile sources. Based on the 2017 base year emission inventory developed for the ELABHWC CERP, NOx emissions were dominated by on-road and off-road mobile sources, which accounted for 80 percent of the total emissions. Heavy-duty truck traffic, trains, and off-road equipment were the largest sources for NOx. It is estimated that vehicles subject to the Off-Road Regulation contributed to 3 percent of NOx emissions and 13 percent of DPM emissions.

4. Portside Environmental Justice Neighborhoods[94]

The main sources of air pollutant emissions identified in the published Portside Environmental Justice Neighborhoods AB 617 CERP were off-road mobile sources, on-road mobile sources, and certain area sources. On-road and off-road mobile sources were the drivers for DPM emissions in the community with the major contributors being commercial harbor craft, off-road diesel equipment, heavy-heavy duty vehicles, and medium-heavy duty vehicles. Based on the 2018 base year emission inventory developed for the Portside Environmental Justice Neighborhood CERP, it is estimated that vehicles subject to the Off-Road Regulation contributed to 6 percent of NOx emissions and 13 percent of DPM emissions.

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[92] Ramboll US Corporation et al. (2019). Imperial County: Year 1 Community Emissions Reduction Program Plan for the El Centro-Heber- Calexico Corridor. Imperial County Air Pollution District. Retrieved July 6, 2022, from *99eb03_080a305618f5453cb0c69272eb622946.pdf (icab617community.org)*

[93] South Coast AQMD. (2019a). Community Emissions Reduction Plan: East Los Angeles, Boyle Heights, West Commerce. Retrieved July 6, 2022, from *final-cerp.pdf (aqmd.gov)*

[94] San Diego County APCD. (2021). Community Emissions Reduction Plan: Portside Environmental Justice Neighborhoods. Retrieved July 6, 2022, from *Table of Contents (sdapcd.org)*

5. San Bernardino, Muscoy[95]

The main sources of air pollution emissions identified in the published SBM AB 617 CERP were on-road traffic, trains, off-road equipment, and certain industrial activities. DPM was the main air toxic pollutant, coming mostly from on-road and off-road mobile sources. Based on the 2017 base year emission inventory developed for the SBM CERP, NOx emissions in this community were dominated by on-road and off-road mobile sources, which accounted for more than 90 percent of the total emissions. It is estimated that vehicles subject to the Off-Road Regulation contributed to 8 percent of NOx emissions and 22 percent of DPM emissions.

6. South Central Fresno[96]

The main sources of air pollution emissions identified in the published South Central Fresno AB 617 CERP were heavy duty vehicles, medium duty vehicles, and passenger cars, trains, truck refrigeration units, and commercial equipment. The majority of NOx emissions in South Central Fresno are from mobile sources. Based on the 2017 base year emission inventory developed for the South Central Fresno CERP, it is estimated that vehicles subject to the Off-Road Regulation contributed to 4 percent of NOx emissions and 15 percent of DPM emissions.

7. South Los Angeles[97]

The main sources of air pollutant emissions identified in the published SLA AB 617 CERP were on-road vehicles, trains, off-road equipment, and industrial activities. DPM was the main air toxic pollutant, coming mostly from on-road and off-road mobile sources, with the major contributors being off-road equipment, heavy-duty trucks, trains, and buses. Based on the 2019 base year emission inventory developed for the SLA CERP, NOx emissions were dominated by on-road and off-road mobile sources, which accounted for 79 percent of the total emissions in 2019. Heavy-duty truck traffic and off-road equipment are the largest sources for NOx. It is estimated that vehicles subject to the Off-Road Regulation contributed to 6 percent of NOx emissions and 23 percent of DPM emissions.

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[95] South Coast AQMD. (2019b). Community Emissions Reduction Plan: San Bernardino, Muscoy. Retrieved July 6, 2022, from *https://www.aqmd.gov/docs/default-source/ab-617-ab-134/steering-committees/san-bernardino/cerp/carb-submittal/final-cerp.pdf?sfvrsn=9*

[96] San Joaquin Valley Air Pollution Control District. (2019). Community Emissions Reduction Program: South Central Fresno. Retrieved July 6, 2022, from *01finalscfresnocerp-9-19-19.pdf (valleyair.org)*

[97] South Coast AQMD. (2022). Draft Community Emissions Reduction Plan: South Los Angeles Chapter 5. Retrieved July 6, 2022, from *ch5a.pdf (aqmd.gov)*

8. Southeast Los Angeles[98]

The main sources of air pollution identified in the published SELA AB 617 CERP were on-road vehicles, trains, off-road equipment, and industrial activities. DPM was the main air toxic pollutant, coming mostly from on-road and off-road mobile sources, with the major contributors being heavy-heavy duty trucks, medium-heavy duty trucks, off-road diesel equipment, and trains. The two main sources of off-road DPM were diesel off-road equipment and trains. In this community, the largest category of off-road equipment was construction equipment, followed by industrial and commercial equipment, and TRU. Based on the 2018 base year emission inventory developed for the SELA CERP, NOx emissions were dominated by on-road and off-road mobile sources, which account for 75 percent of the total emissions. Heavy-duty truck traffic, trains, and off-road equipment are the largest sources for NOx. It is estimated that vehicles subject to the Off-Road Regulation contributed to 6 percent of NOx emissions and 24 percent of DPM emissions.

9. Stockton[99]

The main sources of air pollution emissions identified in the published Stockton AB 617 CERP were heavy duty vehicles, medium duty vehicles, passenger cars, trains, and commercial equipment. Based on the 2018 base year emission inventory developed for the Stockton CERP, it is estimated that vehicles subject to the Off-Road Regulation contributed to 7 percent of NOx emissions and 24 percent of DPM emissions.

10. West Oakland[100]

Based on the 2018 base year emission inventory developed for the West Oakland CERP, construction equipment contributed to 12 percent of DPM in the community. Off-road mobile sources account for 82 percent of the total DPM emissions. It is estimated that vehicles subject to the Off-Road Regulation contributed to 11 percent of DPM emissions.[101]

XI. Standardized Regulatory Impact Assessment

Government Code sections 11346.2(b)(2) and 11346.3(c) require the preparation of a standard regulatory impact assessment (SRIA) for a major regulation (as defined by Department of Finance (DOF) regulations). A SRIA was developed for the Proposed

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[98] South Coast AQMD. (2020). Community Emissions Reduction Plan Final: Southeast Los Angeles. Retrieved July 6, 2022, from *final-cerp.pdf (aqmd.gov)*

[99] San Joaquin Valley Air Pollution Control District. (2021). Community Emissions Reduction Program: Stockton. Retrieved July 6, 2022, from *Stockton Community Emissions Reduction Program 2021 Annual Report (valleyair.org)*

[100] Bay Area Air Quality Management District and West Oakland Environmental Indicators Project. (2019). Owning Our Air - The West Oakland Community Action Plan - Volume 1: The Plan. Bay Area Air Quality Management District. Retrieved July 6, 2022, from *final-plan-vol-1-100219-pdf.pdf (baaqmd.gov)*

[101] The published West Oakland CERP did not include NOx emissions, but focused on PM2.5, DPM, and TACs.

Amendments and released on May 26, 2022, after submission to DOF. The SRIA and response to DOF's comments on the SRIA can be found in Appendix B and C, respectively. There have been minor changes to the Proposed Amendments in addition to updates to the emission calculation methodology and direct costs since the SRIA was submitted to DOF. This chapter provides a description of the updates and the economic and health impacts of the revised methodology. Note that totals in the tables in Chapter XI of this Staff Report may not add due to rounding.

A. Benefits

1. Changes to Emission Calculation Methodology Since Release of the SRIA

Two changes were made to the emission calculation methodology to more accurately reflect the impact of actions taken to comply with the tier phase-out requirement and to include an ultra-small fleet provision that delays the phase-out date for Tier 2 engines until 2036, resulting in small changes to the emissions reductions and health impacts.

The correction to reflect actions taken to comply with the tier phase-out requirement pertains to the estimation of the emissions emitted from a new or used vehicle purchased as a replacement for a phased-out vehicle. The emissions calculations are performed for each calendar year and include the impacts of requirements that took effect in prior years as well as newer requirements phasing in to determine the emissions reductions each year the Proposed Amendments are in effect.

In the methodology used for the analysis in the SRIA, the emissions of a new replacement vehicle were calculated by taking the emissions of all vehicles not designated as low use and whose MY matches the calendar year being calculated, divided by the number of vehicles not designated as low use and whose MY matches the calendar year being calculated, repeated for each calendar year. A used vehicle is assumed to be five years old at the time of purchase, and thus the same calculation would be performed, but with the MY matching the calendar year minus five years. Notice that under this approach, the MY of the replacement vehicle is updated each calendar year so that the impacts of aging of the vehicle, while small, are not included.

With the correction, the MY is instead set to match the calendar year, or the calendar year minus five years for used replacement vehicles, of each tier phase-out rather than the calendar year being calculated. This MY is maintained across all calendar years being calculated, but separately for each tier phase-out (these take effect on different dates for the Tier 0, Tier 1, and Tier 2 phase-outs, and depend on fleet size as well). The same corrections were also applied in the calculations for Alternatives 1 and 2 that were analyzed in the SRIA. The correction results in very small changes to the emissions reductions and health impacts, but the change was still made to ensure the methodology is as accurate as possible.

The second correction is to include a provision for ultra-small fleets that delays the tier phase-out dates of the Proposed Amendments and of Alternative 2 in the SRIA to 2036. This provision was not included in the emissions calculations found in the SRIA, but the

methodology has been updated for the ISOR analysis, also resulting in small changes to the emissions reductions and health impacts.

The complete updated methodology is described in Appendix F of this Staff Report, and the updated results of the calculations are given in Chapter VIII of this Staff Report for the Proposed Amendments, and in Chapter XII of this Staff Report, sections A and B for the two main alternatives analyzed in the SRIA.

B. Direct Costs

1. Changes to the Direct Costs Since the Release of the SRIA

Three changes were made to the direct cost calculations. The first was to include an ultra-small fleet provision that delays the phase-out date for Tier 2 engines until 2036, the second was to align the contracting requirements for prime contractors and public works awarding bodies, and the third was to incorporate a new provision that was added to the Proposed Amendments after the SRIA was completed.

As mentioned in the previous section, CARB staff included an ultra-small fleet provision that delays the phase-out date for Tier 2 engines until 2036. In the SRIA analysis, the off-road vehicle costs to owners incorrectly assumed that ultra-small fleets would phase-out their Tier 2 vehicles on the same timeline as small fleets. The Proposed Amendments allow for ultra-small fleets to continue operating their Tier 2 vehicles until January 1, 2036. For purposes of the cost analysis, CARB staff assumes that all ultra-small fleets would comply with the delayed timeframe. To determine how many vehicles would be eligible for this delayed Tier 2 phase-out, CARB used data reported to CARB in DOORS for 2020 and determined that 35 percent of the Tier 2 vehicles in all reported small fleets are in fleets of less than 500 horsepower.[102] CARB staff used this percentage to adjust the vehicle turnover populations described in Section 3.1.2 of the SRIA to keep 35 percent of small fleet Tier 2 vehicles that would have been phased out January 1, 2032 in the statewide fleet until January 1, 2036. This resulted in changes in the off-road diesel vehicle costs to owners and Tier 4 vehicle maintenance costs. This same adjustment was made for Alternative 2 and the updated costs for this alternative are reported in Chapter XII of this Staff Report.

The second update aligned the contracting requirements for prime contractors and public works awarding bodies to obtain and retain copies of the Certificates of Reported Compliance for the fleet selected for the contract and their listed subcontractors, if applicable, and to only hire those fleets that have a valid Certificate of Reported Compliance. CARB removed the requirement for public works awarding bodies to report information on awarded contracts. This change was also made to both Alternatives analyzed as part of the SRIA. The updated methodology and costs are described further below.

[102] Ultra-small fleets are not currently designated separately from small fleets in CARB's reporting tool, DOORS, since these fleets have the option to comply with either the requirements for small fleets or ultra-small fleets.

The third update added costs for a newly-added provision that requires prime contractors to prominently display information regarding the applicability of this regulation and the telephone number and web address of CARB's off-road programs at each job site. The costs of this new requirement is described further below.

2. Direct Cost Inputs

a) Updates to Vehicle Costs

1) Off-Road Diesel Vehicle Costs to Owners

Minor changes were made to the methodology for calculating direct vehicle costs to owners to reflect the ultra-small fleet provision that delays the phase-out date for Tier 2 engines until 2036. This impacted the turnover population of small fleets for the Proposed Amendments. No other changes were made to the methodology for calculating direct vehicle costs to owners. A full description of this methodology can be found in Section 3.1.2 of the SRIA. A discussion of the changes to the turnover population and the updated incremental vehicle capital costs are provided below.

As described in Section 3.1.2 of the SRIA, for each year of the analysis, staff calculated the number of vehicles that would be removed from operation (vehicle turnover population) in California for both the baseline and the Proposed Amendments. The baseline turnover accounts for the vehicles that would be removed from the fleet due to the Off-Road Regulation as well as natural attrition, or what would happen in the absence of the Proposed Amendments. These vehicle turnover populations were calculated for each fleet size and engine hp group identified in Table 13 of the SRIA. To accommodate the delayed phase-out of Tier 2 engines in ultra-small fleets until January 1, 2036, staff adjusted the vehicle turnover populations for the Proposed Amendments for each engine hp group to keep 35 percent of small fleet Tier 2 vehicles that would have been phased out January 1, 2032 in the statewide fleet until January 1, 2036. The resulting vehicle population portions were then separately multiplied by the compliance path fractions in Table 14 of the SRIA and the new or used vehicle cost in Table 13 of the SRIA in their respective years. No changes were made to the baseline turnover populations for all fleet sizes, and no changes were made to the Proposed Amendments' turnover populations for large and medium fleets.

The updated incremental vehicle capital costs inclusive of sales tax are shown in Table 15. The impact to sales tax is further discussed below. The incremental vehicle capital cost is positive in years where the cost of the Proposed Amendments is larger compared to the baseline, and negative in years where the baseline has a larger capital cost. Incremental vehicle capital costs are amortized over five years at five percent interest. The unamortized costs show a pattern of positive and negative costs which primarily reflect the implementation of the tier phase-out. The baseline has larger capital costs in years where some portion of the baseline turnover population was turned over in a previous year due to implementation of the Proposed Amendments. For example, a Tier 0 engine in a large fleet may be turned over in 2024 as part of natural turnover under the baseline scenario, but the Proposed Amendments require that the vehicle be turned over in 2023. This would

potentially be reflected as a cost due to the Potential Amendments incurred in 2023, followed by savings in 2024. Finally, while fleets would most likely be able to recoup some costs by selling the retired or replaced vehicle on the used market, and while CARB staff does have data on resale values from past auctions, CARB staff decided to omit these possible recouped costs from this analysis due to the amount of uncertainty arising from the numerous factors that would impact the amount that could be recouped, including the effect of the tier phase-out, transportation costs, and condition of the vehicle, among other factors, that may deteriorate the value of the vehicle in the future. The costs in Table 15 are, therefore, a high-end estimate on vehicle capital costs and account for the full replacement costs associated with the Proposed Amendments.

Table 15. Incremental Vehicle Capital Cost, Inclusive of Sales Tax

Year	Vehicle Capital Cost (unamortized)	Vehicle Capital Cost (amortized)
2023	$1,732,369,434	$400,133,680
2024	($115,425,230)	$373,473,361
2025	$546,780,838	$499,765,955
2026	($173,267,760)	$459,745,469
2027	$914,066,616	$670,871,821
2028	($308,469,320)	$199,489,502
2029	$84,591,133	$245,688,241
2030	($271,761,357)	$56,625,623
2031	($109,322,922)	$71,395,269
2032	($238,645,601)	($194,852,203)
2033	($210,714,449)	($172,273,292)
2034	($188,590,565)	($235,371,379)
2035	($112,837,583)	($198,663,992)
2036	($147,794,025)	($207,549,848)
2037	($125,910,016)	($181,510,769)

Year	Vehicle Capital Cost (unamortized)	Vehicle Capital Cost (amortized)
2038	($108,650,368)	($157,936,538)
Total Net Costs	$1,166,418,825	$1,629,030,900

2) Sales Tax

CARB staff made no changes to the sales tax methodology since the release of the SRIA. Off-road diesel vehicles purchased in California incur a sales tax on top of the purchase price. CARB staff used an average sales tax rate of 8.6 percent and applied the sales tax to the capital cost for off-road diesel vehicles based in California.

3) Maintenance Costs

CARB staff made no changes to the methodology for calculating maintenance costs of Tier 4 vehicles since the release of the SRIA. However, to accommodate the delayed phase-out of Tier 2 engines in ultra-small fleets, the Proposed Amendments' turnover population for small fleets was updated as discussed previously in the section on direct vehicles costs. These same vehicle populations are used to determine the number of Tier 4 vehicles in the fleet for each analysis year. The updated incremental Tier 4 off-road diesel vehicle maintenance costs are found in Table 16.

Table 16. Incremental Off-Road Diesel Vehicle Tier 4 Maintenance Cost of Proposed Amendments over Baseline

Year	Maintenance DPF Cost	Maintenance DEF Cost
2023	$0	$0
2024	$816,288	$1,100,245
2025	$816,288	$1,100,245
2026	$1,338,313	$1,564,834
2027	$1,338,313	$1,564,834
2028	$2,509,188	$2,348,679
2029	$2,509,188	$2,348,679
2030	$3,020,288	$2,610,979

Year	Maintenance DPF Cost	Maintenance DEF Cost
2031	$3,020,288	$2,610,979
2032	$3,304,813	$2,722,837
2033	$3,304,813	$2,722,837
2034	$3,304,813	$2,722,837
2035	$3,304,813	$2,722,837
2036	$3,456,813	$2,782,479
2037	$3,456,813	$2,782,479
2038	$3,456,813	$2,782,479
Total	$38,957,838	$34,488,260

b) Contracting Costs

The Proposed Amendments include new contracting requirements to ensure that prime contractors and public works awarding bodies only hire compliant fleets. These requirements align requirements and costs that were previously analyzed in the SRIA for prime contractors and public works awarding bodies. The requirements for prime contractors did not change significantly since the SRIA analysis for prime contractors, therefore CARB also not make any changes to the inputs or methodology for calculating contracting costs for prime contractors (reported in the SRIA as Administrative Costs for Prime Contractors, Section 3.1.5.2). However, the alignment of the contracting requirements did change the requirements for public works awarding bodies and required an updated costs analysis from what was previously analyzed in the SRIA Section 3.1.5.1.

CARB estimated the contracting costs to public works awarding bodies using the same methodology as prime contractors because the proposed requirements are the same for all contracting entities. In order to estimate the potential costs to public works awarding bodies, CARB staff analyzed three key factors: 1) the number of contracted public works projects in California that utilize off-road diesel vehicles, 2) the number of hours needed by a public works awarding body staff person to verify compliance and maintain records, and 3) the job classification and labor rate of the staff person who would most likely be performing this work.

To analyze the potential number of public works projects occurring annually in California, CARB staff reviewed several cities' Capital Improvement Plans[103] [104] [105] [106] [107] [108] [109] to understand how many public works projects cities typically initiate annually that would require the use of off-road diesel machinery. After looking at several plans, it became clear that cities with larger populations had a larger number of projects, so CARB staff categorized cities into large cities (population greater than 400,000) and small cities, then averaged the number of capital improvement projects for each city category to get an estimate of annual projects of all the cities in California. Small cities had an average of 14 projects per year, and large cities had an average of 100 projects per year. Taking the total number of cities in California to be 482 (9 of which are large under CARB staff's assumptions) resulted in an estimated 7,522 capital improvement projects from all cities annually.

Many projects implemented by cities are maintenance or on-call type projects that are not included in Capital Improvement Plans. CARB staff could not find data showing the number of these types of projects, so CARB staff assumed the number of these projects would be much greater than what is included in the Capital Improvement Plans because these plans generally include very large projects, and assumed these smaller types of projects were triple that of capital improvement projects. The total number of maintenance projects by cities was estimated to be 22,566 projects, which results in cities being assumed to have a total of 30,088 projects annually.

In addition to cities, other governmental bodies, including counties, transportation districts, school districts, and State agencies, also play the role of public works awarding bodies, but CARB staff were not able to find data that show the number of annual projects for these entities. To determine the number of projects these governmental bodies initiate each year, CARB staff compared each of these other types of public agencies to cities in terms of agency size, number of such entities, area of jurisdiction, and typical construction activity. CARB staff projected the number of projects of these other government bodies as a factor of

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[103] City of San Diego. (2022). Capital Improvement Program Project List. Retrieved August 15, 2022 from *https://cipapp.sandiego.gov/cipdistrictnav.aspx*

[104] City of Temecula. (2022). Department of Public Works Project Status Report. Retrieved July 26, 2022, from *https://temeculaca.gov/DocumentCenter/View/5081/Infrastructure-Projects*.

[105] City of Santa Rosa. (2022). Capital Improvement Project List. City of Santa Rosa. Retrieved March 2022, from *http://cippublic.srcity.org/ciplist.html*.

[106] City of Los Angeles. (2021). Capital and Technology Improvement Program 2021-22 to 2025-26. Retrieved April 5, 2022, from *https://cao.lacity.org/capital/Five-Year%20Capital%20and%20Technology%20Improvement%20Program%20(CTIP)%20-%202021-22%20to%202025-26.pdf*

[107] City of South San Francisco. (2021). Capital Improvement Program 2021-22. Retrieved April 5, 2022, from *https://www.ssf.net/home/showpublisheddocument/24189/637632507801070000*.

[108] City of Sacramento. (2016). 2016-2021 Approved Capital Improvement Program – 2016. Retrieved April 5, 2022, from *https://www.cityofsacramento.org/-/media/Corporate/Files/Finance/Budget/2016-2021CIP/A015-Index-L-Projects-Receiving-New-Funding-by-Funding-Source.pdf?la=en*.

[109] City of Oakland. (2021). Capital Improvement Program: Adopted Fiscal Year 2021-23. Retrieved April 5, 2022, from *FY-21-23-Adopted-CIP-Book-9.29.21.pdf (cao-94612.s3.amazonaws.com)*

the number of projects of a city. Table 17 depicts the results of Staff's projection. These results are based on the best available data and on broad assumptions, and are intended to be on the high end, to ensure costs are not underestimated.

Table 17. Estimated Number of Public Works Projects Initiated in California Each Year

Type of Entity	Number of Projects Each Year
Cities	30,088
Counties	5,800
Special Districts	62,820
UC Campus	150
Cal State Campus	345
State Agencies	942
Total	**100,145**

Next CARB staff analyzed the amount of labor required for a public works awarding body to comply with the proposed new requirements. CARB anticipates that the number of labor hours required to implement these provisions would vary greatly, based on the size of the project. For a small project, a public works awarding body may only need to verify the Certificate of Reported Compliance for 1 or 2 fleets. For a large project, however, a public works awarding body may need to verify the Certificate of Reported Compliance for many fleets. Public contracting, generally, is a formalized process and CARB expects that, with the existing procedures that the public works awarding bodies have in place, the submittal and verification of the Certificates of Reported Compliance would be streamlined and consistent with other forms of documentation that contractors must submit to public works awarding bodies as part of the contracting process. Therefore, CARB anticipates the verification of the Certificates of Reported Compliance would take between 5 minutes for a small project to upwards of 45 minutes for a larger project. Based on this understanding, CARB staff decided to use 25 minutes, which is the average amount of time needed to comply with these requirements, recognizing that an individual public works awarding body could require quite a bit more or less time to comply with the requirements.

Finally, CARB assumed an office and administrative support staff person would perform the verification of the Certificate of Reported Compliance for the public works awarding bodies,

and using the U.S. Bureau of Labor Statistics data,[110] CARB assigned a to this reporting work a labor rate of $30.16 an hour, which is adjusted for total compensation rate.

Taking an estimate of 100,145 projects initiated in California by public works awarding bodies each year, an average of 25 minutes to report information to CARB for each project, and a labor rate of $30.16 per hour, the total potential annual cost to all public works awarding bodies across the State from the Proposed Amendments' contracting requirement is estimated to be $1,258,489.

c) Signage Costs for Prime Contractors

The Proposed Amendments include a new requirement for prime contractors that require them to prominently display information regarding the applicability of this regulation and the telephone number and web address of CARB's off-road programs at each job site. To comply with this requirement, CARB assumes that most prime contractors will post a sign. The Proposed Amendments include the specific language that is required to be posted and CARB will provide prime contractors with a design for a sign, available electronically, that prime contractors can use to meet the signage requirements of the Proposed Amendments. As a result, CARB does not anticipate that prime contractors will have costs associated with the design of the sign. CARB also does not anticipate prime contracts will have costs associated with posting the sign in a prominent location since the prime contractor will have a presence at the job site even without this requirement. However, CARB staff did estimate costs with the printing of the sign.

To determine the costs associated with printing the sign, staff used the estimated number of annual projects identified for the Administrative Costs for Prime Contractors, which was 200,156. CARB staff gathered costs associated with a prime contractor printing the sign using their own equipment or printing the sign through a retail outlet, such as FedEx Office or Staples. CARB staff assumed 50 percent of prime contractors would self-print and 50 percent would print through a retail outlet. CARB staff estimates the cost of one sheet of waterproof and tear resistant paper is about $0.80.[111] As of June 2022, it costs $1.79 to print a black and white sign on waterproof and tear resistant paper at FedEx.

To determine the labor costs of printing the sign, CARB assumed a first line supervisor for construction trades and extraction workers would be the most likely staff person to implement these requirements for the prime contractor, and using the U.S. Bureau of Labor Statistics data,[112] CARB determined the labor rate to be $56.17 an hour, adjusted for total compensation rate. CARB Staff estimates that it would take 5 minutes to self-print, resulting

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[110] U.S. Bureau of Labor Statistics. (2020). State Occupational Employment and Wage Estimates – May 2020. U.S Bureau of Labor Statistics. Retrieved July 13, 2022 from https://www.bls.gov/oes/2020/may/oes_ca.htm.

[111] Rite in the Rain Store. (n.d.). Rite in The Rain Waterproof (Durante) Copier Paper, 8 ½" x 11". Amazon.com. Retrieved June 25, 2022, from *Amazon.com : Rite In The Rain Waterproof (DURARITE) Copier Paper, 8 1/2" x 11", White, 100 Sheet Pack (6511) : Laser Printer Paper : Office Products*.

[112] U.S. Bureau of Labor Statistics. (2020). State Occupational Employment and Wage Estimates – May 2020. U.S Bureau of Labor Statistics. Retrieved July 13, 2022, from *https://www.bls.gov/oes/2020/may/oes_ca.htm.*

in a labor cost of $4.49, and 30 minutes to print at a retail outlet, resulting in a labor cost of $28.09.

Total costs per project could range from $5.29 to self-print to $29.88 to print at a retail outlet. Using the estimate that half of prime contractors would self-print and half would print through a retail outlet, CARB staff estimates the annual cost of this requirement to be $3,519,603 beginning in 2024.

3. Total Direct Costs

Table 18 shows the total statewide costs and cost savings for the Proposed Amendments with the updates described in the previous sections. The analysis assumed that businesses finance vehicle capital costs. If regulated entities cannot obtain loans, then the upfront costs in certain years would be higher than the annualized cost. This table includes direct costs and cost savings for businesses in addition to costs to local, State and federal governments. Administrative costs to public works awarding bodies are attributed solely to local and State government.

Table 18. Total Statewide Incremental Costs and Savings for the Proposed Amendments

Year	Annual Vehicle Capital Costs (amortized, with tax)	Tier 4 final Maintenance Costs	Contracting Costs	Signage Costs	Total Costs	Total Savings	Total Net Costs
2023	$400,133,680	$0	$0	$0	$400,133,680	$0	$400,133,680
2024	$373,473,361	$1,916,532	$12,501,229	$3,519,603	$391,410,725	$0	$391,410,725
2025	$499,765,955	$1,916,532	$12,501,229	$3,519,603	$517,703,319	$0	$517,703,319
2026	$459,745,469	$2,903,146	$12,501,229	$3,519,603	$478,669,447	$0	$478,669,447
2027	$670,871,821	$2,903,146	$12,501,229	$3,519,603	$689,795,799	$0	$689,795,799
2028	$199,489,502	$4,857,867	$12,501,229	$3,519,603	$220,368,201	$0	$220,368,201
2029	$245,688,241	$4,857,867	$12,501,229	$3,519,603	$266,566,940	$0	$266,566,940
2030	$56,625,623	$5,631,267	$12,501,229	$3,519,603	$78,277,721	$0	$78,277,721
2031	$71,395,269	$5,631,267	$12,501,229	$3,519,603	$93,047,367	$0	$93,047,367
2032	($194,852,203)	$6,027,650	$12,501,229	$3,519,603	$22,048,482	($194,852,203)	($172,803,722)
2033	($172,273,292)	$6,027,650	$12,501,229	$3,519,603	$22,048,482	($172,273,292)	($150,224,810)
2034	($235,371,379)	$6,027,650	$12,501,229	$3,519,603	$22,048,482	($235,371,379)	($213,322,898)
2035	($198,663,992)	$6,027,650	$12,501,229	$3,519,603	$22,048,482	($198,663,992)	($176,615,511)
2036	($207,549,848)	$6,239,292	$12,501,229	$3,519,603	$22,260,124	($207,549,848)	($185,289,724)
2037	($181,510,769)	$6,239,292	$12,501,229	$3,519,603	$22,260,124	($181,510,769)	($159,250,645)
2038	($157,936,538)	$6,239,292	$12,501,229	$3,519,603	$22,260,124	($157,936,538)	($135,676,414)
Total	$1,629,030,900	$73,446,097	$187,518,435	$52,794,045	$3,290,947,498	($1,348,158,021)	$1,942,789,477

C. Direct Costs on Individuals

The Proposed Amendments would not result in any direct costs on individuals. CARB staff anticipates that the Proposed Amendments could result in indirect costs to individuals to the extent that compliance costs are passed through to consumers of construction, mining, industrial, government, and other industries. However, CARB staff also believes that it is unlikely that indirect costs would be passed on to residents of new residential housing, as discussed below. CARB staff analyzed the potential impact to new residential construction on a per unit basis based on forecasted production of new residential units and the needed units to meet California's housing needs identified in the 2022 Statewide Housing Plan.[113] It is important to consider the housing needs established in the Statewide Housing Plan as these inform legal obligations through the Regional Housing Needs Assessment (RHNA), which dictates how much housing local governments must plan to accommodate. The results and methodology for CARB's analysis are found in Appendix C of the SRIA.

Governor Newsom has prioritized tackling California's housing crisis though a comprehensive housing vision focusing on 4 key areas: streamlining the building of new homes, breaking down barriers to build more affordable housing, addressing systemic bias by elevating fair housing principles, and holding local governments accountable to do their job. To achieve this, the Governor signed a housing package with 31 legislative bills in 2021 that touches on all 4 key areas, which will result in local governments needing to plan for the creation of more than 2.5 million units statewide – more than doubling their obligation under the previous RHNA cycle. This suite of legislation is complemented by a $22 billion investment in housing as part of the California Comeback Plan. CARB's analysis is projecting potential impacts based on today's conditions; however, this robust package of legislation and funding provide a basis for extensive growth in the residential housing sector through the next decade.

Developing residential housing in California is complex, with multiple facets combining that add to the cost of development. These include land acquisition, hard construction costs, development fees, permitting and development timelines, financing, and regulations. Hard construction costs are those directly related to construction and are a significant percentage of total development costs. These costs are primarily driven by labor (prevailing wages) and materials (e.g., wood, concrete, plastics, composites, steel, etc.);[114] vehicles, such as those subject to the Proposed Amendments, are not generally factored into cost drivers of residential housing in California.

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[113] California Department of Housing and Community Development. (2022). A Home for Every Californian 2022 Statewide Housing Plan. Statewide Housing Plan. Retrieved July 12, 2022, from *https://storymaps.arcgis.com/stories/94729ab1648d43b1811c1698a748c136/print*

[114] Raetz, H. et al., (2020). The Hard Costs of Construction: Recent Trends in Labor and Materials Costs for Apartment Buildings in California. Tener Center for Housing Innovation. Retrieved July 11, 2022, from *Hard_Construction_Costs_March_2020.pdf (berkeley.edu)*

CARB estimates that there could potentially be a one-time cost per unit (calculated based on forecasted units) of $236 to $1,042, which represents 0.04 to 0.3 percent of the cost of a typical new residential unit, or a one-time cost per unit (calculated based on housing needs) of $117 to $487, which represents 0.02 to 0.1 percent of the cost of a typical new residential unit. If these costs were fully passed along to consumers of newly-constructed, for-sale housing, this could potentially add $1 to $5 a month to a 30-year mortgage at a 4 percent interest rate for some households purchasing newly-constructed housing after the year 2023. For residents of new rental housing constructed after the year 2023, if estimated costs were fully passed along to consumers, the potential additional cost would likely be less than that for consumers of for-sale housing and would likely be lower on a per-unit basis. This is because construction costs for these units are likely to be financed over a longer period time, and because of economies of scale in multi-family housing construction, which is the form of housing in which the majority of rental housing is likely to be produced. Importantly, for residents of deed-restricted low- and moderate-income affordable housing, any potential costs passed through to residential construction projects would not impact out-of-pocket expenses (i.e. monthly rent) to residents because these units are subject to rent restrictions based on area median incomes as established by the federal government.

D. Macroeconomic Impacts

1. Changes to the Macroeconomic Analysis Since the Release of the SRIA

The Regional Economic Models, Inc. (REMI) model's National and Regional Control was updated to conform to the most recent DOF economic forecasts which include U.S. Real Gross Domestic Product, income, and employment, as well as California civilian employment by industry, released with the 2022-23 May Revision to the Governor's Budget, released on May 13, 2022, and DOF demographic forecasts for California population forecasts, last updated in July 2021.[115,116,117,118] Since the DOF economic forecasts extend to 2025, CARB

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[115] California Department of Finance. (2022a). California Economic Forecast – Annual & Quarterly, April 2022. California Department of Finance Economic Research Unit. Retrieved July 12, 2022, from *California-Economic-Forecast-MR-2022-23.xlsx (live.com)*

[116] California Department of Finance. (2022b). National Economic Forecast – Annual & Quarterly, April 2022. California Department of Finance Economic Research Unit. Retrieved July 14, 2022, from *United-States-Economic-Forecast-MR-2022-23.xlsx (live.com)*

[117] California Department of Finance. (2022c) National Deflators: Calendar Year averages: from 1929, April 2022. California Department of Finance Economic Research Unit. Retrieved July 14, 2022, from *Implicit-Price-Deflators-CY.xlsx (live.com)*

[118] California Department of Finance (2021). Demographic Research Unit. Report P-3: Population Projections, California, 2010-2060 (Baseline 2019 Population Projections; Vintage 2020 Release). California Department of Finance. Retrieved July 14, 2022, from *P3_California-and-Counties.xlsx (live.com)*

staff made assumptions that post-2025, economic variables would continue to grow at the same rate projected in the REMI baseline forecasts.

2. The creation or elimination of jobs within the State of California.

The Proposed Amendments are estimated to have a marginally negative impact on statewide employment from 2023 to 2031, and then a positive impact on statewide employment from 2032 to 2038 when compared to the baseline. The results suggest that the estimated negative employment impact for the initial years is primarily from increased production costs due to increases in vehicle purchase costs, maintenance costs, and contracting costs as a result of the Proposed Amendments in the industries described in Table 19. This is caused by the Proposed Amendments' requirement to accelerate the replacement or retirement of vehicles with older engine Tiers between 2023 and 2031, which displaces natural turnover that would have happened after 2031. The decrease in vehicle capital investment and production costs after 2031 results from the vehicle purchases and replacement that have already happened in the time period between 2023 to 2038. Overall, the change in total employment is anticipated to be small, relative to the baseline employment for the California economy. The year with the largest employment change is in 2027, which represents a 0.04 percent decrease relative to baseline California employment.

In 2038, the Proposed Amendments are estimated to add 2,749 jobs and a eliminate 18 jobs. The number of jobs created and eliminated from 2023 to 2038 are presented in Table 20 by year, as well as the net change for each year when compared to the baseline employment in California.

Table 19. Industries Impacted by the Proposed Amendments

Industry	NAICS Code	Percent of Vehicle Population
Mining, quarrying, and oil and gas extraction	21	10%
Construction	23	53%
Air transportation	481	3%
Commercial and industrial machinery and equipment rental and leasing	5324	15%
Waste management and remediation services	562	4%

Industry	NAICS Code	Percent of Vehicle Population
Services to buildings and dwellings	5617	5%
Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance	8113	5%
State Government	N/A	1%
Local Government	N/A	3%
Federal Civilian	N/A	1%
Total		100%

Table 20. Jobs Created and Eliminated by Year

Year	Jobs Created	Jobs Eliminated	Net Change	% Change
2023	1,294	-3,501	-2,206	-0.01%
2024	59	-8,196	-8,137	-0.03%
2025	184	-9,045	-8,862	-0.04%
2026	47	-10,753	-10,706	-0.04%
2027	259	-11,438	-11,179	-0.04%
2028	53	-7,538	-7,485	-0.03%
2029	69	-5,813	-5,744	-0.02%
2030	66	-3,072	-3,006	-0.01%

Year	Jobs Created	Jobs Eliminated	Net Change	% Change
2031	370	-2,184	-1,815	-0.01%
2032	2,607	-448	2,159	0.01%
2033	3,036	-231	2,804	0.01%
2034	4,115	-54	4,061	0.02%
2035	3,906	-26	3,880	0.02%
2036	3,801	-29	3,772	0.01%
2037	3,296	-22	3,274	0.01%
2038	2,749	-18	2,731	0.01%

The overall trend in employment changes by major sector is illustrated in Figure 17. Some major sectors will see gains in employment, while other major sectors may see decreases in employment. The construction and services sectors are estimated to make up the largest proportion of jobs created and eliminated. Because the construction sector represents more than 50 percent of the total off-road diesel vehicle population subject to the Proposed Amendments, this sector will experience relatively larger impacts on employment. The services sector, which also sees large job impacts, includes the following industries that are directly affected by the Proposed Amendment: services to buildings and dwellings; waste management and remediation services; commercial and industrial machinery and equipment repair and maintenance; office administrative services; and facilities support services.

Figure 17. Changes in Employment by Major Sector

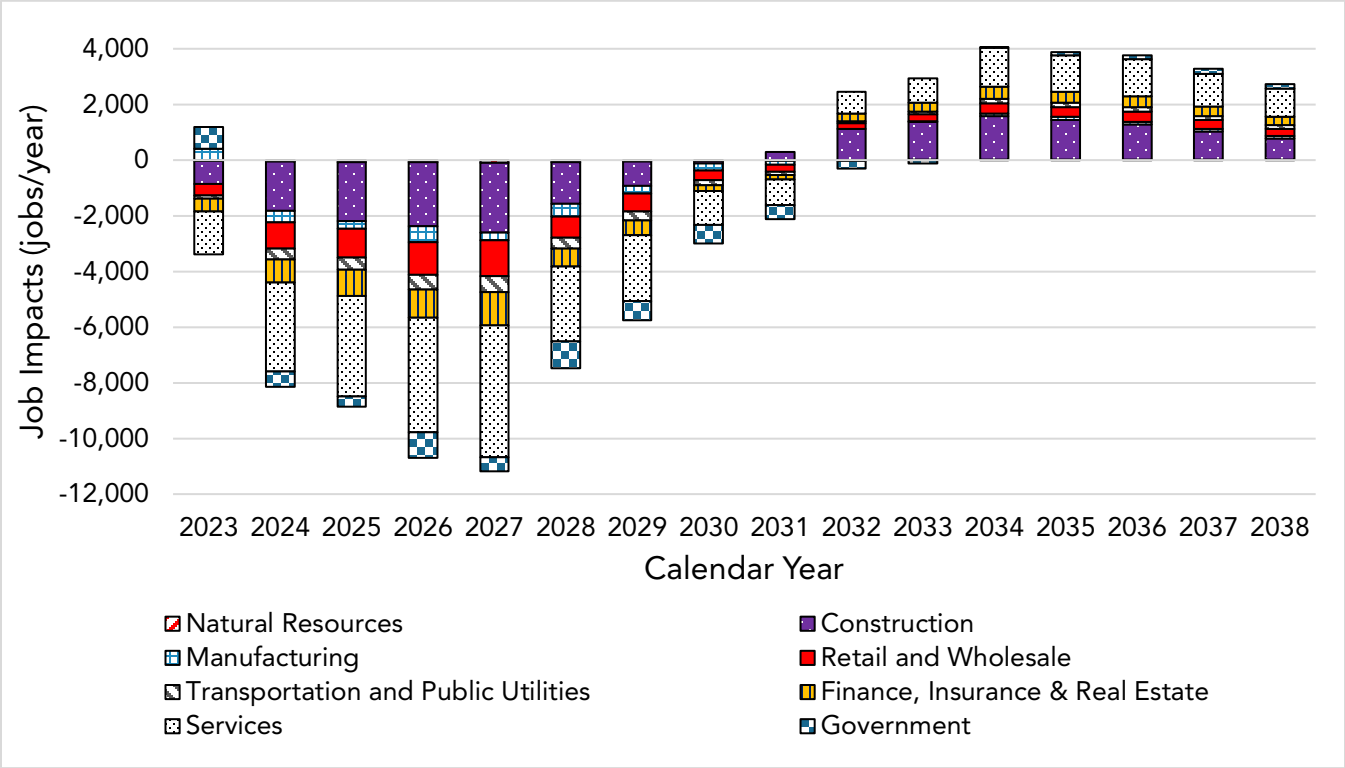

Table 21 shows the changes in employment by industries that are directly-impacted by the Proposed Amendments. Of these directly-impacted industries, mining, construction, and commercial and industrial machinery and equipment rental and leasing are estimated to see the greatest impacts to employment, with an approximately 0.2 percent decrease in baseline employment in 2027.

Table 21. Employment Impacts by Industries

	Mining (21)		Construction (23)		Air transportation (481)		Commercial and industrial machinery and equipment rental and leasing (5324)		Services to buildings and dwellings (5617)		Waste management and remediation services (562)		Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance (8113)		State and Local Government	
Year	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change
2023	-25	-0.07%	-824	-0.06%	-25	-0.04%	-17	-0.05%	-79	-0.02%	-7	-0.01%	-13	-0.04%	779	0.03%
2024	-47	-0.13%	-1773	-0.14%	-39	-0.06%	-32	-0.10%	-177	-0.04%	-23	-0.04%	-31	-0.09%	-548	-0.02%
2025	-60	-0.17%	-2132	-0.16%	-50	-0.07%	-44	-0.13%	-202	-0.05%	-27	-0.04%	-41	-0.11%	-375	-0.02%
2026	-68	-0.19%	-2309	-0.18%	-54	-0.07%	-53	-0.16%	-233	-0.05%	-33	-0.05%	-51	-0.14%	-926	-0.04%
2027	-81	-0.23%	-2515	-0.19%	-68	-0.09%	-66	-0.19%	-266	-0.06%	-37	-0.06%	-62	-0.17%	-506	-0.02%
2028	-61	-0.18%	-1495	-0.12%	-34	-0.05%	-55	-0.16%	-167	-0.04%	-28	-0.05%	-54	-0.14%	-974	-0.04%
2029	-50	-0.15%	-875	-0.07%	-32	-0.04%	-50	-0.14%	-142	-0.03%	-24	-0.04%	-49	-0.13%	-684	-0.03%
2030	-33	-0.10%	-94	-0.01%	-16	-0.02%	-39	-0.11%	-79	-0.02%	-16	-0.03%	-39	-0.10%	-683	-0.03%
2031	-23	-0.07%	296	0.02%	-13	-0.02%	-32	-0.09%	-58	-0.01%	-12	-0.02%	-33	-0.08%	-487	-0.02%
2032	-1	0.00%	1128	0.09%	11	0.01%	-15	-0.04%	35	0.01%	0	0.00%	-16	-0.04%	-272	-0.01%
2033	9	0.03%	1366	0.11%	12	0.02%	-5	-0.01%	48	0.01%	3	0.01%	-7	-0.02%	-128	-0.01%

	Mining (21)		Construction (23)		Air transportation (481)		Commercial and industrial machinery and equipment rental and leasing (5324)		Services to buildings and dwellings (5617)		Waste management and remediation services (562)		Commercial and industrial machinery and equipment (except automotive and electronic) repair and maintenance (8113)		State and Local Government	
Year	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change	Change in Jobs	% Change
2034	19	0.06%	1547	0.12%	19	0.03%	5	0.01%	80	0.02%	9	0.01%	3	0.01%	27	0.00%
2035	22	0.07%	1418	0.11%	18	0.02%	10	0.03%	78	0.02%	10	0.02%	8	0.02%	124	0.01%
2036	24	0.07%	1251	0.10%	19	0.03%	14	0.04%	80	0.02%	11	0.02%	13	0.03%	149	0.01%
2037	24	0.07%	1006	0.08%	17	0.02%	17	0.04%	72	0.02%	11	0.02%	15	0.04%	166	0.01%
2038	22	0.07%	754	0.06%	15	0.02%	17	0.05%	63	0.01%	10	0.02%	16	0.04%	165	0.01%

3. The creation of new businesses or the elimination of existing businesses within the State of California.

Regional Economic Models, Inc. (REMI) Policy Insight Plus Version 2.5.0 is used to estimate the macroeconomic impacts of the Proposed Amendments on the California economy. Although the REMI model cannot directly estimate the creation or elimination of businesses the model does predict changes in the number of jobs and output in the California economy which can be used to understand some of the potential impacts to businesses and is discussed in the next section. Initially California will see job losses, but the overall impact will be a slight growth in employment which suggests that the Proposed Amendments will have a minimal impact on business operations. As off-road fleets and regulated entities face compliance costs, the potential for some of these businesses to be eliminated cannot be ruled out.

Section D.2 of this Chapter describes the statewide employment impacts of the Proposed Amendments. The overall jobs and output impacts are small relative to the total California economy. The largest employment and output decreases in the State are estimated to be about 0.04 percent in 2025, 2026 and 2027. Reductions in output could indicate the elimination of businesses. Within the primary industries impacted, mining and construction are estimated to see the greatest negative impact in 2027, with an approximate 0.2 percent decrease in employment relative to baseline employment in 2027 (See Table 19). Conversely, increased output within an industry could signal the potential for additional business creation if existing businesses cannot accommodate all future demand. There is no threshold that identifies the creation or elimination of business. The overall net loss of 36,458 jobs over the lifetime of the Proposed Amendments results in a decrease of approximately 0.01 percent when compared to the employment levels of California overall which suggests very little impact on business operations.

4. The expansion of businesses currently doing business within the State of California.

The increased demand for newer vehicles due to the tier phase-out requirements would also increase sales of off-road diesel vehicles, resulting in additional income for businesses involved in the manufacture and distribution of off-road diesel vehicles, including vehicle and parts manufacturers, dealers, financial institutions, as well as consultant companies that advise companies on compliance with the regulation's changes.

5. Significant statewide adverse economic impact directly affecting business, including ability to compete

The Executive Officer has made an initial determination that the proposed regulatory action would not have a significant statewide adverse economic impact directly affecting businesses, including the ability of California businesses to compete with businesses in other states, or on representative private persons.

6. The competitive advantages or disadvantages for businesses currently doing business within the State of California

CARB staff do not anticipate impacts to the competitive advantage or disadvantage of businesses currently doing business in the State. The Proposed Amendments impose requirements equally on all fleets that operate off-road diesel vehicles in California, whether the business that owns or operates them is based in-state or out-of-state. If an out-of-state business wants to operate vehicles subject to the Off-Road Regulation, it would need to comply with all requirements of the regulation, just as an in-state business would. In addition, the work performed by these off-road diesel vehicles is bound to the job site, and requires large infrastructure investments, such as mining and construction activities. Therefore, it is unlikely the directly-impacted businesses will move out of the State.

7. The increase or decrease of investment in the State of California

Private domestic investment consists of purchases of residential and nonresidential structures and of equipment and software by private businesses and nonprofit institutions. It is used as a proxy for impacts on investments in California because it provides an indicator of the future productive capacity of the economy.

The relative changes to growth in private investment due to the Proposed Amendments are shown in Table 22. Private domestic investment is estimated to show a decrease of $256 million in 2023 compared to the baseline private investment value. The highest decrease of private investment is $806 million in 2027. Revenue available for investment will decrease as business operating costs increase due to vehicle purchases early in the regulatory horizon, which is followed by an increase in private investment as businesses have additional revenue associated with savings in operational and maintenance costs, resulting in an increase in private investment of $225 million by 2038. Businesses are expected to continue to realize increases in investments for several years past the lifetime of this analysis. In any given year, this represents changes of 0.15 percent or less than that of baseline investment.

Table 22. Change in Gross Domestic Investment

Year	Private Investment (2020M$)	Change (2020M$)	% Change
2023	459,700	-256	-0.06%
2024	486,249	-485	-0.10%
2025	506,747	-631	-0.12%
2026	514,069	-692	-0.13%

Year	Private Investment (2020M$)	Change (2020M$)	% Change
2027	522,237	-806	-0.15%
2028	529,139	-528	-0.10%
2029	538,147	-376	-0.07%
2030	544,777	-155	-0.03%
2031	551,330	-44	-0.01%
2032	559,148	204	0.04%
2033	567,345	294	0.05%
2034	576,053	370	0.06%
2035	585,090	357	0.06%
2036	594,054	333	0.06%
2037	603,669	282	0.05%
2038	614,188	225	0.04%

8. The incentives for innovation in products, materials, or processes

The Proposed Amendments will further reduce emissions from off-road diesel equipment operating in California by phasing out the use of the most polluting vehicles. The Proposed Amendments target the removal of vehicles with Tier 0, 1, and 2 engines and require the vehicles to be replaced with the cleanest available technology. The Tier 4 final engine standard has been in use since the late 2010's. Hence, the Proposed Amendments' requirements can be met with existing technology and will not be driving innovation in terms of engine standards. However, the Proposed Amendments include an optional flexibility provision for fleets that want to incorporate zero-emission technology into their fleets. CARB staff does not assume any benefits or costs associated with this provision, as it is optional. The Proposed Amendments provide an opportunity for fleets wanting to participate in the beachhead innovation of off-road zero-emission technology to obtain additional compliance flexibility. The compliance flexibility offered in the Proposed Amendments could create a staging ground for fleets to initiate and improve their experience with zero-emission

technology. While this provision provides opportunities, the degree to which it will be employed will depend on individual fleets' decisions and are not quantified.

9. The benefits of the regulation to the health and welfare of California residents, worker safety, and the state's environment.

The Proposed Amendments will benefit individual California residents (and worker exposure) mainly by reducing adverse health impacts caused by NOx and PM emissions. A detailed review of the benefits of the Proposed Amendments can be found in Chapter VIII of this Staff Report.

XII. Evaluation of Regulatory Alternatives

Government Code section 11346.2, subdivision (b)(4) requires CARB to consider and evaluate reasonable alternatives to the proposed regulatory action and provide reasons for rejecting those alternatives. This section discusses alternatives evaluated and provides reasons why these alternatives were not included in the proposal. As explained below, no alternative proposed was found to be less burdensome and equally effective in achieving the purposes of the regulation in a manner than ensures full compliance with the authorizing law. The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business.

During the development process of the Proposed Amendments, CARB staff solicited public input regarding alternatives to achieving the Regulation's goals. CARB staff requested input on alternatives in multiple public workshops since May 2021. Staff evaluated several alternatives to the proposal, including suggestions from both public and industry stakeholders.

Staff has selected two alternatives to the Proposed Amendments for formal evaluation in Sections A and B, which includes an analysis of cost impacts and health benefits of each alternative and a discussion of why the alternative was rejected. It is important to note that two of the alternatives listed here for formal evaluation are the same as those that staff considered for the SRIA (Appendix B); however, the costs and benefits have been updated since the SRIA was completed, and those updates are discussed in Chapter XI of this Staff Report and reported below. Staff identified and evaluated several other alternatives based on stakeholder comments, which are descried in further detail below. Note that totals in the tables in Chapter XI of this Staff Report may not add due to rounding.

A. Delayed Requirements with Additional Provisions for Small and Ultra-Small Fleets Alternative (SRIA Alternative 1)

1. Description of Alternative

SRIA Alternative 1 is a less stringent requirement for fleets that own and operate the vehicles subject to the Proposed Amendments. SRIA Alternative 1 adjusts the Proposed Amendments

by delaying the phase-out of vehicles with Tier 0, 1, and 2 engines by 2 years. Additionally, SRIA Alternative 1 does not implement a phase-out of Tier 2 engines for small and ultra-small (<500 HP) fleets. SRIA Alternative 1 also delays the restrictions on adding Tier 3 and Tier 4 Interim vehicles to a fleet by two years when compared to the Proposed Amendment. SRIA Alternative 1 does not require fleets to transition to RD99/100. This alternative would not make changes to the contracting or prime contractor requirements. Key elements of SRIA Alternative 1 include the following:

- Requirements for the tier phase-out are adjusted based on the schedule in Table 23. Some exemptions apply, such as using a vehicle less than 200 hours per year (i.e., low-use). For all fleet sizes, low-use vehicles with Tier 0 or a MY 1994 or earlier on-road engines would be required to be phased-out by January 1, 2036.

Table 23. Tier and MY Phase-Out Dates by Fleet Size for SRIA Alternative 1

Year (January 1)	Large Fleets	Medium Fleets	Small Fleets[119]
2026	Tier 0/MY 1994 or older on-road		
2028	Tier 1/MY 1999 or older on-road	Tier 0/MY 1994 or older on-road	
2030	Tier 2/MY 2003 or older on-road	Tier 1/MY 1999 or older on-road	Tier 0/MY 1994 or older on-road
2032		Tier 2/MY 2003 or older on-road	Tier 1/MY 1999 or older on-road

- Requirements for the restrictions on the addition of a Tier 3 or Tier 4i vehicle or a MY 2006 or older on-road vehicle to a fleet are adjusted based on the schedule in Table 24.

Table 24. Compliance Dates for the Restrictions on Adding Vehicles for SRIA Alternative 1

Year (January 1)	Large Fleets	Medium Fleets	Small and Ultra-Small Fleets
2024	Tier 3		

[119] Ultra-small fleets would not have additional phase-out requirements under Alternative 1.

Year (January 1)	Large Fleets	Medium Fleets	Small and Ultra-Small Fleets
2026	Tier 4i/MY 2006 or older on-road	Tier 3	
2028		Tier 4i/MY 2006 or older on-road	Tier 3
2030			Tier 4i/MY 2006 or older on-road

This alternative aligns with proposals and comments made by stakeholders advocating for delayed implementation of several key elements to the Proposed Amendments and to not require RD99/100 usage as part of the Proposed Amendments.

CARB staff developed cost estimates for SRIA Alternative 1 according to the methodology described in Section 3.1 of the SRIA. Table 25 provides the summary results of the incremental costs associated with SRIA Alternative 1. For simplicity, included are the amortized vehicle capital costs, Tier 4 Final maintenance costs, contracting costs, and signage costs for prime contractors.

Table 25. Summary of Incremental Costs Due to SRIA Alternative 1

Year	Annual Vehicle Capital Costs (amortized, with tax)	Tier 4 final Maintenance Costs	Contracting Costs	Signage Costs	Total Net Costs
2023	$0	$0	$0	$0	$0
2024	$0	$0	$12,501,229	$3,519,603	$16,020,832
2025	$347,911,868	$0	$12,501,229	$3,519,603	$363,932,700
2026	$323,967,974	$1,669,374	$12,501,229	$3,519,603	$341,658,180
2027	$426,350,837	$1,669,374	$12,501,229	$3,519,603	$444,041,043
2028	$392,088,839	$2,672,415	$12,501,229	$3,519,603	$410,782,086
2029	$540,997,696	$2,672,415	$12,501,229	$3,519,603	$559,690,944
2030	$135,470,277	$4,109,815	$12,501,229	$3,519,603	$155,600,924

Year	Annual Vehicle Capital Costs (amortized, with tax)	Tier 4 final Maintenance Costs	Contracting Costs	Signage Costs	Total Net Costs
2031	$173,240,000	$4,109,815	$12,501,229	$3,519,603	$193,370,647
2032	$20,133,210	$4,796,242	$12,501,229	$3,519,603	$40,950,283
2033	$8,145,990	$4,796,242	$12,501,229	$3,519,603	$28,963,064
2034	($183,275,900)	$4,796,242	$12,501,229	$3,519,603	($162,458,826)
2035	($165,246,301)	$4,796,242	$12,501,229	$3,519,603	($144,429,228)
2036	($213,129,916)	$4,796,242	$12,501,229	$3,519,603	($192,312,842)
2037	($191,418,081)	$4,796,242	$12,501,229	$3,519,603	($170,601,007)
2038	($170,099,621)	$4,796,242	$12,501,229	$3,519,603	($149,282,547)
Total	$1,445,136,873	$50,476,901	$187,518,435	$52,794,045	$1,735,926,253

SRIA Alternative 1 would result in fewer NOx and PM emission reductions than the Proposed Amendments. From 2023 through 2038, SRIA Alternative 1 results in emission reductions of 18,294 tons of NOx and 1,252 tons of PM2.5 compared with the baseline. Figure 18 and Figure 19 show the NOx and PM emissions under the Baseline, Proposed Amendments, and SRIA Alternative 1. For additional clarity, Table 26 and Table 27 show the data that correspond to Figure 18 and Figure 19, respectively.

Figure 18. Projected NOx Emissions under the Baseline, Proposed Amendments, and SRIA Alternative 1

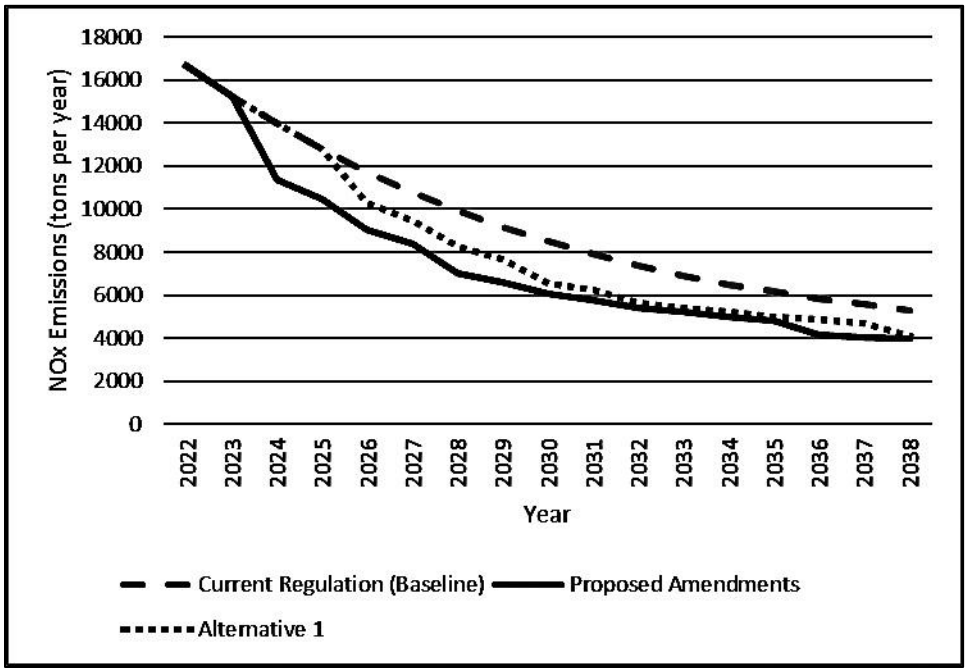

Table 26. Projected NOx emissions under the Baseline, Proposed Amendments, and SRIA Alternative 1, in tons per year

Year	Baseline	Proposal	SRIA Alternative 1
2023	15,257	15,257	15,257
2024	13,967	11,374	13,967
2025	12,800	10,467	12,800
2026	11,742	9,069	10,295
2027	10,790	8,410	9,489
2028	9,946	7,042	8,260
2029	9,162	6,630	7,667
2030	8,530	6,046	6,562
2031	7,935	5,756	6,223
2032	7,387	5,429	5,678
2033	6,918	5,205	5,426
2034	6,508	5008	5,207
2035	6,155	4,836	5,020
2036	5,837	4,159	4,852
2037	5,562	4,065	4,706
2038	5,320	3,980	4,119

Figure 19. Projected PM Emissions under the Baseline, Proposed Amendments, and SRIA Alternative 1

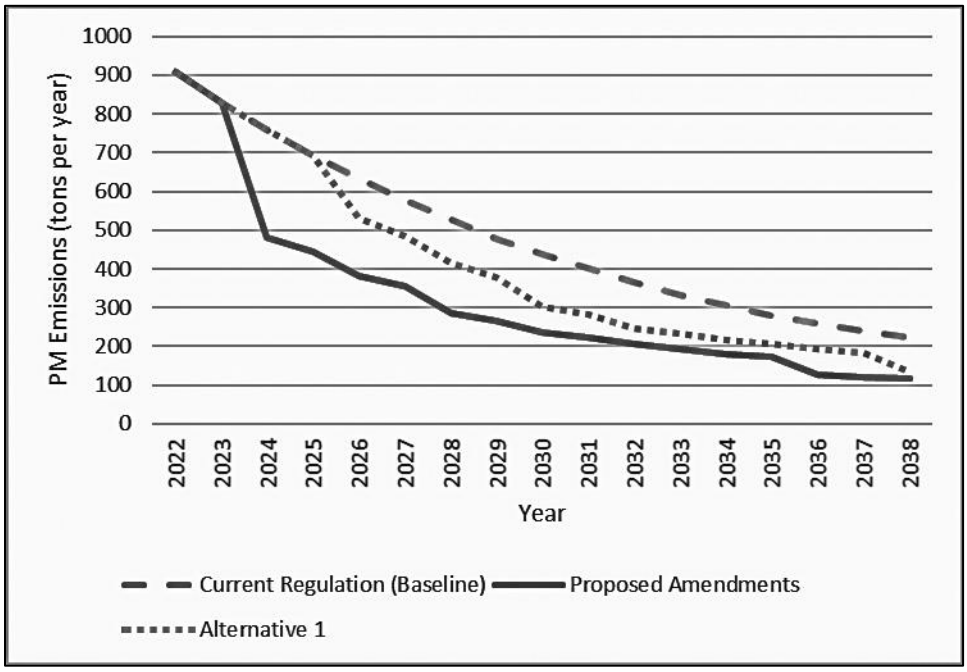

Table 27. Projected PM emissions under the Baseline, Proposed Amendments, and SRIA Alternative 1, in tons per year

Year	Baseline	Proposal	SRIA Alternative 1
2023	830	830	830
2024	758	482	758
2025	692	444	692
2026	632	383	530
2027	577	354	485
2028	526	284	413
2029	478	265	378
2030	438	237	301
2031	400	223	281
2032	364	207	247
2033	333	192	232
2034	305	181	218
2035	280	172	205
2036	258	126	194
2037	239	121	185
2038	222	117	132

The reductions in cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and ER visits for respiratory illness and asthma that would be expected from SRIA Alternative 1 are shown in Table 28, generating a lower valuation of health benefits, at $3.03 billion compared to the Proposed Amendments' $5.74 billion.

Table 28. Statewide Valuation of Avoided Health Outcomes for SRIA Alternative 1 from 2023 to 2038

Outcome	Avoided Incidents	Valuation (million 2020$)
Cardiopulmonary mortality	301	$3,020.3
Hospitalizations for cardiovascular illness	45	$2.6
Hospitalizations for respiratory illness	53	$2.7
ER visits	145	$0.1
Total		**$3,025.8**

The macroeconomic impact analysis results for SRIA Alternative 1 are qualitatively similar to the results of the Proposed Amendments, but the impacts are delayed by two years compared to the Proposed Amendments. The largest decreases in GSP, personal income, employment, output, and private investment occur in 2029 in SRIA Alternative 1 versus 2027 in the Proposed Amendments. In SRIA Alternative 1, these economic indicators are estimated to increase slightly relative to the baseline starting from 2034. The magnitude of the impacts for SRIA Alternative 1 is slightly less than that of the Proposed Amendments. The changes in statewide output and employment represent, at most, a 0.03 percent decrease relative to the baseline. As a result, CARB staff estimates that SRIA Alternative 1 is less cost-effective than the Proposed Amendments. Table 29 displays the cost-effectiveness of the Proposed Amendments compared to SRIA Alternative 1.

Table 29. Cost-Effectiveness of the Proposed Amendments and SRIA Alternative 1

Proposal	Carl Moyer Program Cost-Effectiveness per Weighted Ton
Proposed Amendments	$22,742
SRIA Alternative 1	$40,059
Difference	$17,317

2. Reasons for Rejection

CARB staff rejected SRIA Alternative 1 because it is less cost-effective and would achieve fewer NOx and PM reductions than the Proposed Amendments. Achieving fewer NOx and PM reductions will hinder California's ability to achieve the NAAQS. SRIA Alternative 1 delays

the tier phase-out for Tier 0, Tier 1, and Tier 2 vehicles in all fleet sizes, allowing the oldest equipment to continue to operate for several additional years. The delay in the tier phase-out, along with the delay in the restrictions on adding vehicles, would result in fleets being able to add Tier 3 as replacements for their Tier 0 vehicles, therefore increasing NOx emissions and causing significant delays to achieving PM reductions in impacted communities throughout the state. To the extent the vehicles impacted by the Proposed Amendments are domiciled at a facility, SRIA Alternative 1 does not provide much-needed localized reductions in toxic DPM. SRIA Alternative 1 also does not align with the 2020 MSS goal of reducing statewide NOx emissions by 7.5 tons per day by 2031 and full turnover of remaining Tier 0 through Tier 2 engines in the fleet between 2024 and 2033, nor does it not align with the measure in the 2022 State SIP Strategy to achieve reductions of 4.1 tons per day of NOx in 2037. Additionally, SRIA Alternative 1 does not include the requirement for fleets to use RD, which achieves significant near-term NOx reductions needed to help meet the federal ambient air quality standards for ozone and achieve additional PM reductions in communities throughout the State.

B. Accelerated Requirements with Tier 3 Phase-Out Alternative (SRIA Alternative 2)

1. Description of Alternative

SRIA Alternative 2 is a more stringent requirement for fleets who own and operate the vehicles subject to the Proposed Amendments. SRIA Alternative 2 adjusts the Proposed Amendment by implementing the phase-out of vehicles with Tier 0, 1, and 2 engines earlier than the Proposed Amendments. SRIA Alternative 2 also imposes a phase-out of Tier 3 vehicles for all fleet sizes that is not required under the Proposed Amendments. Additionally, SRIA Alternative 2 implements the restrictions on adding Tier 3 and Tier 4i vehicles to large and medium fleets upon adoption of the proposal. For small fleets, SRIA Alternative 2 implements the restriction on adding Tier 3 vehicles upon adoption and Tier 4i vehicles two years earlier than the Proposed Amendments. This alternative would not make changes to the RD99/100, contracting, or prime contractor requirements in the Proposed Amendments. Key elements of SRIA Alternative 2 include the following:

- Requirements for the tier phase-out are adjusted based on the schedule in Table 30. Some exemptions apply, such as using a vehicle less than 200 hours per year (i.e., low-use). For all fleet sizes, low-use vehicles with a Tier 0 engine or a MY 1994 or earlier on-road engine would be required to be phased-out by January 1, 2036.

Table 30. Tier and MY Phase-Out Dates by Fleet Size for SRIA Alternative 2

Year (January 1)	Large Fleets	Medium Fleets	Small Fleets	Ultra-Small[120]
Upon adoption	Tier 0/MY 1994 or older on-road			
2024		Tier 0/MY1994 or older on-road		
2025	Tier 1/MY1999 or older on-road			
2026		Tier 1/MY 1999 or older on-road	Tier 0/MY 1994 or older on-road	
2027	Tier 2/MY 2003 or older on-road			
2028		Tier 2/MY 2003 or older on-road	Tier 1/MY 1999 or older on-road	
2029	Tier 3			
2030		Tier 3	Tier 2/MY 2003 or older on-road	
2032			Tier 3	
2036				Tier 2/MY 2003 or older on-road

- Requirements for the restrictions on the addition of a Tier 3 or Tier 4i vehicle or a MY 2006 or older on-road vehicle to a fleet are adjusted based on the schedule in Table 31.

[120] Ultra-small fleets are required to have 100 percent of their fleet Tier 2 or cleaner by January 1, 2029 under the Off-Road Regulation.

Table 31. Compliance Dates for the Restrictions on Adding Vehicles for SRIA Alternative 2

Year	Large Fleets	Medium Fleets	Small and Ultra-Small Fleets
Adoption	Tier 4i/MY 2006 or older on-road	Tier 4i/MY 2006 or older on-road	Tier 3 or older
2026			Tier 4i/MY 2006 or older on-road

This alternative aligns with proposals and comments made by stakeholders advocating to achieve additional emission reductions from this sector as quickly as possible and to require the phase-out of Tier 3 engines in California.

CARB staff developed cost estimates for SRIA Alternative 2 according to the methodology described in Section 3.1 of the SRIA. Table 32 provides the summary results of the incremental costs associated with SRIA Alternative 2. For simplicity, included are the amortized vehicle capital costs, Tier 4 final maintenance costs, contracting costs and signage costs for prime contractors

Table 32. Summary Incremental Costs Due to SRIA Alternative 2

Year	Annual Vehicle Capital Costs (amortized, with tax)	Tier 4 final Maintenance Costs	Contracting Costs	Signage Costs	Total Net Costs
2023	$459,778,687	$514,139	$0	$0	$460,292,825
2024	$547,793,640	$910,167	$12,501,229	$3,519,603	$564,724,640
2025	$664,766,126	$1,692,842	$12,501,229	$3,519,603	$682,479,800
2026	$746,483,499	$3,130,589	$12,501,229	$3,519,603	$765,634,920
2027	$766,561,286	$4,087,801	$12,501,229	$3,519,603	$786,669,919
2028	$379,346,036	$5,031,786	$12,501,229	$3,519,603	$400,398,654
2029	$284,392,935	$5,938,060	$12,501,229	$3,519,603	$306,351,827
2030	$70,364,353	$6,752,967	$12,501,229	$3,519,603	$93,138,153
2031	($64,050,879)	$6,752,967	$12,501,229	$3,519,603	($41,277,080)

Year	Annual Vehicle Capital Costs (amortized, with tax)	Tier 4 final Maintenance Costs	Contracting Costs	Signage Costs	Total Net Costs
2032	($163,220,776)	$7,022,264	$12,501,229	$3,519,603	($140,177,681)
2033	($303,485,393)	$7,022,264	$12,501,229	$3,519,603	($280,442,297)
2034	($354,381,769)	$7,022,264	$12,501,229	$3,519,603	($331,338,673)
2035	($293,703,921)	$7,022,264	$12,501,229	$3,519,603	($270,660,825)
2036	($281,882,797)	$7,329,848	$12,501,229	$3,519,603	($258,532,117)
2037	($236,124,412)	$7,329,848	$12,501,229	$3,519,603	($212,773,732)
2038	($196,050,847)	$7,329,848	$12,501,229	$3,519,603	($172,700,167)
Total	$2,026,585,769	$84,889,917	$187,518,435	$52,794,045	$2,351,788,167

SRIA Alternative 2 would result in slightly greater emission reductions than the Proposed Amendments. From 2023 through 2038, SRIA Alternative 2 results in emission reductions of 37,103 tons of NOx and 3,007 tons of PM2.5 compared with the baseline. Figure 20 and Figure 21 show the NOx and PM emissions under the Baseline, Proposed Amendments, and SRIA Alternative 2. For additional clarity, Table 33 and Table 34 show the data that correspond to Figure 20 and Figure 21, respectively.

Figure 20. Projected NOx Emissions under the Baseline, Proposed Amendments, and SRIA Alternative 2

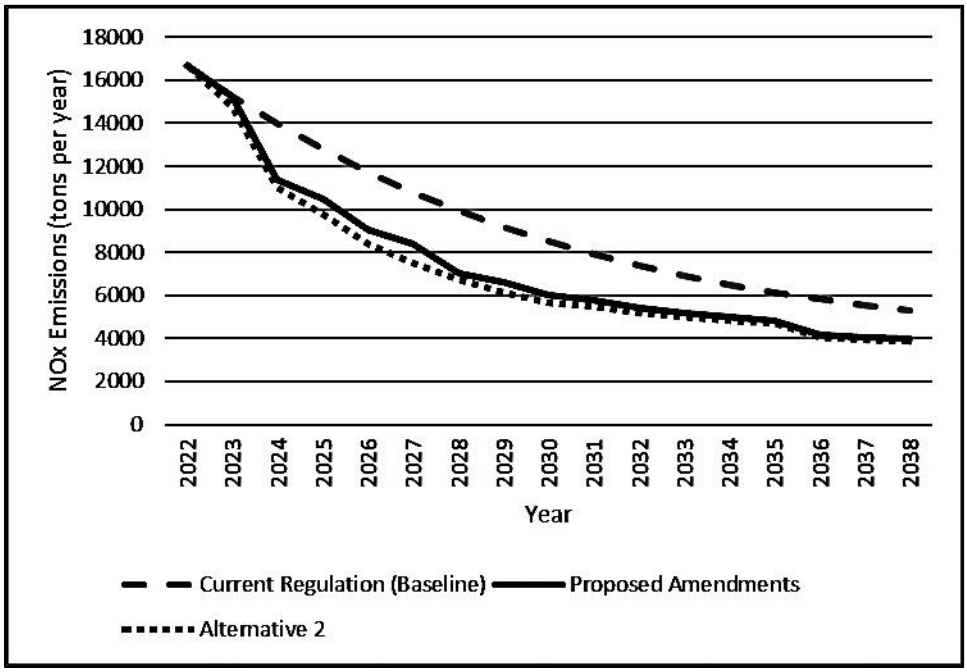

Table 33. Projected NOx emissions under the Baseline, Proposed Amendments, and SRIA Alternative 2, in tons per year

Year	Baseline	Proposal	SRIA Alternative 2
2023	15,257	15,257	14,772
2024	13,967	11,374	11,033
2025	12,800	10,467	9,796
2026	11,742	9,069	8,398
2027	10,790	8,410	7,503
2028	9,946	7,042	6,735
2029	9,162	6,630	6,120
2030	8,530	6,046	5,677
2031	7,935	5,756	5,452
2032	7,387	5,429	5,191
2033	6,918	5,205	5,008
2034	6,508	5,008	4,843
2035	6,155	4,836	4,694
2036	5,837	4,159	4,034
2037	5,562	4,065	3,952
2038	5,320	3,980	3,875

Figure 21. Projected PM Emissions under the Baseline, Proposed Amendments, and SRIA Alternative 2

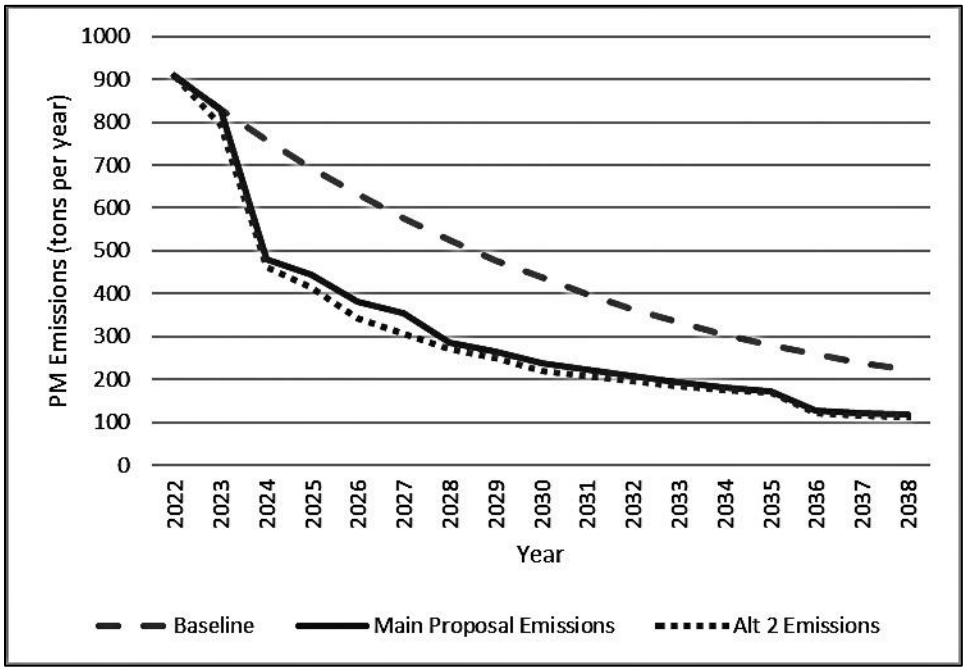

Table 34. Projected PM emissions under the Baseline, Proposed Amendments, and SRIA Alternative 2, in tons per year

Year	Baseline	Proposal	SRIA Alternative 2
2023	830	830	795
2024	758	482	462
2025	692	444	414
2026	632	383	341
2027	577	354	306
2028	526	284	271
2029	478	265	251
2030	438	237	220
2031	400	223	209
2032	364	207	195
2033	333	192	185
2034	305	181	176
2035	280	172	168
2036	258	126	120
2037	239	121	116
2038	222	117	112

The reductions in cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and ER visits for respiratory illness and asthma that would be expected from SRIA Alternative 2 are shown in Table 35, generating a higher valuation of health benefits, at $6.51 billion, compared to the Proposed Amendments, at $5.74 billion.

Table 35. Statewide Valuation of Avoided Health Outcomes for SRIA Alternative 2 from 2023 to 2038

Outcome	Avoided Incidents	Valuation (million 2020$)
Cardiopulmonary mortality	648	$6,495.2
Hospitalizations for cardiovascular illness	93	$5.5
Hospitalizations for respiratory illness	111	$5.7
ER visits	314	$0.3
Total		**$6,506.7**

The macroeconomic impact analysis results for SRIA Alternative 2 are qualitatively similar to the results of the Proposed Amendments, but of a greater magnitude. The largest decreases in GSP, personal income, employment, output, and private investment for SRIA Alternative 2 occur in 2027, which is the same year as for the Proposed Amendments. Similar to the Proposed Amendments, these economic indicators start to increase after 2031. The changes in statewide output and employment for SRIA Alternative 2 represent, at most, a 0.06 percent decrease relative to the baseline. As a result, CARB staff estimates that SRIA Alternative 2 is less cost-effective than the Proposed Amendment. Table 36 displays the cost-effectiveness of the Proposed Amendments compared to SRIA Alternative 2.

Table 36. Cost-Effectiveness of the Proposed Amendments and SRIA Alternative 2

Proposal	Carl Moyer Program Cost-Effectiveness per Weighted Ton
Proposed Amendments	$22,742
SRIA Alternative 2	$24,357
Difference	$1,615

2. Reasons for Rejection

SRIA Alternative 2 was rejected because it imposes higher costs but achieves low additional emission reductions; therefore, it would be less cost-effective to implement than the Proposed Amendments. Although SRIA Alternative 2 achieves greater emissions benefits in the early years of implementation, primarily due to the accelerated timeline of the tier phase-out, this adjusted timeframe would pose a challenge for fleets to comply with, due to

the immediate need for action. The Proposed Amendments attempt to balance the need for additional NOx and PM reductions with the cost impacts. The accelerated timeline under SRIA Alternative 2 creates significant additional costs in the near-term, which could put fleets at risk of noncompliance or inability to continue their business at current levels. Additionally, due to the additional near-term vehicle turnover that will be required, vehicle costs may increase due to increased demand and there could be a lack of availability of vehicles to meet the near-term need. This alternative therefore may not be more effective at achieving emission benefits than the Proposed Amendments, due to the potential lack of availability of vehicles and the compliance flexibility in the Off-Road Regulation that allows for delayed compliance if compliant vehicles are unavailable.

C. Small Business Alternative

The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business. However, CARB did analyze less stringent requirements for small and ultra-small fleets as part of SRIA Alternative 1, but ultimately rejected that alternative for the reasons described. The Proposed Amendments incorporate delayed implementation of the tier phase-out and adding vehicle provisions to accommodate the special needs of smaller fleets and businesses.

D. Declining Fleet Average Target Alternative

1. Description of Alternative

Some stakeholders have suggested an alternative based on continuing the current fleet average target approach beyond the Current Regulation's requirements through imposition of additional, more stringent fleet average targets, to take effect for medium and large fleets beyond 2023, and for small fleets, beyond 2028. Under the Current Regulation, a weighted fleet average emission level is calculated based on the vehicles in the fleet. For annual compliance, the fleet's average emission level is compared against a fleet average emission target that declines each year. Because this approach would follow a similar structure to the Current Regulation up to its current implementation phase, fleets believe this approach would be more familiar to them, and would be more compatible with their current compliance practices. In addition, an averaging approach can generally provide greater flexibility to fleets in their decisions to retire or replace existing vehicles; in particular, certain fleets may prefer to take extra actions to lower their fleet average emissions in order to allow the operation of a specific older piece of equipment for a longer period of time. Furthermore, with the fleet average approach, it is possible to set fleet average targets on a schedule, so that this approach can produce emissions reductions similar to those of the tier phase-out provision in the Proposed Amendments.

2. Reasons for Rejection

There are some potential drawbacks to the fleet average target approach, including potential impacts that may negate some of the perceived advantages of this alternative. The Proposed

Amendments seek to greatly accelerate and augment the emissions reductions expected from the current regulation. To achieve similar reductions in a similar timeframe as in the Proposed Amendments, very stringent fleet average targets will need to be set, so that most of the flexibility expected from the averaging approach may be lost. In addition, the ability to carry over BACT credits accrued from previous years' sunsets in the Current Regulation the same year as when the final set of fleet average targets take effect, which would further reduce the flexibility from the averaging approach.

Another point of consideration is that one of the primary objectives of the Proposed Amendments, in addition to increasing and accelerating emissions reductions, is to streamline and simplify the requirements of the regulation and increase enforceability of its provisions. Enforcement of the fleet average approach is certainly feasible and will continue for the remaining fleet average targets in the current regulation, but is inherently more time and labor intensive for both enforcement personnel and the fleet being audited, as the entire fleet's vehicles across all of its locations need to be accounted for. This results in a lower number of fleets that can be examined as part of enforcement activities. The Proposed Amendments' vehicle-based requirements would allow for far more efficient enforcement of the regulation, and thus better ensure a level playing field among regulated entities who dutifully comply with the requirements and those who choose to ignore their obligations, as well as better ensure that the expected emissions reductions are realized. Furthermore, stakeholders are generally also in support of achieving the goal of streamlining requirements, and staff have received feedback from a number of stakeholders in support of the proposed structure of the amendments. Because the fleet average alternative does not meet the objective to increase enforceability and streamline requirements, and may not include as much flexibility as would be expected, CARB staff recommends rejecting the fleet average target alternative.

E. Zero-Emission Alternative 1

1. Description of Alternative

In this alternative, CARB would propose amendments that require fleets to transition to zero -emission technology. There are a couple of ways the amendments could be structured. In the more stringent approach, CARB would propose a phase-out of vehicles operating with Tier 0, 1, and 2 engines, similar to the Proposed Amendments. However, the vehicle adding provisions would require fleets to add ZEVs. In the less stringent approach, there would be no phase-out, but the vehicle adding provisions would require fleets to add ZEVs. This approach would permit fleets to use vehicles throughout their useful lives, allowing for natural attrition.

2. Reasons for Rejection

Through EO N-79-20, the State is committed to the implementation of strategies to achieve 100 percent deployment of zero-emission off-road vehicles by 2035, where technologically feasible and cost-effective. Presently, zero-emission vehicle technology in the off-road sector is at a less mature stage of development due to several factors, including demanding

duty-cycles, high power needs, specialized production, and remote or rugged operating environments. Given that zero-emission commercial offerings are presently limited for vehicles subject to the Off-Road Regulation, both approaches would only be technologically feasible if timelines were delayed until zero-emission technology in the sector reaches a more mature stage. Based on CARB's 2020 MSS, it is important to obtain near-term emission reductions beginning in 2024. Additionally, ZEVs currently have greater upfront capital costs than the vehicles being considered in the Proposed Amendments. A mandatory zero-emission requirement could greatly increase costs to fleets. A mandatory, fully zero-emission approach that is viable, cost-effective, and obtains near-term emission reductions is not feasible with either the first or second approach for this alternative.

F. Zero-Emission Alternative 2

1. Description of the Alternative

This alternative combines the Proposed Amendments with mandatory zero-emission requirements. The vehicle adding provisions would require fleets to add ZEVs if reasonable levels of zero-emission commercial offerings are available. The vehicle adding provisions would remain as in the Proposed Amendments and would add additional requirements for fleets to add ZEVs if reasonable levels of zero-emission commercial offerings are available.

2. Reasons for Rejection

The availability of zero-emission commercial offerings is expected to vary by vehicle type and hp range. The uncertainty about when ZEVs would be available at reasonable levels across the numerous vehicle type and hp ranges would significantly increase the complexity of the Off-Road Regulation. This timing uncertainty also makes it unclear as to when the benefits of this alternative would occur. Furthermore, fleets will need adequate preparation time to effectively utilize ZEVs which, among other factors, include operational and facility changes to address new fueling methods and infrastructure. Given the complexities, effective implementation of this alternative would be difficult. Additionally, ZEVs currently have greater up-front capital costs than the vehicles being considered in the Proposed Amendments. A mandatory zero-emission requirement could greatly increase costs to fleets. Because the zero-emission alternative 2 would increase the complexity and costs of the Proposed Amendments while having an uncertain emissions benefit, CARB staff did not pursue this alternative.

The Proposed Amendments include voluntary provisions that offer compliance flexibility for the deployment of ZEVs. This, along with a suite of other CARB strategies, will facilitate further advancement of ZEVs in the off-road sector.

G. Biodiesel Alternative

1. Description of Alternative

Staff has received from a stakeholder a suggested alternative to the Proposed Amendments pertaining to the inclusion of biodiesel fuel as an additional consideration as part of the Proposed Amendments' RD requirement, and an expansion to the number of fleets exempt from this requirement. This alternative would leave all other provisions in the Proposed Amendments intact.

Under the current Proposed Amendments' RD requirement, all fleets subject to the regulation would be required to use RD99/100 in all vehicles subject to the regulation unless the fleet is designated as a captive attainment area fleet or the fleet consists entirely of vehicles with Tier 4 Final engines or MY 2007 or newer on-road engines. Fleets facing challenges due to the unavailability of RD99/100 in their operating area may also, with proper documentation and other evidence of having regularly made reasonable attempts to obtain RD99/100, be exempt from being required to use RD99/100 fuel.

The stakeholder's suggested alternative proposes to modify CARB staff's Proposed Amendments by adding a requirement for regulated fleets who intend to use the exemption for unavailability of RD99/100 to also first make similar attempts to procure and use R75/B20 blend fuel[121], and if that is not available, to further make attempts to procure and use R55/B20 blend fuel[122], and only if none of the three types of fuel are available may the fleet qualify for the exemption to use conventional CARB ULSD. The fleet would still be required to maintain records that document evidence of having regularly made reasonable attempts to procure and use, without success due to unavailability, RD99/100, R75/B20 blend fuel, and R55/B20 blend fuel, in that order. The submitted alternative also proposes to modify the threshold for exemption for fleets entirely (100 percent) comprised of Tier 4 Final engines and MY 2007 or newer on-road engines to also exempt fleets comprised of at least 90 percent such engines and fleets for which at least 90 percent of the total hours of operation are performed by such engines.

2. Reasons for Rejection

CARB staff explored this suggested alternative, but ultimately, based on Staff's findings, rejected it due to increased NOx emissions and the increased complexity and burden on regulated fleets. CARB studies conducted on the combustion of RD99/100, RD-biodiesel blends, and conventional CARB ULSD under different engine test cycles have shown that while engine consumption of RD99/100 and RD-biodiesel blends both show reductions in emissions of DPM, THC, and CO when compared to engine consumption of conventional CARB ULSD, the RD99/100 and the RD-biodiesel blends diverged in the emissions of NOx. While engine consumption of RD99/100 showed a reduction in NOx emissions compared to

[121] Blended fuel that has a minimum of 75 percent renewable diesel and 20 percent biodiesel.
[122] Blended fuel that has a minimum of 55 percent renewable diesel and 20 percent biodiesel.

CARB ULSD, the consumption of RD-biodiesel blend fuels resulted in increases in NOx emissions over CARB ULSD[123]. A recent study comparing a CARB reference diesel to RD99/100 and two RD-biodiesel blends found that when used in older engines not equipped with SCR and DPF technologies, the R50/B50 blend produced higher NOx emissions compared to CARB ULSD, while increasing the proportion of RD in the blended fuel to a R65/B35 blend resulted in similar NOx emissions to CARB ULSD. The data from these studies show that the proportions of RD and biodiesel in fuel blends do affect the resulting NOx emissions, although there continue to be uncertainties regarding the exact amount of this impact. Because a primary goal of the Proposed Amendments is to achieve near-term NOx reductions needed to meet CARB's obligations in the 2022 State Implementation Plan, staff rejected this alternative as this suggested proposal requiring biodiesel fuel blends would limit CARB's ability to fully realize the NOx emission reductions needed from the regulation.

Another factor for CARB staff's rejection of this alternative is the increased complexity and burden on fleets due to the additional requirements introduced in this alternative. CARB staff anticipate that there may be certain locations in the State where availability of RD99/100 may be limited, and staff has therefore proposed flexibility, provided that the fleet keeps evidence of its attempts to meet the requirement. CARB staff understands that requiring fleets to regularly verify availability of RD99/100 and keep documentation may create additional workload, but believes that it is necessary to ensure that only fleets that truly are not able to access this fuel qualify for this flexibility. The submitted alternative's additional requirement to regularly verify the availability of two more types of fuel imposes an additional burden on the fleet, with little additional benefit. CARB staff believe that RD99/100 is generally available within the State, with only limited numbers of fleets needing the exemption for lack of availability. Furthermore, CARB staff anticipate that areas with no availability of RD99/100 would generally also have no availability of the two types of RD-biodiesel blends being required by the submitted alternative.

Finally, the two major goals of the Proposed Amendments are to achieve further emissions reductions, such as through requiring the use of RD99/100, and to streamline enforcement through a more vehicle-based approach in setting requirements. The suggested alternative's modification to lower the threshold for exemption from the fuel requirement from fleets comprised entirely (100 percent) of Tier 4 Final engines or MY 2007 or newer on-road engines to fleets comprised 90 percent of these engines reduces the number of fleets required to use the alternative fuel and complicates enforcement as audits of the entire fleet would be required. The suggested alternative's further modification to also exempt from the fuel requirement fleets that put at least 90 percent of the total hours of operation on such engines would create additional requirements for fleets to track and report usage on all vehicles in the fleet, expanding the number of fleets and vehicles affected beyond those using the low-use exemptions. This provision would add administrative costs to the fleet and

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[123] Durbin, T. D. et al. (2021). Final Report: Low Emission Diesel (LED) Study: Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines. California Air Resources Board. Retrieved July 6, 2022, from *Low Emission Diesel (LED) Study: Biodiesel and Renewable Diesel Emissions in Legacy and New Technology Diesel Engines - Final Report (ca.gov)*

would greatly complicate enforcement as audits of the entire fleet and fleet activity would be required.

Because of the added complexity to enforcement, potentially increased costs to fleets, and reduced emission benefits, CARB staff recommend rejecting this alternative.

H. Do Nothing Alternative

1. Description of Alternative

In this alternative, amendments to the Off-Road Regulation are not adopted and fleets continue with their current compliance pathways to meet their respective Fleet Average Targets under the Current Regulation. Fleets would not specifically be required to phase-out vehicles with Tier 0, Tier 1, and Tier 2 engines. While some Tier 0, Tier 1, and Tier 2 vehicles may continue to be replaced under the Current Regulation, the timing of those replacements will be delayed beyond the phase-out in the Proposed Amendments and other Tier 0, Tier 1, and Tier 2 vehicles may continue to operate indefinitely with no usage limits. If the Proposed Amendments are not adopted, fleets would not be required to use RD fuel. Fleets would continue to report to CARB annually and would provide fleet updates as presently required by the Current Regulation.

Advantages to this alternative include an estimated direct cost savings of $1.9 billion, as identified in the Standardized Regulatory Impact Assessment. In the absence of the Proposed Amendments, businesses would not be faced with the challenge of diverting revenue to meet additional compliance requirements. This alternative could be especially beneficial to small businesses that are operating on tight profit margins.

The regulated community would not be required to invest additional effort into understanding new amendments, developing plans to meet the amendments, and efforts to implement the plans. Furthermore, businesses would not face a potential decrease in the resale value of used vehicles as a result of a mandated Tier 0, Tier 1, and Tier 2 engine phase-out. If the Proposed Amendments are not adopted, businesses would not be required to use or maintain records on their use of RD fuel. Nor would businesses be required to provide documentation on a potential lack of RD availability.

2. Reasons for Rejection

If the Proposed Amendments are not adopted, the Off-Road Regulation control measure in CARB's Proposed 2022 State SIP Strategy [124] would fail to be achieved with a loss in emission reductions of 4.0 tons per day of NOx by 2037. SIPs are comprehensive plans that describe

[124] CARB. (2022b). Proposed 2022 State Strategy for the State Implementation Plan. Retrieved August 12, 2022 from *Proposed 2022 State Strategy for the State Implementation Plan August 12, 2022 (ca.gov)*

how areas will attain NAAQS and are submitted to the U.S. EPA for approval. A deficit in SIP-committed emission reductions would need to be offset by other emission reductions.

Additionally, if CARB does not propose amendments to the Off-Road regulation, the benefits described in Chapter VIII of this Staff Report would not be expected to occur without a substitution measure. Following is an overview of the benefits that would not be realized:

- Cumulatively, from 2024 through 2038, expected statewide emission reductions of approximately 31,218 tons of NOx and 2,729 tons of PM, and associated reductions in atmospheric ozone concentrations.
- Reduction in adverse health outcomes from 2024 to 2038 due to reduced PM2.5 and NOx. These health outcomes include cardiopulmonary mortality, hospital admissions for cardiovascular and respiratory illnesses, and ER visits for asthma. This has been estimated as: 574 fewer premature deaths; 83 fewer hospital admissions for cardiovascular illnesses; 99 fewer hospital admissions for respiratory illnesses; and 278 fewer ER visits for asthma.[125]
- A valuation per incident of: $10,030,076 for avoided premature deaths; $59,247 for avoided hospital admissions for cardiovascular illnesses; $51,678 for avoided hospital admissions for respiratory illnesses; and $848 for avoided ER visits for asthma.
- Tiers 0, 1, and 2 engines would not be phased out. Tier 0 engines have uncontrolled emissions and are 37 years and older. These engines emit at least 80 times more NOx than engines meeting the most recent Tier 4 emission standards.
- Health benefits to those people residing or working near operation of off-road diesel vehicles and health benefits to those operating the vehicles. Health benefits would translate into reduced healthcare costs and reduced lost productivity from sickness associated with exposure to diesel emissions.
- Due to the increased demand for newer vehicles due to the tier Phase-Out requirements, there would be additional income for businesses involved in the manufacture and distribution of off-road diesel vehicles, including vehicle and parts manufacturers, dealers, financial institutions, as well as consultants who advise companies on compliance with the regulatory changes.
- Increased efficiencies and in some cases increased versatility from the use of newer off-road vehicles. Some newer vehicles have increased versatility due to the numerous attachments available, increasing the type of work a single machine can do. Newer off-road vehicles often incorporate advancements that increase worker comfort, have more precise operations that decrease fuel use (e.g., telematics and electronic throttles for precision control), and newer engines that may reduce fuel consumption through optional modes that reduce engine speed without reducing power, as examples.

[125] Details concerning confidence intervals are provided in Chapter VIII of this report.

- A more level playing field for businesses through enhanced enforcement and reporting provisions.
- A mandate to use RD99/100 in place of conventional diesel would reduce engine output of PM and NOx. Benefits from the use of RD were estimated to be a 10 percent reduction in NOx and a 30 percent reduction in PM emitted from engines that are Tier 4 Interim and older.[126]

Considering CARB's comprehensive efforts to reduce emissions in all feasible areas, failure to move forward with the Proposed Amendments would be a significant absence of action in a sector that can obtain additional emission reductions with existing, proven technology. Given CARB's mandates to meet air quality attainment standards, failure to move forward with the Proposed Amendments would prompt the need to obtain similar emission reduction elsewhere.

I. Performance Standards in Place of Prescriptive Standards

With respect to Government Code § 11346.2(b)(4)(A) and 11346.2(b)(1), the Proposed Amendments do not mandate the use of specific technologies or equipment or prescribe specific actions for regulated entities. However, out of an abundance of caution CARB staff have evaluated some provisions of the Proposed Amendments that may be viewed as prescriptive if read in isolation. First is the Tier 0, Tier 1, and Tier 2 phase-out. The tier phase-out states that fleets can no longer operate vehicles with engines meeting specific Tier standards at specified dates. An alternative to this requirement is discussed above in the Alternative D: Declining Fleet Average Target, which would be a performance-based alternative to the tier phase-out. CARB has rejected this alternative for the reasons stated above. Second, the Proposed Amendments require fleets to use RD beginning January 1, 2024, with some limited exemptions. An alternative to this would be to not require fleets to use RD and allow fleets to continue to operate using conventional diesel. The alternative to not require the use of RD was evaluated as part of Alternative A: Delayed Requirements with Additional Provisions for Small and Ultra-Small Fleets and would not achieve significant near-term NOx reductions needed to help meet the federal ambient air quality standards for ozone and achieve additional PM reductions in communities throughout the State.

J. Health and Safety Code section 57005 Major Regulation Alternatives

CARB estimates the Proposed Regulation would have an economic impact on the state's business enterprises of more than $10 million in one or more years of implementation. CARB will evaluate alternatives submitted to CARB and consider whether there is a less costly alternative or combination of alternatives that would be equally as effective in achieving

[126] CalEPA. (2015). Staff Report: Multimedia Evaluation of Renewable Diesel. California Air Resources Board. Retrieved June 2, 2022, from *Staff Report: Multimedia Evaluation of Renewable Diesel (ca.gov)*

increments of environmental protection in full compliance with statutory mandates within the same amount of time as the proposed regulatory requirements, as required by Health and Safety Code section 57005.

XIII. Justification for Adoption of Regulations Different from Federal Regulations Contained in the Code of Federal Regulations

Government Code section 11346.2(b)(6) requires CARB to describe its efforts to avoid unnecessary duplication or conflicts with federal regulations that address the same issues.

Currently, there are no federal regulations that directly address the same issues as CARB's Proposed Amendments. The U.S. EPA has promulgated emission standards for new off-road diesel engines, but has not promulgated federal standards for addressing emission reductions from fleets operating in-use vehicles with off-road (nonroad) engines. Consequently, the Proposed Amendments are not comparable to any federal regulations.

XIV. Public Process for Development of the Proposed Action (Pre-Regulatory Information)

Consistent with Government Code sections 11346, subdivision (b), and 11346.45, subdivision (a), and with the Board's long-standing practice, CARB staff held public workshops and other meetings with interested stakeholders during the development of the Proposed Amendments. These informal pre-rulemaking discussions provided staff with useful information that staff considered during development of the Proposed Amendments that are now available for formal public comment. This chapter describes the public process that staff conducted in relationship to the development of this proposed rulemaking.

To ensure an open and transparent rulemaking process, staff have engaged in an extensive public process since the development of the Proposed Amendments in May 2021. CARB staff conducted 3 virtual public workshops, 3 workgroup meetings, and over 30 individual meetings with stakeholders upon request to gather additional information and feedback during the development of the Proposed Amendments. Attendees of these meetings included impacted community members, industry stakeholders, local air districts, consultants, construction companies, off-road vehicle operators, and vehicle manufacturers. Staff established the Proposed Amendments email, ordamendments@arb.ca.gov, so that the public may reach out to CARB staff at any time. In addition, in August 2021, CARB sent a postcard announcing multiple regulatory efforts, including the Proposed Amendments to about 273,000 recipients in California.

Table 37. List of Proposed Amendments Workshops and Workgroups

Meeting	Date
First Workshop	May 6, 2021
Renewable Diesel Workgroup	September 10, 2021
Prime Contractor and Public Works Workgroup	September 21, 2021
Cost and Incentives Workgroup	October 15, 2021
Second Workshop	December 14, 2021
Third Workshop	May 16, 2022

CARB staff published two posts on CARB's Environmental Justice Blog[127] to encourage feedback from underserved community groups in California that may be impacted by emissions from off-road vehicles or by the Off-Road Regulation. The first post was published on September 15, 2021[128] and the second post was published on November 30, 2021[129]. Both posts included information about the current regulation and the potential amendments along with links to register for public meetings.

A. Public Workshops

CARB staff conducted three public workshops to discuss the amendment concept and solicit feedback from stakeholders. Staff notified stakeholders of the first workshop by posting notices to CARB's website for the Off-Road Regulation[130] and by distributing the notice to several public GovDelivery topic lists, such as the Agricultural Activities, Zero-Emission Forklifts, Off-Road Equipment (In-Use) Control Measure, Mobile Source Emission Inventory, SIP, Workshops Sponsored by CARB, Enforcement Activities, and Environmental Justice

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[127] CARB Environmental Justice Blog. (n.d.). CARB Environmental Justice Blog. Retrieved July 10, 2022, from *https://carbej.blogspot.com/*

[128] CARB Environmental Justice. (2021a). Potential Amendments to CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation. CARB Environmental Justice Blog on September 15, 2021. Retrieved July 14, 2022, from *Potential Amendments to CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation | CARB Environmental Justice Blog (carbej.blogspot.com)*

[129] CARB Environmental Justice. (2021b). Proposed Amendments to CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation. CARB Environmental Justice Blog on November 30, 2021. Retrieved July 14, 2022, from *Proposed amendments to CARB's In-Use Off-Road Diesel-Fueled Fleets Regulation | CARB Environmental Justice Blog (carbej.blogspot.com)*

[130] CARB. (n.d.-d). In-Use Off-Road Diesel-Fueled Fleets Regulation. Retrieved July 10, 2022, from *Proposed Amendments: Workshops and Meetings | In-Use Off-Road Diesel-Fueled Fleets Regulation | California Air Resources Board*

Stakeholders Group lists. Combined, these lists have over 40,000 subscribers. In addition, all off-road diesel fleets with accounts in DOORS[131] the reporting tool for the Off-Road Regulation, were sent an email announcing the first workshop. The second and third workshops were posted to the Off-Road Equipment (In-Use) Control Measure topic list, which has more than 7,000 subscribers. The workshops were open to all members of the public. Staff posted meeting materials, including agendas, slide presentations, and amendment concept language on CARB's Proposed Amendment webpage prior to each workshop.

The first public workshop was held virtually on May 6, 2021 using GoToWebinar. CARB staff presented a background on the Current Regulation and a status update on fleet compliance and implementation. CARB staff also presented the need for amendments to the existing regulation to achieve additional emission reductions and established a goal to simplify the requirements for regulated parties. CARB provided a conceptual proposal of how the amendments could be structured to achieve the emission reductions needed in alignment with the 2020 MSS and to simplify regulatory requirements. In addition, staff went over next steps and the amendment timeline. Attendees included local air districts, consultants, construction companies, off-road vehicle operators, and industry stakeholders. CARB staff solicited alternatives to the conceptual proposal presented at this workshop. The workshop included 550 attendees and was not recorded.

The second public workshop was held virtually on December 14, 2021 using GoToWebinar. CARB staff presented a more refined and comprehensive concept of the potential amendments to the Off-Road Regulation that built upon the concepts presented at the kick-off workshop on May 6th. These included: a phase-out of the oldest and highest-emitting vehicles in the fleet (Tier 0-2 vehicles), an extension to the restrictions on adding vehicles to a fleet to include Tier 3 and Tier 4 Interim vehicles, and the elimination of the year-by-year low-use option. In addition, staff discussed RD requirements and reporting requirements for prime contractors and public works awarding bodies, and voluntary flexibility provisions for the addition of ZEVs to a fleet. The second half of this workshop focused on the development of the 2022 Off-Road Inventory and covered data sources and methodology, including population, activity, and emission rates. CARB staff solicited alternatives to the proposed concept discussed at this workshop, which had an attendance of 263. The workshop was recorded and posted on CARB's Proposed Amendment webpage under Workshops and Meetings.

The third public workshop was held virtually on May 16, 2022 using Zoom Webinar. CARB staff presented the draft regulatory language for the potential amendments to the Off-Road Regulation that incorporated potential changes addressing the feedback received in the second workshop. Staff presented the general concept of the tier phase-out, a ban on Tier 3 and Tier 4 Interim engines, RD flexibility, and requirements for prime contractors and public works awarding bodies. In addition, staff provided an update on the cost analysis, summarized the SRIA (Standardized Regulatory Impact Assessment) costs and health

[131]CARB. (n.d.-e) DOORS. Retrieved July 10, 2022, from *https://ssl.arb.ca.gov/ssldoors/doors_reporting/doors_login.html*

benefits, and discussed the future steps. The second half of this workshop shifted focus on the cost analysis for the potential amendments and provided updates to the development of the 2022 Off-Road Inventory. This workshop included 274 attendees which ranged from local air districts, consultants, construction companies, off-road vehicle operators, and industry stakeholders. The workshop was recorded and posted on CARB's Proposed Amendment webpage under Workshops and Meetings.

B. Public Workgroup Meetings

CARB staff conducted three virtual public workgroup meetings on GoToWebinar to solicit stakeholder feedback and discussed potential RD requirements, prime contractor and public works requirements, and costs and incentives associated with the potential amendments. The notice and information to register for the workgroups was posted to CARB's Proposed Amendment webpage. In addition, the notice was distributed to the Off-Road Equipment (In-Use) Control Measure topic list before each workgroup. The workgroup meetings were open to all members of the public. Staff posted slide presentations prior to the workgroups on CARB's Proposed Amendment webpage.

Staff held the first public workgroup virtually on September 10, 2021 to discuss the use of RD in the off-road sector. Staff assessed the potential benefits and emission reductions of RD, and during the meeting, staff discussed the potential requirements and exemptions for utilizing RD. The workgroup solicited stakeholder feedback on fuel contracting cycles and costs to switch from conventional diesel to RD. The workgroup meeting was comprised of 101 attendees and was not recorded.

Staff held the second public workgroup virtually on September 21, 2021 to discuss proposed requirements for contractors and public works awarding bodies. Staff did additional public outreach for this workgroup to reach a broader audience by publishing an industry bulletin[132] through the Contractors State Licensing Board to invite licensees to participate in the workgroup. Additionally, staff distributed the notice for this workgroup to the Fleet Rule for Public Agencies and Utilities and the Environmental Justice Stakeholders Group topic lists, which have a combined 9,800 subscribers. Staff went over the potential applicability, vehicle certificates, and record keeping requirements for public works awarding bodies. This workgroup solicited stakeholder feedback on vehicle certificate requirements and discussed the potential implications and costs of the additional requirements. The workgroup meeting was comprised of 124 attendees. The workgroup was recorded and posted on CARB's Proposed Amendment webpage under Workshops and Meetings.

Staff held the third workgroup virtually on October 15, 2021 to discuss the development of the cost analysis and availability of incentive funds for clean construction equipment. The first part of this workgroup centered around a discussion of the cost analysis and methodology, which included topics such as data sources and data gathering. The second part of this

[132] CARB. (2021d). Air Resources Board Invites CSLB Licensees to Attend Workgroup on Proposed Amendment for Off-Road Diesel Vehicles. California Contractor Licensing Board. Retrieved July 6, 2022, from *CARB Workgroup*

workgroup focused on the availability of incentive programs and how the programs might overlay with the proposed amendments for the off-road construction industry. The workgroup meeting was comprised of 73 attendees. The workgroup was recorded and posted on CARB's Proposed Amendment webpage under Workshops and Meetings.

C. Cost Survey to Inform the Development of Potential Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation

In October 2021, staff developed a survey to help CARB better understand how off-road vehicles are purchased and other costs that stakeholders may incur as a result of the potential amendments to the Off-Road Regulation. The survey was requested by stakeholders during the workgroup on October 15 and was developed in response to this request. The survey was distributed directly to all registrants from the October 15 workgroup via email and a notice of availability was distributed to the Off-Road Equipment (In-Use) Control Measure list serve. The survey consisted of two parts:

1. Questionnaire Worksheet that included questions regarding vehicle purchasing behavior, vehicle purchasing mechanisms, fuel use, selling of old vehicles, and other questions to better understand how the proposed concept would impact fleets.
2. Purchasing Data Worksheet that requested detailed cost information on recent vehicle acquisitions.

CARB staff was particularly interested in cost data for all equipment types greater than 600 hp (new and used), data for aerial lifts, paving equipment, sweeper/scrubbers, drill rigs, rubber-tired dozers, trenchers, workover rigs and railcar movers. The goal was to receive the most relevant cost data for Tier 4 Final vehicles both new and used from fleets firsthand. Staff received 19 responses from a mix of large fleets, small fleets, and 1 medium fleet, and received cost information for 440 off-road vehicles.

Based on the responses from the survey, CARB staff identified six compliance pathways used to analyze direct costs for vehicle owners:

1. Retiring off-road diesel vehicles and replacing them with new Tier 4 Final vehicles,
2. Retiring off-road diesel vehicles and replacing with used Tier 4 Final vehicles (five-year old),
3. Retiring off-road diesel vehicles and not replacing,
4. Designating off-road diesel vehicles as low-use and purchasing new Tier 4 Final vehicles,
5. Designating off-road diesel vehicles as low-use and purchasing used Tier 4 Final vehicles (five-year old), and
6. Designating off-road diesel vehicles as low-use and not replacing.

CARB staff believes that while the response rate of the survey was relatively low, responses generally trended similar to fleet compliance in response to the Current Regulation when replacing vehicles, by fleet size. For example, larger fleets are more likely to replace with new equipment, while medium and small fleets replace with used equipment or simply downsize their fleet at a higher rate than large fleets. While the rates at which small and ultra-small fleets replace with used equipment are likely to be higher than that of medium fleets, combining these three fleet size categories together as an average number is reasonable given the relatively small number of responses received per fleet size category. It is possible that this may lead to a slight underrepresentation of used vehicle purchases among the small and ultra-small fleets, and thus a slightly higher cost estimate for the Proposed Amendments.

Results of the survey were presented at the December 2021 workshop[133] for further public comment and no further comments were received. The aggregated results of this survey are presented in Appendix D of this staff report.

Because no further comments were received regarding the six compliance pathways presented at the December 2021 workshop, the information was then incorporated into the Proposed Amendment's cost analysis. Comments were received by the Construction Industry Air Quality Coalition (CIAQC) to review new vehicle cost data that CIAQC had provided to CARB before this rulemaking effort was initiated. After these comments were received CARB staff incorporated CIAQC's cost data into the cost analysis.

D. Stakeholder Meetings

CARB staff has conducted more than 30 informal virtual meetings, phone calls, and attended one site visit with a variety of stakeholders, as of June 2022. These meetings have been held with representatives from various groups including fleet managers (both private and governmental), regulated fleets, public works awarding bodies, prime contractors, environmental advocacy groups, vehicle and engine manufacturers, rental companies, renewable diesel and biodiesel representatives, mining operations, and consultants and company officials that represent large, medium, and small fleets subject to the Off-Road Regulation. Various topics were discussed based on the needs of the stakeholder group. These topics primarily focused on the new provisions of the proposed amendments and included: challenges with RD and its availability, new requirements for prime contractors and public works awarding bodies, challenges with the proposed tier phase-out and early dates for Tier 0, the proposed extension on the restriction on adding Tier 3 and Tier 4 Interim vehicles to a fleet, and the removal of the year-by-year low-use provision.

[133] CARB. (2021e). Potential Amendments to the In-Use Off-Road Diesel Fuel Fleet Regulations: Second Workshop. Retrieved July 11, 2022, from *Potential Amendments to the In-Use Off-Road Diesel-Fueled Fleets Regulation Second Workshop (ca.gov)*

Table 38. List of Stakeholder Meetings[134]

Date	Stakeholder(s)/Entity	Purpose of Visit
3/17/2021	Agriculture Stakeholders	Discussed the preliminary approach to agricultural equipment in the Amendments
3/17/2021	Caterpillar	Discussed electrification of construction equipment
3/18/2021	CIAQC	Discussed the 2022 Off-Road Inventory
5/17/2021	Fleet Manager Leaders	Meeting after the kick-off workshop to discuss the potential impacts of the concept
8/3/2021	CIAQC	Discussed the general Off-Road Diesel Regulation Amendments
8/20/2021	Contractors State License Board (CSLB)	Discussed the Potential Prime Contractor Requirements
11/2/2021	City of Rancho Cucamonga	Discussed the Public Works Awarding Body Requirements
11/10/2021	Colorado Regional Air Quality	Discussed the general Off-Road Diesel Amendments and CARB's general approach for the in-use off-road diesel sector
11/30/2021	Volvo	Discussed the Off-Road Diesel Amendments and Volvo's cost information
12/10/2021	Biodiesel Representatives	Discussed allowing biodiesel to be used under the RD requirements
1/7/2022	Rick Teebay	Discussed issues with engine aftertreatment in newer engines while operating in active fires, biodiesel pilot project
1/13/2022	CIAQC	Discussed general concerns with the Off-Road Diesel Amendments
1/26/2022	Sacramento Municipal Utility District	Discussed the general Off-Road Diesel Amendments

[134] All Stakeholder Meetings were held by video conference call, except for one site visit.

Date	Stakeholder(s)/Entity	Purpose of Visit
2/2/2022	Caterpillar dealers	Discussed general concerns with the Off-Road Diesel Amendments, also discussed how the Off-Road Diesel Amendments would overlay with rental fleets
2/10/2022	CIAQC	Discussed the general Off-Road Diesel Amendments
2/24/2022	California Construction and Industrial Materials Association (CalCIMA)	Discussed the general Off-Road Diesel Amendments
2/25/2022	York Engineering	Discussed the general Off-Road Diesel Amendments and received recommendations on targeted provisions of the Off-Road Diesel Amendments
3/1/2022	DIR	Met to discuss possible data that would help CARB's analysis of the Off-Road Diesel Amendments related to the Prime Contractor requirements
3/1/2022	Fleet Manager Leaders	Followed-up with the fleet manager group from 5/17/21 to discuss the current version of the Off-Road Diesel Amendments
3/3/2022	CalCIMA	Discussed concerns with the prime contractors' requirements
3/11/2022	P.W. Gillibrand Co., Inc.	Individual aggregate operations fleet meeting to discuss the potential impacts of the Off-Road Diesel Amendments for that fleet
3/18/2022	Vulcan Materials	Individual aggregate operations fleet meeting to discuss the potential impacts of the Off-Road Diesel Amendments for that fleet
4/7/2022	CalCIMA, Granite Construction	Prepared for an upcoming site visit
4/19/2022	Granite Construction	Site Visit: CARB staff visited Granite Construction in Carpinteria, CA to discuss the Off-Road Diesel Amendments as well as observe and discuss the construction operations underway related to the expansion of Hwy 101.

Date	Stakeholder(s)/Entity	Purpose of Visit
5/12/2022	US Borax	Individual mining operations fleet meeting to discuss the potential impacts of the Off-Road Diesel Amendments for that fleet
5/18/2022	CIAQC	Discussed the 2022 Off-Road Inventory
5/24/2022	Caterpillar	Discussed the potential zero-emission flexibility provisions in the Off-Road Diesel Amendments
5/24/2022	Biodiesel Representatives	Discussed the potential of allowing biodiesel to be used under the RD requirements and made alternate recommendations compared to the 12/10/2021 meeting based on CARB's response
5/25/2022	California Cleaner Freight Coalition	Presented the current ORD Amendment proposal to the California Cleaner Freight Coalition
6/10/2022	Caltrans	Discussed the RD requirements and RD availability in the 2024 timeframe in California
6/24/2022	Caltrans	Discussed the public works awarding body requirements, Caltrans presented recommended edits to the regulatory language
7/13/2022	Global Clean Energy Holdings	Discussed the RD requirements
7/21/2022	South Coast Air Quality Management District	Discussed the Surplus Off-Road Opt-In for NOx (SOON) program

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XVI. Appendices

Appendix A-1: Proposed Regulation Order

Appendix A-2: Proposed Regulation Order (Accessible Format)

Appendix B: Standardized Regulatory Impact Assessment (SRIA)

Appendix B-1: Update to SRIA Appendix B

Appendix C: Summary and Response to DOF Comments on the SRIA

Appendix D: Cost Survey and Aggregated Responses

Appendix E: Aggregated AB 617 Emissions Data

Appendix F: 2022 CARB Construction, Industrial, Mining and Oil Drilling Emissions Inventory (2022 Off-Road Inventory)