CALIFORNIA
AIR RESOURCES BOARD

Gavin Newsom, Governor
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April 22, 2024

The Honorable Michael S. Regan
Administrator
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue NW; 1101-A
Washington, D.C. 20460

Submitted Electronically via Regulations.gov
Docket ID No.: EPA-HQ-OAR-2023-0574

RE: Comments of the California Air Resources Board in Support of its Request for Authorization Pursuant to Clean Air Act Section 209(e)(2)(A) for California's In-Use Locomotive Regulation

Dear Administrator Regan:

The California Air Resources Board (CARB) submits these comments in response to the Environmental Protection Agency's (EPA) Notice of Opportunity for Public Hearing and Public Comment on California's Request for Authorization for CARB's In-Use Locomotive Regulation (Locomotive Regulation).[1] For the reasons explained in CARB's Authorization Request and supplemented below, under Clean Air Act Section 209(e)(2)(A), EPA must grant the request because none of the three findings necessary for EPA to deny CARB's request can be made. CARB is not aware of any additional data, and none was provided at the hearing regarding CARB's requested authorization, that would change the fact that EPA must grant the request. The Locomotive Regulation will prevent approximately 3,200 premature deaths, 1,100 hospital admissions and 1,500 emergency room visits in California. California and its residents urgently need the emission reductions and accompanying public health protection that the Locomotive Regulation will provide, and CARB therefore urges EPA to expeditiously grant the request.

I. Background

A. Congress Intentionally Preserved State Authority to Control Emissions from Non-New Locomotives

As you know, the Clean Air Act establishes a system for setting emission standards for locomotives that allocates authority between EPA and California. EPA has authority to set emission standards for new locomotives whereas California has authority to set standards

[1] 89 Fed. Reg. 14,484 (Feb. 27, 2024).

and other requirements for locomotives that have been put into service (non-new locomotives).

EPA was required by 1995 to promulgate regulations containing standards applicable to emissions from new locomotives to attain the greatest degree of emission reductions achievable through the application of technology available in the relevant timeframes.[2] Accordingly, Congress provided that all States and political subdivisions are prohibited from adopting or attempting to enforce any standard or other requirement for the control of emissions from "new locomotives or new engines used in locomotives."[3] But for all other nonroad vehicles, which includes non-new locomotives, EPA is required to authorize California standards and other requirements for the control of emissions from such vehicles unless the evidence in the record establishes at least one of three limited criteria for denying such authorization.[4] Other States may adopt California standards that EPA has authorized, if they so choose, subject to certain conditions.[5] Congress also preserved state authority to establish and enforce "in-use regulations" to control nonroad vehicle and engine emissions, as Congress had done earlier with respect to on-road motor vehicles.[6]

Thus, Congress's intent with respect to the regulation of locomotive emissions is apparent on the face of the statute: California and the other States are preempted only from regulating emissions from new locomotives, which is under the exclusive purview of the EPA, but States may regulate emissions from non-new locomotives through authorized California "standards and other requirements" and their "accompanying enforcement procedures," as well as through in-use regulations.

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[2] 42 U.S.C. § 7547(a)(5).

[3] *Id.* § 7543(e)(1)(B). Hereinafter, references to the regulation of locomotives generally refer the regulation of both locomotives and engines used in locomotives. Congress also preempted regulation of new engines used in construction vehicles and farm equipment smaller than 175 horsepower. *Id.* § 7543(e)(1)(A).

[4] *Id.* § 7543(e)(2)(A); 88 Fed. Reg. 77,004, 77,005 (Nov. 8, 2023).

[5] 42 U.S.C. § 7543(e)(2)(B).

[6] *Engine Mfrs. Ass'n v. U.S. Envtl. Prot. Agency*, 88 F.3d 1075, 1094 (D.C. Cir. 1996) (upholding "EPA's interpretation that § 213(d) incorporates into the nonroad regime at least the reservation of the states' right to impose in-use regulations found in § 209(d)"). While EPA did not expressly so conclude, this interpretation must extend to non-new locomotives, as it does to all non-road vehicles which States are not categorically preempted from regulating. "[S]tatutes are not chameleons, acquiring different meanings when presented in different contexts."
Env't Comm. of Fla. Elec. Power Coordinating Grp., Inc. v. EPA, 94 F.4th 77, 115 (D.C. Cir. 2024) (internal quotation marks omitted).

B. Locomotive Emissions Impede NAAQS Attainment and Cause Adverse Public Health Impacts in California, Including in Overburdened Communities

As you are also aware, the Clean Air Act requires EPA to set, and regularly review and revise, federal health-based ambient air quality standards for "criteria pollutants," which are pollutants that the EPA has found satisfy the criteria for listing under Section 108(a)[7] These standards are called the National Ambient Air Quality Standards (NAAQS). EPA has determined that fine particulate matter (PM2.5), oxides of nitrogen (NOx), and ground-level ozone are criteria pollutants.[8] Depending on whether the air quality in a particular area meets the NAAQS for a given pollutant, the area will be designated as either in "attainment" or "nonattainment." Some nonattainment areas are then further classified as marginal, moderate, serious, severe, and extreme.[9]

As of March 2024, California had 21 areas that were not in attainment with the 2015 8-hour ozone NAAQS, including the only 3 extreme nonattainment areas in the nation: South Coast Air Quality Basin, San Joaquin Valley, and Coachella Valley.[10] These areas cover 99% of the State's disadvantaged communities.[11] The South Coast Air Basin has the highest ozone levels in the nation.[12] For the South Coast Air Basin to meet the federal ozone standards, overall NOx emissions (a precursor to ground-level ozone) need to be reduced to 60 tons per day (tpd) in 2037, an approximately 80% reduction from 2018 levels.[13] The South Coast Air Basin and the San Joaquin Valley Air Basin, along with the Imperial County Air Basin and Plumas County, also fail to meet the NAAQS for PM2.5.[14]

Locomotives generate significant emissions of PM2.5 and NOx.[15] CARB estimates locomotives contribute approximately 650 tons per year (tpy) of PM2.5 and over 30,000 tpy

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[7] 42 U.S.C. §§ 7408, 7409.

[8] U.S. EPA, Criteria Air Pollutants, accessed April 17, 2024, *https://www.epa.gov/criteria-air-pollutants*.

[9] *See* U.S. EPA, Current Nonattainment Counties for All Criteria Pollutants (Mar. 31, 2024), accessed April 17, 2024, *https://www3.epa.gov/airquality/greenbook/ancl.html*.

[10] *Id.*

[11] EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 001. CARB 2022 State Strategy for the State Implementation Plan (Sept. 22, 2022) (hereinafter CARB 2022 SIP Strategy), at 2.

[12] U.S. EPA, Status of California Designated Areas, accessed April 17, 2024, *https://www3.epa.gov/airquality/urbanair/sipstatus/reports/ca_areabypoll.html*.

[13] South Coast Air Quality Management District, 2022 Clean Air Management Plan, at 5-17, *http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2022-air-quality-management-plan/08-ch5.pdf?sfvrsn=8#:~:text=%E2%80%A2Without%20additional%20control%20measures%2C%20the%20South%20Coast%20Air,is%2071%20percent%20lower%20than%20the%202037%20baseline*.

[14] U.S. EPA, PM-2.5 (2012) Nonattainment Area State/Area/County Report, March 31, 2024, accessed April 17, 2024, *https://www3.epa.gov/airquality/greenbook/kncs.html#CA*.

[15] 73 Fed. Reg. 37,096, 37,099 (June 30, 2008).

of NOx in California.[16] Reducing locomotive emissions is therefore a critical component of California's efforts to attain the ozone and secondary particulate matter.[17]

Reducing locomotive emissions is also critical to protecting communities that disproportionately bear the burden of health impacts caused by emissions from locomotives. In California, more than half of the population (21 million out of nearly 40 million) live in areas that exceed the most stringent ozone standard).[18] A disproportionate number of California's population also live in areas designated extreme nonattainment.[19] These Californians often live in low-income and disadvantaged communities that experience greater exposure to diesel exhaust and other toxic air pollutants compared to surrounding areas, such as communities situated near locations affected by locomotive operations. At least 90% of California's railyards are within one mile of disadvantaged communities according to EPA's Justice40 Climate and Economic Justice Screening Tool, and locomotives travel to and operate at seaports, railyards, and other locations that are often near vulnerable populations of children, the elderly, and the ill, such as schools, hospitals, elder care facilities, and residential neighborhoods.[20]

II. The In-Use Locomotive Regulation

The Locomotive Regulation is an important addition to California's nonroad emission control program aimed at controlling the emissions from locomotives operating in the state (non-new locomotives). The Locomotive Regulation applies to operators of freight line haul, switch, industrial, passenger, and historic locomotives.[21] It contains four primary components and an Administrative Payment provision.

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[16] EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 006, CARB Initial Statement of Reasons for In-Use Locomotive Regulation (hereinafter ISOR), at 179-180.
[17] U.S. EPA, Ground-level Ozone Basics, June 2, 2023, accessed April 17, 2024, *https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics*; U.S. EPA, Evaluating the Contribution of PM2.5 Precursor Gases and Re-entrained Road Emissions to Mobile Source PM2.5 Particulate Matter Emissions, n.d., at 22, *https://www3.epa.gov/ttnchie1/conference/ei13/mobile/hodan.pdf*. *See also* CARB, Staff Report Proposed SIP Revision for the 15 µg/m3 Annual PM2.5 Standard for the San Joaquin Valley at 1, August 13, 2021, *https://ww2.arb.ca.gov/sites/default/files/2021-08/SJV%2015%20ug%20SIP%20Revision%20Staff%20Report%20FINAL.pdf*.
[18] Status of CA Designated Areas; U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population for Counties in California: April 1, 2020 to July 1, 2022 (CO-EST2022-POP-06) (March 2023), *https://www2.census.gov/programs-surveys/popest/tables/2020-2022/counties/totals/co-est2022-pop-06.xlsx*.
[19] *Id.*
[20] ISOR at 33–34.
[21] Cal. Code Regs., tit. 13, § 2478.1(a), (c); *see id.* § 2478.3, for definitions of specified locomotives.

A. Idling Requirements

Notwithstanding EPA regulations which require that locomotives be equipped with automatic engine stop/start (AESS) systems that shut off the main locomotive engine after 30 minutes of idling, subject to specified exceptions,[22] CARB has received numerous community complaints about excessive locomotive idling within California.[23] To address the impacts that excessive idling has on surrounding communities and on air quality objectives, the Idling Requirements require operators to ensure that AESS-equipped locomotives shut off after 30 minutes of idling, subject to the same exceptions in EPA's regulation (plus an additional exception for compliance with state regulations)—in other words, to operate the AESS devices as designed pursuant to EPA regulations. Operators must also keep AESS devices in working order and employ manual shut-off procedures when the device is inoperative.[24] The Idling Requirements also require locomotives equipped to connect to wayside power to turn off all engines and use wayside power if stationary for longer than 30 minutes.[25]

B. In-Use Operational Requirements

The In-Use Operational Requirements set emission standards for non-new locomotives through an age restriction and zero-emission (ZE) configuration requirements. The age restriction provides that, beginning January 1, 2030, locomotives that are 23 years or older may not operate in California unless they are operated in a ZE configuration (or they have seen limited use).[26] The age of the locomotive is based on its original engine build date, which is defined as the date of final assembly of the locomotive engine prior to any remanufacture.[27] However, the original engine build date for locomotives remanufactured to EPA's currently applicable emissions tier (Tier 4) prior to January 1, 2030, is based on the first year the locomotive was remanufactured.[28] Given that operators typically remanufacture locomotives every 10 years, this ensures that operators will be able to remanufacture every locomotive built prior to 2030, and those remanufactured to EPA's currently applicable emissions standard prior to 2030, at least once before being required to operate in a ZE configuration.[29]

The ZE operational requirements provide that switch, industrial, and passenger locomotives with original engine build dates after January 1, 2030, and freight line haul locomotives with

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[22] 40 C.F.R. § 1033.115(g).
[23] ISOR at 23.
[24] Cal. Code Regs., tit. 13, § 2478.9(a)-(c).
[25] *Id.* § 2478.9(d).
[26] *Id.* § 2478.5(a).
[27] *Id.* § 2478.3.
[28] *Id.* § 2478.5(a)(1).
[29] ISOR at 109.

original engine build dates after January 1, 2035, must operate exclusively in a ZE configuration in California.[30] To be considered as operating in a ZE configuration, the locomotive shall not emit any criteria pollutant, toxic pollutant, or greenhouse gas from any onboard source of power at any power setting.[31] The Locomotive Regulation does not specify or limit the methods an operator may use to operate a locomotive in a ZE configuration.

C. Spending Account Requirements

Beginning July 1, 2026 (and each year thereafter), the Spending Account requires locomotive operators to set aside funds in a restricted trust based on a conservative estimate of the health costs attributable to the emissions of their locomotives operated in California in the prior year.[32] Lower-emitting locomotives will naturally incur lower Spending Account obligations, and ZE locomotives will incur no obligations. The set-aside amount can be reduced through the use of grant monies for qualified expenditures and through early adoption of ZE -technologies.[33]

Spending Account funds may be used for a variety of purposes including to purchase, lease, or rent Tier 4 (or cleaner) locomotives, or to remanufacture lower tier locomotives to Tier 4 (or cleaner) until 2030.[34] The funds may be used at any time to purchase, lease, or rent, or remanufacture to, ZE and ZE capable locomotives.[35] A ZE capable locomotive is any locomotive that can be operated in a ZE configuration and that is operated only in that configuration in California.[36] The funds may also be used to purchase, lease, or rent ZE rail equipment and ZE infrastructure, which would include on-track equipment not meeting the definition of a locomotive that can serve the same function and infrastructure such as battery charging equipment and overhead catenary.[37]

D. Registration, Recordkeeping and Reporting Requirements, and Administrative Payment

The Locomotive Regulation includes registration, recordkeeping and reporting requirements (Recordkeeping and Reporting Requirements) to enable CARB to effectively ensure compliance. Operators must register basic information such as the operator's name

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[30] Cal. Code Regs., tit. 13, § 2478.5(b), (c);
[31] *Id.* § 2478.3.
[32] *Id.*, § 2478.4(a), (b), (f).
[33] *Id.* § 2478.4(g).
[34] *Id.* § 2478.4(d)(1).
[35] *Id.* § 2478.4(d)(2), (3).
[36] *Id.* § 2478.3 (def. of "Zero Emission (ZE) Capable Locomotive").
[37] *Id.* § 2478.4(d)(2), (3); *id.* § 2478.3 (defs. of "Zero Emission (ZE) Rail Equipment" and "Zero Emission (ZE) Infrastructure").

and headquarters address, and each locomotive's serial number and date of acquisition.[38] Operators must also report certain data annually, including locomotive use, information about each instance an AESS-equipped locomotive idles in excess of 30 minutes, and information necessary to confirm the accuracy of the operator's calculation of its Spending Account obligation.[39] To pay for the administrative costs of implementation (including compliance monitoring and enforcement), the Locomotive Regulation also requires payment of 175 dollars per locomotive to be submitted annually with each annual report (Administrative Payment).[40]

E. Alternative Compliance Options

The Locomotive Regulation also includes two alternative compliance options: the Alternative Compliance Plan and the Alternative Fleet Milestone Option.[41] The Alternative Compliance Plan allows operators to comply with the Spending Account and/or In-Use Operational Requirements through projects that achieve equivalent emissions reductions.[42] The Alternative Fleet Milestone Option allows compliance with the Spending Account and In-Use Operational Requirements through demonstrating that 50% of a regulated party's California annual usage is accomplished by Tier 4 (or cleaner) locomotives by 2030 and 100% by 2035, and that 50% of annual usage is accomplished- by ZE locomotives, ZE capable locomotives, or ZE rail equipment by 2042 and 100% by 2047.[43] The Alternative Fleet Milestone Option provides credits for early operation of ZE locomotives or rail equipment allowing for continued operation of older-tier locomotives beyond the specified deadlines.[44]

III. Discussion

A. EPA Must Grant the Requested Authorization Because None of the Three, Limited Bases for Denial Is Supported by the Record

EPA must grant an authorization under Section 209(e)(2)(A) for California's emission standards applicable to nonroad vehicles unless it makes one of three findings supporting denial.[45] The first two criteria for authorizations under Section 209(e)(2)(A) are identical to the criteria under Section 209(b)(1) applicable to motor vehicles and are, therefore, applied

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[38] *Id.* § 2478.10.
[39] *Id.* § 2478.11.
[40] *Id.* § 2478.12.
[41] *Id.* §§ 2478.7, 2478.8.
[42] *Id.* § 2478.7(b).
[43] *Id.* § 2478.8(b)(1)-(4).
[44] *Id.* § 2478.8(c).
[45] 42 U.S.C. § 7543(e)(2)(A) ("the Administrator *shall* . . . authorize") (emphasis added).

in the same way across the two Sections.[46] The third criterion—the consistency criterion—contains a textual difference: Section 209(b)(1)(C) refers to "consistent with section [202(a)]," whereas Section 209(e)(2)(A)(iii) refers to "consistent with this section."[47] EPA has interpreted the latter "to include . . . section 209(b)(1)(C)."[48] "Hence, EPA believes that it should review nonroad authorization requests under the same 'consistency' criterion with which it reviews motor vehicle waiver requests."[49] In addition, however, EPA looks for consistency with Section 209(a), meaning "California's nonroad standards and enforcement procedures must not apply to new motor vehicles or new motor vehicle engines," and with Section 209(e)(1), meaning California's standards and enforcement procedures "must not attempt to regulate engine categories that are permanently preempted from state regulation (such as '. . . any standard or other requirement relation to the control of emissions from . . .(B) New locomotives or new engines used in locomotives.')."[50]

EPA's inquiries in reviewing an authorization request are narrow and substantially deferential to California.[51] The burden lies with the opponents of an authorization to demonstrate that "the factual circumstances exist in which Congress intended a denial of the [authorization]."[52] In other words, California's program and determinations are "presumed to satisfy" the authorization requirements, and those favoring denial of an authorization must provide EPA with material evidence that demonstrates the authorization requirements have not been met.[53] No opponent of this authorization can meet this burden and therefore EPA has no basis to deny this request.

B. California's Conclusion that Its Nonroad Emission Control Program Is at Least as Protective of Public Health and Welfare as EPA's Is Not Arbitrary and Capricious

Under Section 209(e)(2)(A)(i), EPA may not deny an authorization unless it finds California's determination that its standards "will be, in the aggregate, at least as protective of public health and welfare as applicable Federal standards" is arbitrary and capricious.[54] California must evaluate the protectiveness of its nonroad emission control program "in the

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[46] *Compare id.* § 7543(b)(1)(A), (B) *with id.* § 7543(e)(2)(A)(i), (ii) and 40 C.F.R. § 1074.105(b)(1), (2); *see also* 59 Fed. Reg. 36,969, 36,982 (July 20, 1994) (asserting "that the first two criteria [of Section 209(e)(2)] be interpreted the same as for section 209(b)").
[47] 42 U.S.C. § 7543(b)(1)(C), (e)(2)(A)(iii).
[48] 59 Fed. Reg. at 36,970; *see also id.* at 36,983; 89 Fed. Reg. at 14,485 (citing 59 Fed. Reg. 36,969).
[49] 59 Fed. Reg. at 36,983.
[50] 89 Fed. Reg. at 14,486.
[51] 88 Fed. Reg. 72,461, 72,464 (Oct. 20, 2023); *see Motor & Equipment Mfrs. Ass'n v. U.S. Envtl. Prot. Agency* (*MEMA I*), 627 F.2d 1095, 1114 (D.C. Cir. 1979).
[52] 88 Fed. Reg. at 72,464.
[53] *Id.*
[54] 68 Fed. Reg. 65,702, 65,703 (Nov. 21, 2003); 75 Fed. Reg. 8,056, 8,059 (Feb. 23, 2010).

aggregate," assessing whether California's standards and other requirements, as a whole regulatory program, are at least as protective as EPA's.[55] Notably, California's protectiveness determination occurs against the backdrop of prior authorization proceedings in which California previously determined—and EPA affirmed—that California's nonroad emission control program is at least as protective as EPA's.[56] In fact, EPA affirmed just such a determination in October 2023, and no one challenged EPA's finding.[57] Thus, the question is whether the Locomotive Regulation will cause California's nonroad emission control program to become less protective than EPA's.

CARB has determined that the addition of the Locomotive Regulation to its nonroad emissions control program "will not cause California's [nonroad] engine emission standards, in the aggregate, to be less protective of public health and welfare than applicable federal standards."[58] This determination is clearly not arbitrary and capricious given that EPA does not have authority to regulate in-use nonroad engines under the Clean Air Act.[59] Where, as here, California adds a new regulation to its program and there is no EPA equivalent to that regulation, it is plain that the addition of the new California regulation cannot make California's program less protective than EPA's.[60] EPA has previously determined that comparing a new California standard to "an absence" of an EPA standard "provides a clearly rational basis for California's determination that the California . . . program will be more protective of human health and welfare than non-existent federal standards," and that "California standards may be most clearly 'at least as protective' when they are compared to the absence of Federal emission standards."[61] For these reasons, the addition of the Locomotive Regulation, which has no federal analogue, cannot cause California's nonroad emission control program to become less protective than the federal program.

Reviewing the substantive effects of the Locomotive Regulation also makes clear that the addition of the regulation does not make California's nonroad emission program less protective than EPA's. The Locomotive Regulation increases the protectiveness of California's existing program by reducing emissions from a previously uncontrolled source: non-new locomotives operating in California. The Locomotive Regulation is expected to

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[55] 75 Fed. Reg. at 8,057.

[56] *See e.g.*, 68 Fed. Reg. 65,702, 65, 704 (Nov. 21, 2003); 75 Fed. Reg. 8,056, 8,059 (Feb. 23, 2010).

[57] 88 Fed. Reg. at 72,465-66.

[58] CARB Resolution 23-12 (April 27, 2023); *see also* Cover Letter to Authorization Request ("By requiring the gradual reduction of total in-use emissions from locomotives operating in California, the Locomotive Regulation will not alter California's (or EPA's) prior conclusions that the State's Non-Road Program is, in the aggregate, at least as protective as the applicable federal requirements."); CARB, Clean Air Act § 209(e)(2) Authorization Support Document (Nov. 7, 2023) (hereinafter Authorization Support Doc.), at 13.

[59] *See* 42 U.S.C. §§ 7543(e)(1)(B), (e)(2), 7547(e)(5).

[60] This consideration of individual standards that have been added to California's program does not run afoul of the text's requirement that protectiveness be considered "in the aggregate" because the question being asked and answered is whether the protectiveness of the program is being adversely affected by changes to it. Congress itself understood this as indicated in 42 U.S.C. § 7543(b)(2).

[61] 74 Fed. Reg. 32,744, 32,754-55 (Jul. 8, 2009).

reduce a cumulative total of more than 7,000 tons of PM2.5 and almost 400,000 tons of NOx through 2050.[62] It will also reduce cumulative statewide GHG emissions by an estimated 21.6 million metric tons.[63] As such, it makes California's nonroad emission control program—which was previously determined to be at least as protective of public health and welfare as the federal program—more protective of public health and welfare than it previously was. Therefore, EPA has no basis to conclude that the addition of the Locomotive Regulation to California's nonroad emission program will make that program less protective than EPA's.

C. California Still Needs Its Nonroad Emissions Control Program—and Needs this Regulation—to Meet Compelling and Extraordinary Conditions in California

EPA may not deny California's authorization request under Section 209(e)(2)(A)(ii) unless it determines California "does not need such California standards to meet compelling and extraordinary conditions."[64] There is no basis for EPA to make such a determination here.

Under its long-standing interpretation of Section 209(e)(2)(A)(ii), EPA looks to "whether conditions in California justify the need for a separate nonroad vehicle and engine program to meet compelling and extraordinary conditions, and not whether any given standard or set of standards is necessary to meet such conditions."[65] This is consistent with EPA's even longer-standing interpretation of virtually identical language in Section 209(b)(1)(B).[66] As explained in more detail in attached comments submitted in EPA's proceeding to consider a waiver requested by California under Section 209(b), there is no statutory basis or other reason for EPA to depart from its traditional approach.[67] And, under that traditional approach, there is no basis for denying this authorization under Section 209(e)(2)(A)(ii).

As explained in CARB's Authorization Support Document, California's air pollution conditions remain compelling and extraordinary. California's residents experience some of the worst air quality in the nation. California has the only extreme nonattainment regions for ozone in the country (the South Coast and San Joaquin Valley air basins, and Coachella Valley), and those areas also suffer some of the worst levels of PM2.5 pollution in the country.[68] Moreover, California currently has 36 counties in nonattainment with the 2015

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[62] Authorization Support Doc. at 2.
[63] *Id.* at 3.
[64] 42 U.S.C. § 7543(e)(2)(A)(ii).
[65] 88 Fed. Reg. at 72,466 (citing 82 Fed. Reg. 6,525 (Jan. 19, 2017); 78 Fed. Reg. 58,090 (Sept. 20, 2013)).
[66] *Id.*
[67] Comments of States and Cities in Support of CARB's Waiver Request for ACC II Regulations, Feb. 27, 2024, at 12-16.
[68] U.S. EPA, PM-2.5 (2012) Designated Area/State Information with Design Values (last updated March 31, 2024), accessed April 17, 2024, *https://www3.epa.gov/airquality/greenbook/kbtcw.html*; U.S. EPA, PM-2.5 Nonattainment Areas (2012 Standard) (last updated March 31, 2024), accessed April 17, 2024, *https://www3.epa.gov/airquality/greenbook/mappm25_2012.html*.

eight-hour ozone NAAQS, and 14 counties in nonattainment with the 2012 PM2.5 NAAQS.[69] Three areas in California remain the only areas of the country found to be in "serious nonattainment" for the PM2.5 NAAQS set in 2012.[70] And EPA projects that the new standard for PM2.5 will lead to new non-attainment designations for much of the Bay Area, as well as San Diego and Colusa Counties.[71] Indeed, of the 52 counties in the country projected not to meet the 2024 PM2.5 standard, almost half—23—are in California.[72] The 2023 American Lung Association's State of the Air report lists the 25 most polluted cities in the country.[73] Ten California cities were on the top 25 most polluted for daily PM2.5 and ozone—far more than any other state in the nation.[74] The impact of these air quality problems is pervasive, with nearly 21 million Californians residing in communities where pollution levels exceed NAAQS limits.[75]

EPA has never questioned that California's criteria pollution "conditions" are "extraordinary and compelling." Indeed, EPA has consistently found that these challenges, and the conditions that give rise to them, are "compelling and extraordinary," and thus that California still "need[s]" its nonroad emissions program to address them.[76] And given the severity and intractability of these conditions—despite decades of regulation and progress—California needs to reduce emissions of these pollutants by every fraction of a metric ton it can achieve.

California's climate change conditions are also "compelling and extraordinary" under Section 209(e)(2)(A)(ii). California faces severe threats from climate change, as recognized almost 20 years ago by the California legislature in the California Global Warming Solutions Act of 2006 (AB 32):

Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the

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[69] *See supra* footnote 9.
[70] *Id.*
[71] U.S. EPA, Fine Particle Concentrations for Counties with Monitors Based on Air Quality Data from 2020 – 2022, *https://www.epa.gov/system/files/documents/2024-02/table_annual-pm25-county-design-values-2020-2022-for-web.pdf*; U.S. EPA, EPA Projects 52 Counties would not Meet the Strengthened Standard in 2032, *https://www.epa.gov/system/files/documents/2024-02/projected-county-list-2032-for-web.pdf*.
[72] U.S. EPA, EPA Projects 52 Counties would not Meet the Strengthened Standard in 2032, *https://www.epa.gov/system/files/documents/2024-02/projected-county-list-2032-for-web.pdf* (list); U.S. EPA, EPA Projects More than 99% of Counties would Meet the Revised Fine Particle Pollution Standard, *https://www.epa.gov/system/files/documents/2024-02/2024-pm-naaqs-final-2032-projections-map.pdf* (map).
[73] American Lung Association, 2023 State of the Air Report, *https://www.lung.org/getmedia/338b0c3c-6bf8-480f-9e6e-b93868c6c476/SOTA-2023.pdf*.
[74] *Id.* at 14, 18.
[75] ISOR at 59.
[76] 88 Fed. Reg. at 72,468; 82 Fed. Reg. 6,525, 6,530 (Jan. 19, 2017).

displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.[77]

This is far from a comprehensive list of the issues California faces as a result of climate change.[78] More recently, California's Fourth Climate Change Assessment has identified other significant impacts of climate change specifically occurring and expected in California, including increases in already-severe ground-level ozone, coastal erosion, increased frequency of extreme droughts and land subsidence, lower agricultural crop yields, increased susceptibility to massive wildfires, and flooding of significant coastal infrastructure.[79] California consistently loses more acres and more property value to wildfires than any other state.[80] Additionally, California's water supply relies heavily on highly vulnerable snowpack for seasonal water storage.[81] California's agricultural and seafood industries, some of the most productive in the nation, are heavily impacted by rising temperatures on land and sea.[82] These and other climate change impacts disproportionately affect socially and economically disadvantaged populations.[83] These impacts constitute "compelling and extraordinary conditions" under any reasonable interpretation of Section 209(e)(2)(A)(ii). Indeed, climate change conditions in California—from wildfires to droughts—are already "compelling and extraordinary," and they are only anticipated to get worse.[84] There is, thus, no basis to deny this authorization under EPA's

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[77] California Global Warming Solutions Act of 2006, 2006 Cal. Stat. 3419, 3419–20 (codified at Cal. Health & Safety Code § 38501(a)).

[78] *See generally* Brief of Amici Curiae California Climate Scientists in Support of Respondents U.S. Environmental Protection Agency and Michael S. Regan, *Ohio v. EPA*, No. 22-1081 (D.C. Cir. Jan. 18, 2023), ECF No. 1981964.

[79] California's Fourth Climate Change Assessment, a Summary of Key Findings at 5–7, 14, 18 (2018), *https://www.energy.ca.gov/sites/default/files/2019-11/20180827_Summary_Brochure_ADA.pdf*; California's Fourth Climate Change Assessment, Statewide Summary Report at 24, 40, 54–55 (2018), *https://www.energy.ca.gov/sites/default/files/2019-11/Statewide_Reports-SUM-CCCA4-2018-013_Statewide_Summary_Report_ADA.pdf*.

[80] *See e.g.*, Nat'l Interagency Coordination Ctr., Wildland Fire Summary and Statistics Annual Report at 37–38 (2021), *https://www.nifc.gov/sites/default/files/NICC/2-Predictive%20Services/Intelligence/Annual%20Reports/2021/annual_report_0.pdf*; Lindsay Bishop, Wildfire Statistics: Damage, Fatalities and Insurance Rates, ValuePenguin (Jan. 23, 2024), *https://www.valuepenguin.com/homeowners-insurance/wildfire-statistics* (citing data from National Centers for Environmental Information).

[81] California's Fourth Climate Change Assessment, Statewide Summary Report, at 56–57, 65.

[82] *Id.* at 59.

[83] U.S. EPA, EPA Report Shows Disproportionate Impacts of Climate Change on Socially Vulnerable Populations in the United States (Sept. 2, 2021), accessed April 17, 2024, *https://www.epa.gov/newsreleases/epa-report-shows-disproportionate-impacts-climate-change-socially-vulnerable*.

[84] Some of these climate change impacts are highly localized—for instance, elevated concentrations of carbon dioxide measured in the Monterey Bay from nearby California cities and agricultural areas. *See* Devon

traditional interpretation of the second criterion because California continues to need its own program to address several compelling and extraordinary conditions (which are, in any event, interrelated).

Even under the alternative approach to the criterion advanced by some who have in past proceedings objected to California's requests for waivers and authorizations, there is no basis to deny this authorization. Under this alternative approach, EPA would look to whether this Locomotive Regulation itself is needed to meet compelling and extraordinary conditions in California.[85]

The In-Use Operational Requirements will reduce the harmful emissions from more heavily polluting locomotives by eventually restricting operators to using locomotives meeting EPA's Tier 4 standards in California. Tier 4 locomotives are required to emit approximately five times less NOx than Tier 3 and Tier 2, and approximately three times less PM.[86] The reductions compared to pre-Tier 0 and Tiers 0 and 1 are even more dramatic.[87] The requirement to operate locomotives in a ZE configuration in California will eliminate direct NOx and PM pollution from locomotives.[88] The Spending Account requirements will further reduce emissions by incenting operators to reduce their pollution impacts through usage of cleaner locomotives and investments in other forms of less polluting rail equipment and infrastructure.[89]

The Idling Requirements will reduce emissions from excessive idling by ensuring locomotives equipped with AESS devices are operated as intended by EPA's regulations and maintained. These reductions are particularly important for low-income and disadvantaged communities, which are disproportionately impacted by idling due to their proximity to railyards and freight facilities where idling is more frequent.[90]

The Recordkeeping and Reporting Requirements, and Administrative Payment enable CARB to effectively monitor compliance with the other requirements and enforce against violations. The registration requirement is necessary for CARB to establish a database of operators and locomotives in California subject to the Locomotive Regulation.[91] For example, information on the locomotive date of manufacture and EPA Tier is necessary to verify reported emission levels and determine whether a locomotive may be operated in

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Northcott et al., *Impacts of Urban Carbon Dioxide Emissions on Sea-Air Flux and Ocean Acidification in Nearshore Waters,* PLOS ONE (Mar. 27, 2019), *https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0214403#sec009*.

[85] *See Dalton Trucking, Inc. v. U.S. Env't Prot. Agency*, 846 F. App'x 442, 443 (9th Cir. 2021).

[86] 40 C.F.R. § 1033.101(a), (b).

[87] *Id.*

[88] Cal. Code Regs., tit. 13, § 2478.4 (def. of "Zero Emission (ZE) Locomotive").

[89] *Id.* § 2478.4(d).

[90] ISOR at 59, 127.

[91] *Id.* at 130-33.

California.[92] The recordkeeping requirements enable CARB to obtain and verify reported compliance information from operators on a timely basis and ensure that required information is retained by the operator for a reasonable period of time.[93] The reporting requirements, among other things, allow CARB to verify Spending Account obligations and to determine whether any excess idling falls within permitted exceptions or is in violation of the Idling Requirements.[94] The Administrative Payment is necessary for CARB to recover the administrative costs of compliance monitoring and enforcement and is based on staff labor and operational costs.[95]

The Locomotive Regulation is expected to produce more reductions in NOx than any other measure in California's SIP strategy.[96] While California is making significant strides toward reducing PM2.5 and NOx in other sectors, such as heavy-duty trucks, these reductions will not be enough to meet California's State 2022 SIP Strategy goals.[97] Without new emission reduction measures like those discussed in the 2022 State SIP Strategy, by 2037 NOx emissions will need to be reduced by an additional 124 tpd in the South Coast Air Basin to meet the federal 70 parts per billion ozone standard.[98] The emission reductions achieved by the Locomotive Regulation are key to meeting NAAQS requirements.

Locomotives are projected to contribute 14% of California's freight diesel emissions NOx inventory and 16% of the state's freight diesel PM2.5 emissions by 2030.[99] The Locomotive Regulation is estimated to achieve reductions of 7,390 tons of PM2.5 and 386,283 tons of NOx as compared to the business as usual baseline.[100] The Locomotive Regulation will also reduce cumulative statewide emissions of GHG by an estimated 21.6 million metric tons.[101] Thus, there can be no question that California needs this Regulation.

There is no basis to conclude that California does not need its nonroad vehicle and engine program, or the Locomotive Regulation specifically, to meet compelling and extraordinary conditions.

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[92] *Id.* at 131-32.
[93] *Id.* at 134.
[94] *Id.* at 135-36, 141.
[95] *Id.* at 142.
[96] CARB 2022 SIP Strategy, at 38.
[97] ISOR at 15.
[98] CARB 2022 SIP Strategy, at 14.
[99] CARB 2022 SIP Strategy, at 110.
[100] Authorization Support Doc. at 3, 16.
[101] *Id.* at 3.

D. The Addition of the Locomotive Regulation Will Not Make California's Nonroad Program Inconsistent with Section 209

Under Section 209(e)(2)(A)(iii), EPA must grant California's authorization unless EPA finds that California's "standards and accompanying enforcement procedures are not consistent with" Section 209.[102] EPA interprets this consistency prong to require California standards and enforcement procedures to be consistent with Section 209(a), 209(e)(1), and 209(b)(1)(C).[103]

EPA considers the consistency prong in light of congressional purpose "to afford California the broadest possible discretion in selecting the best means to protect the health of its citizens and the public welfare."[104] And, again, California's program and determinations are "presumed to satisfy" the authorization requirements, and those favoring denial of an authorization must provide EPA with sufficient evidence to demonstrate a finding supporting denial must be made.[105]

As explained below, the addition of the Locomotive Regulation to California's program will not render the program inconsistent with Section 209. Thus, EPA may not deny California's Authorization Request under Section 209(e)(2)(A)(iii)'s consistency inquiry.

E. Consistency with 209(a): The Locomotive Regulation Does Not Apply to New Motor Vehicles or New Motor Vehicle Engines

Section 209(a) prohibits States from "adopt[ing] or attempt[ing] to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines."[106] "In order to be consistent with Clean Air Act section 209(a), California's nonroad standards and enforcement procedures must not apply to new motor vehicles or new motor vehicle engines."[107]

"Motor vehicle" is defined as "any self-propelled vehicle designed for transporting persons or property *on a street or highway*."[108] As the Locomotive Regulation expressly "applies to any Locomotive Operator that Operates a Locomotive in the State of California,"[109] and CARB defines "Locomotive[s]" as "self-propelled piece[s] of *on-track* equipment designed for moving or propelling Railcars,"[110] the Locomotive Regulation does not apply to motor

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[102] 42 U.S.C. § 7543(e)(2)(A)(iii).
[103] 89 Fed. Reg. at 14,485-86.
[104] 88 Fed. Reg. at 72,464.
[105] *Id.*
[106] 42 U.S.C. § 7543(a).
[107] 88 Fed. Reg. at 72,463.
[108] 42 U.S.C. § 7550(2) (emphasis added).
[109] Cal. Code Regs., tit. 13, § 2478.1(a).
[110] *Id.* § 2478.3(a).

vehicles. Thus, there is no basis for EPA to determine that the addition of the Locomotive Regulation to California's program will render the program inconsistent with 209(a).[111]

F. Consistency with 209(e)(1): The Locomotive Regulation Does Not Attempt to Regulate New Locomotives

EPA may only deny authorization on the basis of inconsistency with Section 209(e)(1) if it finds the Locomotive Regulation regulates new locomotives.[112] But there is no basis to make this finding because the Locomotive Regulation is specifically limited to the regulation of locomotives that have been placed into service in California, or in other words, non-new locomotives.

EPA's regulations provide that a locomotive ceases to be "new" when: (1) the locomotive's equitable or legal title is transferred to an ultimate purchaser or (2) the locomotive is placed into service, or back into service if the locomotive has been remanufactured.[113] This definition aligns with *Allway Taxi*, which EPA has stated it will consider when determining whether a California regulation applies to new locomotives.[114] In *Allway Taxi*, the court held that preemption of the regulation of "new" motor vehicles extends "only . . . to the manufacture and distribution" of those vehicles.[115] Accordingly, States are only prohibited from setting standards that apply "before the initial sale or registration of an automobile."[116]

The touchstone under *Allway Taxi* is that the burden of state regulation must not "fall on the manufacturer" where the state is preempted from regulating new vehicles.[117] Thus, a local regulation that may apply to post-sale vehicles immediately upon transfer to a purchaser does not run afoul of *Allway Taxi* when it does not require the *manufacturer* "to comply with a[n] [] emission standard that is different from the federal standard" or "require [] *manufacturers* to alter their manufacture of new vehicles before sale."[118] Consistent with this, EPA has stated that any application for authorization to regulate non-new locomotives "would be subject to consideration of whether such regulations *significantly affect the*

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[111] *Cf.* 88 Fed. Reg. at 72,468 (finding CARB's regulation to be consistent with 209(a), because it "expressly appl[ies] only to nonroad engines and do not apply to motor vehicles or engines used in motor vehicles").
[112] *See* 42 U.S.C. § 7543(e)(1)(B), (2)(A).
[113] 40 C.F.R. § 1033.901 (def. of "new").
[114] 88 Fed. Reg. at 77,006.
[115] *Allway Taxi, Inc. v. City of New York*, 340 F. Supp. 1120, 1124 (S.D.N.Y. 1972), *aff'd*, 468 F.2d 624 (2d Cir. 1972); *see also In re Volkswagen "Clean Diesel" Mktg., Sales Pracs., & Prod. Liab. Litig.*, 959 F.3d 1201, 1205 (9th Cir. 2020) (distinguishing between regulation of "pre-sale" and "post-sale" vehicles).
[116] *Id.*
[117] *Engine Mfrs. Ass'n*, 88 F.3d at 1086.
[118] *In re Volkswagen*, 959 F.3d at 1218-19 (emphasis added); *see also Allway Taxi*, 340 F. Supp. at 1124 (regulation does not run afoul of the prohibition on setting standards for new vehicles when the owner or operator bears the cost for compliance).

design or manufacture of a new locomotive or new engine used in a locomotive to the extent such is prohibited by Section 209(e)(1)(B)."[119]

The Locomotive Regulation does not set standards that affect the design and manufacture of new locomotives. Rather, operators can comply with all aspects of the Locomotive Regulation through the use of locomotives built to current EPA emission standards and/or operation of their existing locomotives in a ZE configuration.

1. The Idling Requirements Do Not Regulate New Locomotives

The Idling Requirements set no standards for the design and manufacture of new locomotives. Rather, they require only that *already-installed AESS devices* be used as designed and be timely repaired; that *already-installed* wayside power be used (when possible) to limit idling beyond 30 minutes; and that when an AESS device malfunctions, the device be repaired quickly and the locomotive shut down manually when the device would otherwise do so.[120] In other words, these requirements affect only locomotives already put into service in California.

2. The Recordkeeping and Reporting Requirements and Administrative Payment Do Not Regulate New Locomotives

The Recordkeeping and Reporting Requirements require that locomotives operated in California be registered and that certain information on the locomotives and their usage be reported annually.[121] Nothing is required of a manufacturer or remanufacturer. For example, while usage can be calculated using megawatt hour (MWh) equipment installed on the locomotive, that equipment need not be installed by the manufacturer or remanufacturer—it can be installed by the operator, or the operator can choose to calculate usage by using a conversion formula to convert annual fuel consumption to MWh, in which case no additional equipment is even necessary.[122]

The Administrative Payment requirement applies only to each locomotive operated in California during the preceding year and also has no effect on the design and manufacture (or remanufacture) of any locomotive.[123]

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[119] 88 Fed. Reg. at 77,007-08 (emphasis added).
[120] Cal. Code Regs., tit. 13, § 2478.9(a)-(d).
[121] *Id.* § 2478.11.
[122] *Id.* § 2478.3 (def. of "Usage"). To the extent the railroads claim they would need to invest in new technology for idling and location tracking in order to collect and report the required information, these would be voluntary choices not mandated by the Locomotive Regulation. In any event, there is no basis to conclude that the addition of any such technology would affect how the locomotive is designed and manufactured.
[123] *Id.* § 2478.12.

Accordingly, the Recordkeeping and Reporting Requirements and Administrative Payment provision cannot be found inconsistent with Section 209(e)(1)'s restriction on regulating new locomotives.

3. The In-Use Operational Requirements Do Not Regulate New Locomotives

The In-Use Operational Requirements set emission standards for locomotives operating in California, as the Clean Air Act expressly preserves California's authority to do. These standards will, over time, require *operators* who place locomotives into service in California to improve the emission performance of those locomotives. They do not require manufacturers to change anything in order to sell a locomotive. Nor are any required changes in emission performance triggered by, or necessary during, remanufacturing cycles. To the extent operators may choose to make such changes as part of any remanufacturing, that is entirely their choice.

The age limitation component of the In-Use Operational Requirements permits operators to use locomotives newly purchased or remanufactured to EPA's current Tier 4 emission standard before 2030 *without change* for 23 years (or longer if put to limited use or used as part of an alternative compliance plan).[124] To the extent operators must then make changes to those locomotives—i.e., to meet EPA's Tier 4 standards or to run in a ZE configuration—to continue using them in California, there can be no credible argument that this regulates manufacturers of new locomotives in any way.[125] Under the plain meaning of the word "new" in the Clean Air Act itself and under EPA's definition, a locomotive that has already been placed into service for 23 years is not "new." And there is no design requirement or any other condition of sale imposed on any manufacturer or remanufacturer. If Congress's choice to permit California to set its own emission standards for non-new locomotives operating in California is to be given any meaning (as it must be), California must be able to limit the emission levels of such locomotives. This is precisely what the age limitation does.

The same is true of the ZE requirements that apply to locomotives originally sold beginning in 2030 and 2035. These requirements apply to the operator and do not impose design standards or other requirements on manufacturers. Notably, with the exception of some ZE locomotives, locomotives currently operating in California are diesel-electric, and the railroads can and do bypass the diesel generator of a locomotive when tying locomotives together in a mother-slug configuration.[126] Operators similarly may comply with the ZE operational requirements by using their *existing locomotives* by employing a ZE power source (e.g., electricity or hydrogen) instead of diesel to power the engine when operating

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[124] *Id.* §§ 2478.5(a), 2478.7.
[125] *Id.* § 2478.5(b), (c).
[126] EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 007, CARB, Final Statement of Reasons for the In-Use Locomotive Regulation (hereinafter FSOR), at 37.

in California.[127] Again, there is no burden placed on manufacturers to change how they design and manufacture or remanufacture locomotives because all locomotives in service today can be configured by the operator to run on ZE power.

4. The Spending Account Requirements Do Not Result in Standards for New Locomotives

The only *obligation* created by the Spending Account Requirements is that operators must place a certain amount of funding into an account over which they maintain control but for which there are restrictions on expenditures.[128] Even this requirement can be mitigated or even eliminated in a number of ways such as by obtaining and spending grant funds on qualifying purchases, by operating locomotives in a ZE configuration in California, and by making qualifying expenditures prior to a given year's set-aside requirement (funds do not need to be set aside if they have already been spent).[129] And the amount that must be set aside is determined based on the locomotives actually placed into service in California by the particular operator.[130] None of this affects manufacturers or remanufacturers in any way.

To the extent opponents of this authorization argue that the restrictions on expenditures from Spending Accounts regulate new locomotives, those arguments fail. For one thing, the Spending Account Requirement does not actually *require* operators to spend the money they have set aside (assuming they must do so because they do not avail themselves of the options to eliminate that obligation).[131] For another, the Spending Account allows operators to spend all of the funds on retrofits and upgrades to *existing* locomotives (e.g., to bring them to Tier 4 or make them ZE capable) and/or on equipment and infrastructure other than locomotives.[132] Operators thus have multiple choices concerning their Spending Accounts that will not even involve locomotive manufacturers or locomotive sales, much less control them.

For these reasons, there is no basis to find the Locomotive Regulation inconsistent with Section 209(e)(1).

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[127] *Id.* at 37; EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 039, CARB, Appx. C Technical Support Document: Zero Emission Locomotive Conversion (hereinafter Appx. C); EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 038, Natalie Popovich et al., Economic, environmental and grid-resilience benefits of converting diesel trains to battery-electric.
[128] Cal. Code Regs., tit. 13, § 2478.4(a)-(d).
[129] *Id.* § 2478.4(g), (h).
[130] *Id.* § 2478.4(f).
[131] *See generally id.* § 2478.4.
[132] *Id.* § 2478.4(d).

G. Consistency with 209(b)(1)(C): The Addition of the Locomotive Regulation to California's Program Is Feasible and Will Not Render California's Program Inconsistent with Sections 209(b)(1)(C)

To determine consistency with Section 209(b)(1)(C), EPA reviews nonroad authorization requests under the same "consistency" criteria that are applied to motor vehicle waiver requests under Section 209(b)(1)(C).[133] Section 209(b)(1)(C) requires that California's "standards and accompanying enforcement procedures" are not inconsistent with Section 202(a) of the Clean Air Act.[134] To assess consistency with Section 202(a), EPA evaluates whether opponents of a waiver have met their burden to establish that: (1) California's program is technologically infeasible, and (2) California's test procedures impose requirements that are inconsistent with Federal test procedures.[135]

The scope of EPA's review is narrow and deferential to California,[136] as noted above, and it is limited to the record before EPA on feasibility of the requisite technologies.[137] Moreover, EPA "evaluates CARB's request in light of congressional intent . . . to foster California's role as a laboratory" and "to continue the national benefits that might flow from allowing California to continue to act as a pioneer," recognizing that its program may require "new and/or improved technology."[138]

As explained below, the Locomotive Regulation is feasible and its addition to California's program does not render the program inconsistent with Section 202(a), as it is analyzed under Section 209(b)(1)(C).[139]

IV. The Locomotive Regulation Is Technologically Feasible within the Lead Time Provided

Under EPA's 209(b)(1)(C) consistency inquiry, the Locomotive Regulation cannot be deemed technologically infeasible unless opponents of the authorization demonstrate that

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[133] 80 Fed. Reg. 26,041, 26,043 (May 6, 2015) ("In light of the similar language of sections 209(b) and 209(e)(2)(A), EPA has reviewed California's requests for authorization of nonroad vehicle or engine standards under section 209(e)(2)(A) using the same principles that it has historically applied in reviewing requests for waivers of preemption for new motor vehicle or new motor vehicle engines under section 209(b).");
78 Fed. Reg. 58,090, 58,113 (Sept. 20, 2013).

[134] 42 U.S.C. § 7543(b)(1)(C).

[135] 88 Fed. Reg. 20,688, 20,704 (Apr. 6, 2023); *see Motor Equipment Manufacturers Association v. Nicols* (*MEMA II*), 142 F.3d 449, 463 (D.C. Cir. 1998).

[136] 88 Fed. Reg. at 20,704; 88 Fed. Reg. 72,461, 72,469-70 (Oct. 20, 2023); 78 Fed. Reg. at 2115, 2132.

[137] 88 Fed. Reg. at 72,469.

[138] 78 Fed. Reg. at 58,113.

[139] EPA has long acknowledged that the feasibility analysis in the Section 209(b)(1)(C) context differs from the feasibility analysis for the federal standards promulgated under Section 202(a). 49 Fed. Reg. 18,887 18,892 (May 3, 1984).

there is insufficient lead time to permit the development and application of the technology necessary to meet the Locomotive Regulation, considering the cost of compliance within that time.[140] EPA determines technological feasibility "in the context of the entire regulatory program for the particular industry category," and EPA has rejected the argument that its analysis should focus on "whether each of CARB's [] regulatory components, in isolation, is consistent with section 202(a)."[141]

In the Section 209(b)(1)(C) context, EPA analyzes the technological feasibility for *manufacturers* who design and produce new motor vehicles. As discussed, the Locomotive Regulation applies to locomotive *operators* who use non-new locomotives in California.[142] There is no basis for EPA to conclude that the requirements imposed on operators by the Locomotive Regulation are infeasible with the lead-time provided, and thus no basis to conclude that the addition of the Locomotive Regulation will render California's nonroad program inconsistent with Section 209(b)(1)(C).

A. The Technologies Needed to Comply with the Locomotive Regulation Already Exist, and There Is Adequate Lead Time for Their Application

The Idling Requirements govern the use and maintenance of existing technologies (AESS device and wayside power capabilities) and direct operators to manually shut-down locomotives under certain circumstances. And, while operators may choose to use MWh meters to track usage for purposes of complying with the Recordkeeping and Reporting and Spending Account requirements, those meters are not mandatory.[143] Even so, the fact that most locomotives are already equipped with a MWh meter shows that the technology is clearly technologically feasible within the lead time provided.[144]

Only the In-Use Operational Requirements will require operators to apply technology. And the technologies necessary to comply already exist and are in use or being demonstrated, or are under development. Moreover, operators have ample lead time to apply any required technologies. The age-limitation begins to take effect in 2030—more than six years after CARB promulgated the regulation—and requires a gradual phasing out of the use of heavily-polluting locomotives in California. The ZE configuration requirement also phases in with substantial lead time, as it applies to locomotives originally built in 2030 or 2035, depending on the type of locomotive, or to locomotives that gradually age out under the

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[140] 80 Fed. Reg. 26,041, 26,043 (May 6, 2015).
[141] 78 Fed. Reg. at 2,132; *see also MEMA II*, 142 F.3d at 463.
[142] Cal. Code Regs., tit. 13, § 2478.1.
[143] *Id.* § 2478.3 (def. of "Usage") (allowing calculation by formula); *id.* § 2478.11
[144] Authorization Support Doc. at 23; CARB, Standardized Regulatory Impact Assessment (May 26, 2022) (hereinafter SRIA), at 69.

age limitation. Operators have more than adequate time to plan for these gradually phased-in requirements.

In fact, the age limitation does not require the application of any technology, unless the operator wants to use a given locomotive longer than 23 years. In that case, the operator would have to make the locomotive operate more cleanly—either upgrade a lower-tier locomotive to Tier 4 or upgrade any locomotive to operate in ZE configuration in California. Upgrades to Tier 4 are feasible. Upgrades to operate in ZE configuration are also feasible for the same reason that the ZE configuration component is feasible.

The ZE configuration requirements (which apply to locomotives with original build dates of 2030 or 2035) "will be feasible when [they] go into effect,"[145] as the requisite technologies exist and further "developments are anticipated to accelerate in the coming years."[146] Locomotive operators could choose to: (1) hybridize existing diesel-electric locomotives, such that the locomotives could alternate between diesel power and ZE power; (2) convert an existing diesel-electric locomotive to Tier 4 or to ZE-only operation by replacing the diesel engine and generator/alternator with a ZE power source; (3) acquire a ZE locomotive; (4) achieve the required emissions reductions via an Alternative Compliance Plan[147]; or (5) comply with the Alternative Fleet Milestone Option.[148]

Hybridize.[149] A locomotive is hybridized when batteries, hydrogen fuel cells, or other ZE power sources are used together with the main source of propulsion power to reduce locomotive emissions and improve energy efficiency. Hybridization may be achieved by a pure hybrid engine, use of battery or hydrogen tender cars, or a "mother-slug" configuration. A tender car may be connected to a modern diesel-electric locomotive with wiring that transmits electricity via cable to the locomotive's central electrical bus and then to the traction motors that deliver electricity to the drivetrain of the locomotive.[150] Similarly, in a "mother-slug" operation, the diesel-electric generator from the "mother" locomotive is connected by cables to provide power to a "slug" unit that has traction motors but no engine, which allows the train to gain additional horsepower.[151]

Hybrid technologies can be used on all locomotive types and tiers, and they are available for any of the main propulsion sources, including diesel or natural gas engines, fuel cells, or

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[145] Authorization Support Doc. at 22.
[146] *Id.* at 22. CARB has also prepared as an example an analysis demonstrating the feasibility of operating ZE locomotives on a high-traffic freight route in California between the Port of LA and Barstow, CA. CARB, *Feasibility Analysis: Zero Emission Train from the Port of LA to Barstow* (Exhibit A).
[147] Cal. Code Regs., tit. 13, § 2478.7.
[148] *Id.* § 2478.8.
[149] Hybrid locomotives meet the definition of "ZE capable locomotive," as they can be operated in a ZE configuration and also operated using a fuel that produces emissions. *Id.* § 2478.3(a).
[150] Popovich et al., 6 Nature Energy 1017-25.
[151] Appx. C at 9-10.

any other type of power generating system.[152] Thus, nearly every locomotive operated in California today can be configured by the operator to run on ZE power.[153]

Hybrid locomotives can also be programmed to run on ZE power in certain locations.[154] Hybrid locomotives' control systems can be configured to automatically turn off their internal combustion engines and use batteries in designated areas,[155] such as when entering California or near disadvantaged communities, to maximize the emission reduction benefits. A locomotive's control system could rely on GPS to determine its location, an algorithm would continuously monitor the locomotive's location, and, when the locomotive enters predefined geofenced areas, the algorithm would trigger a switch to battery power. This type of technology is already being used in other vehicle contexts. For example, BMW's eDrive Zones service uses geofencing technology to mark low emission zones across Europe and, when one of its vehicles enters a low emission zone, it automatically changes to battery power.[156]

Hybrid locomotives are feasible technology, given that several models are commercially available and in use today, and many more are being demonstrated.[157] For example:

- Amtrak placed an order in 2021 for 15 battery-electric hybrid locomotives that can be charged by either a 480V external power source, by regenerative braking, or by the diesel engine. The first of these locomotives will be delivered in 2025, with the full fleet anticipated to be delivered by 2030.[158]
- DB Cargo is currently in the process of obtaining 300 new hybrid switcher locomotives, with the long-term goal of replacing 900 older diesel locomotives. Siemens Mobility will produce 150 of its Vectron Dual Mode locomotives, with deliveries planned to start in 2023. Vossloh Locomotives GmbH will produce 50 hybrid locomotives that will begin operation in 2024. Toshiba will produce 100 Toshiba HDB 800 hybrid locomotives, with rollout also scheduled for 2024.[159]

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[152] *Id.* at 15; Authorization Support Doc. at 30.
[153] Popovich et al., 6 Nature Energy 1018.
[154] *Cf.* BAE Systems, What is geofencing?, accessed April 17, 2024, *https://www.baesystems.com/en-us/definition/what-is-geofencing*; Appx. C at 13.
[155] Appx. C at 13.
[156] Geospatial World, *How Geo-fencing Helps BMW Promote Electric Driving*, accessed April 17, 2024, *https://www.geospatialworld.net/prime/case-study/how-geo-fencing-helps-bmw-promote-electric-driving/*; *see also* Lexus UK Magazine, *Predictive Efficient Drive raises fuel efficiency*, April 26, 2023, accessed April 17, 2024, *https://mag.lexus.co.uk/predictive-drive-system/*.
[157] Authorization Support Doc. at 30; Appx. F at 16-19.
[158] Appx. F at n.39.
[159] DB Cargo, New climate-friendly locomotive fleet on the way, January 24, 2022, accessed March 21, 2024, *https://www.dbcargo.com/rail-de-en/logistics-news/new-climate-friendly-locomotive-fleet-pioneering-technology-7201018*.

- The EURO9000 hybrid locomotive from Stadler has received approval for operation in the Netherlands, Belgium, Germany, Austria, and Switzerland, emphasizing its adaptability to the requirements of international rail corridors. The flexibility of the locomotive allows it to be run on AC or DC electrified lines and its modular design allows three different power systems (catenary, diesel, battery) to be installed together.[160]

- In October 2023, Progress Rail delivered two hybrid EMD GT38H locomotives to Rumo, Brazil's largest railway operator, for revenue freight service. The locomotives draw energy to power the traction motors from a diesel generator and a bank of batteries. Rumo estimates the units could reduce fuel use by up to 45% while also reducing emissions such as PM and NOx.[161]

- In November 2023, Rail Cargo Hungary's Class 181 locomotive designed by CRRC Zhuzhuo successfully underwent compatibility assessments with infrastructure during a two-day trial in Bulgaria, with more trials to follow in Romania. The CRRC Class 181 is an electric unit that operates on electrified lines but also has "last mile" battery technology to operate on partially electrified lines.[162]

- CRRC's 1000 kW HFC and BE locomotive entered the trial operation phase in China in November 2023. The switcher locomotive is expected to begin operation at the narrow-gauge railway FCAB, which connects the port of Antofagasta in Chile with mining facilities in Bolivia, in the second half of 2024.[163]

- In December 2023, it was reported that the CHA3C1 hybrid locomotive commissioned by Meishan Iron & Steel has started operation at a steel plant in Nanjing, China. The CHA3C1 is fitted with a 380 kW diesel engine and a 315 kWh lithium-titanate battery. The locomotive can operate in diesel, battery, or hybrid mode.[164]

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[160] RailTech.com, Stadler hybrid Locomotive approved in Belgium and the Netherlands, December 22, 2023, accessed March 15, 2024, *https://www.railtech.com/rolling-stock/2023/12/22/stadler-hybrid-locomotive-approved-in-belgium-and-the-netherlands/*.
[161] Trains, Progress Rail Delivers Hybrid Locomotives for freight use in Brazil, October 6, 2023, accessed March 15, 2024, *https://www.trains.com/trn/news-reviews/news-wire/progress-rail-delivers-hybrid-locomotives-for-freight-use-in-brazil/*
[162] Railway Supply, The hybrid electric locomotive CRRC Class 181, December 13, 2023, accessed March 15, 2024, *https://www.railway.supply/en/the-hybrid-electric-locomotive-crrc-class-181/*.
[163] Railway Supply, Operational experience of the CRRC hydrogen locomotive, November 22, 2023, accessed March 18, 2024, *https://www.railway.supply/en/operational-experience-of-the-crrc-hydrogen-locomotive/*.
[164] Rolling Stock, CRRC launches a new model of hybrid shunting locomotive, December 25, 2023, accessed March 15, 2024, *https://rollingstockworld.com/locomotives/crrc-launches-a-new-model-of-hybrid-shunting-locomotive/*.

- In April 2024, it was reported that Canadian National (CN), a Class I railroad, will purchase a plug-in, hybrid diesel-battery locomotive from Progress Rail for test operation on CN's main line in British Columbia.[165]

As with the development of hybrids and similar technologies in other contexts, these technologies are only expected to improve and diversify over the lead time provided by the gradual phase-in of the Locomotive Regulation's requirements.

Convert. Locomotives may also be converted to Tier 4, ZE-capable, or ZE.[166] Conversion of locomotives from Tiers 0-3 to Tier 4 is technologically feasible,[167] as demonstrated by the January 2024 Consent Decree between the U.S. EPA, CARB, and Cummins (who manufactures and services locomotives), that requires Cummins to repower pre-Tier 0 to Tier 1 switchers to Tier 4.[168] And, as described above, conversion of diesel-electric locomotives to ZE-capable is feasible through connecting the motor to a ZE power source such as a battery or hydrogen fuel cell tender car.[169] CARB has also determined that locomotive conversion from a diesel-electric to battery-electric operation is "highly feasible"[170] and that conversion is also feasible for hydrogen fuel cell technology.[171]

While further technological advances are expected in the coming years,[172] locomotive operators are already engaged in upgrading locomotives to Tier 4, ZE-capable, or ZE. For example:

- Multiple switchers that have been remanufactured to Tier 4 operate in California.[173]
- Modesto and Empire Traction Railroad received federal funding to remanufacture two Tier 0 locomotives to Tier 4.[174]

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[165] Trains, CN to acquire, test first plug-in diesel-battery hybrid locomotive in British Columbia, April 5, 2024, accessed April 17, 2024, *https://www.trains.com/trn/news-reviews/news-wire/cn-to-acquire-test-first-plug-in-diesel-battery-hybrid-locomotive-in-british-columbia/*.

[166] *See* Appx. C.

[167] *See EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 023,* Metrolink's Locomotive Fleet Modernization Study Update at 4-5.

[168] United States of America v. Cummins Inc., Consent Decree, at 52, Jan. 10, 2024, *https://www.epa.gov/system/files/documents/2024-01/cumminsin2024-cd.pdf.*

[169] Railway Gazette International, *Battery tender for freight loco to be developed*, March 11, 2024, accessed April 17, 2024, *https://www.railwaygazette.com/traction-and-rolling-stock/battery-tender-for-freight-loco-to-be-developed/66098.article* (battery-electric tender cars to be used in this configuration are under development).

[170] Authorization Support Doc. at 28; *see* Appx C. at 2.

[171] Authorization Support Doc. at 29.

[172] Authorization Support Doc. at 22; *see* CARB, Zero Emission Rail Project Dashboard, accessed April 17, 2024, *https://ww2.arb.ca.gov/applications/zero-emission-rail-project-dashboard.*

[173] SRIA at 68.

[174] EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Material, 021, FY 2022 CRISI Program Selections at 3; Authorization Support Doc. at 24.

- Western Rail. Inc. purchased Cummins QST30 Tier 4 locomotive power modules and will remove the old diesel engine from a lower Tier locomotive, drop in the new Tier 4 power module, and rewire the old electrical system.[175]
- Watco, an owner and operator of short line railroads, placed two converted all-electric switcher locomotives into full service toward the end of 2023 and stated after testing that the locomotives were outperforming assumptions for functionality.[176]
- Canadian Pacific Kansas City and CSX Corporation have announced a joint venture to build and deploy hydrogen conversion kits for diesel-electric locomotives and a converted Canadian Pacific locomotive has accumulated more than 1,000 miles of testing in revenue service.[177] Indeed, the CEO of one of the fuel-cell companies involved is quoted as stating that the conversion project "proves that it is technically and economically feasible to convert diesel-powered switcher locomotives to hydrogen fuel cell-based power systems."[178]
- Other examples are detailed in CARB's authorization request support documents.[179]

Additionally, diesel-electric locomotives could be converted to run on catenary or third-rail power, both of which are "well-established, well-studied and have been in use for more than 100 years."[180]

Transforming diesel-powered locomotives into dual-mode electro-diesel engines is feasible.[181] Depending on the locomotive type and the desired configuration of the conversion, modifications may be necessary to the structural frame of the locomotive to

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[175] EPA Docket EPA-HQ-OAR-2023-0574, Supporting and Related Materials 024 (Cummins Rail), at 1 and 025 (Western Rail, Inc.), at 1.
[176] Railway Age, *Watco Electric Switchers Receive High Marks*, Oct. 5, 2023, accessed April 17, 2024, *https://www.railwayage.com/freight/short-lines-regionals/watco-electric-switchers-receive-high-marks/*.
[177] Electric & Hybrid Rail Technology, *CPKC and CSX to develop hydrogen conversion kits for diesel electric locomotives*, June 26, 2023, accessed April 17, 2024, *https://www.electricandhybridrail.com/content/news/cpkc-and-csx-to-develop-hydrogen-conversion-kits-for-diesel-electric-locomotives/*; CSX Press Release, *CPKC and CSX Announce Planned Collaboration to Develop Additional Hydrogen Locomotives*, June 22, 2023, accessed April 17, 2024, *https://www.csx.com/index.cfm/about-us/media/press-releases/cpkc-and-csx-announce-planned-collaboration-to-develop-additional-hydrogen-locomotives/*.
[178] Businesswire, *Loop Energy and Hydrogen In Motion Inc. (H2M) Announce Project in British Columbia to Convert Diesel Electric Locomotive to Hydrogen Electric*, Sept. 1, 2021, accessed April 17, 2024, *https://www.businesswire.com/news/home/20210901005289/en/Loop-Energy-and-Hydrogen-In-Motion-Inc.-H2M-Announce-Project-in-British-Columbia-to-Convert-Diesel-Electric-Locomotive-to-Hydrogen-Electric*; *see also* Progressive Railroading, *Palmetto Railways to retrofit two locomotives to battery-electric power*, Feb. 14, 2024, accessed April 17, 2024, *https://www.progressiverailroading.com/mechanical/news/Palmetto-Railways-to-retrofit-two-locomotives-to-battery-electric-power--71257*.
[179] *See* Authorization Support Doc. at 28-30; Appx. C.
[180] Appx. C at 2.
[181] *See* Appx. F.

accommodate the additional internal equipment necessary for dual-mode conversion.[182] However, there are scenarios where only minor modifications to the structure would be required.[183] The addition of the pantograph and associated roof equipment would require further reinforcement to the locomotive roof.[184] Additional retrofitting to the electrical traction equipment would also be necessary, such as the addition of an electronic control unit, auxiliary rectifiers, and a transformer to step down the voltage from the contact lines to the appropriate rating for the traction motors. The transformer, due to its inherently larger volume and weight, will need to be carefully selected to fit locomotive weight and volume constraints.[185] Due to the transformer taking the place of the alternator when in electric mode, the existing traction motors do not require modification.[186] Batteries or supercapacitors could be installed to provide additional power by using regenerative breaking or other electricity stored in the batteries or supercapacitors.

Operators may also choose to convert a diesel locomotive fully to an overhead catenary system (OCS) or to an OCS-battery hybrid, so that the locomotive may be paired with a diesel locomotive when OCS is not available. This would reduce space constraints during the OCS conversion because the diesel engine would be removed, allowing more space for the transformer.

Conversion from diesel to OCS has already been proven by a locomotive operator. For example:

- In 2018, Indian Railways converted two WAGC3-class diesel locomotives into a combined, permanently coupled 12-axle electric WAGC3. The conversion of the locomotives from concept to execution was carried out within 69 days.[187]

Optional: Locomotive Manufactured as ZE. Locomotive operators may instead choose to use or acquire a locomotive manufactured as ZE.[188] CARB expects both ZE battery-electric and ZE hydrogen-fueled locomotives to be commercially available before 2030 for

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[182] Indian Railways, Specification for Dual Mode Goods Locomotive, October 2016, *https://rdso.indianrailways.gov.in/uploads/files/MP-0-0800-109%20(Rev_%2002)-%20Oct-16.pdf*.
[183] *See* L.J. Lawson and L.M. Cook, The Garrett Corporation, Dual-Mode Locomotive Systems Engineering Volume 1 Summary, Report No. FRA/ORD-80/82.1 (Feb. 1981), *https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/15203/PB81191314%5B1%5D.pdf*.
[184] *Id.*
[185] *Id.*
[186] L.J. Lawson and L.M. Cook, Airesearch Manufacturing Company of California, *Wayside Energy Storage Study Volume IV - Dual Mode Locomotive: Preliminary Design Study*, Report No. FRA/ORD-78/78.IV (Feb. 1979), *https://railroads.dot.gov/sites/fra.dot.gov/files/fra_net/14990/DOT-FRA-ORD-78-78-IV-1979_Wayside%20Energy%20Storage%20Study-volume%20IV%20Dual%20Mode%20Locomotive.pdf*.
[187] Smriti Jain, *Indian Railways creates history! Converts diesel loco to 'Make in India' electric locomotive; watch video*, FINANCIAL EXPRESS (Mar. 3, 2018), *https://www.financialexpress.com/business/railways-indian-railways-creates-history-converts-diesel-loco-to-make-in-india-10000-hp-electric-locomotive-1086123/*.
[188] Authorization Support Doc. at 31.

switchers and 2035 for line haul locomotives.[189] Numerous ZE locomotive models exist and are in service, and more are being developed and demonstrated.[190]

Battery-electric locomotives may be used for all locomotive types, though they are presently particularly well-suited for passenger and switcher locomotive duty cycles due to the more frequent opportunities to recharge.[191] While battery-electric line haul locomotives currently have limited operational ranges compared to diesel-electric line hauls, their range may be extended by use of battery tender cars.[192] Manufacturers have clarified that, while the early models have smaller battery capacity, battery capacity is highly customer dependent and can be increased to meet specific customer operational requirements.[193] And range will increase as battery technologies continue to improve over the coming decade.[194]

Hydrogen fuel-cell locomotives may also be used for all locomotive types and have similar refueling times to that of diesel-electric locomotives.[195] Canadian Pacific Kansas City railroad is currently investing in hydrogen fuel-cell locomotives, which are expected to enter service for switching and local freight service in Alberta, Canada, by the end of 2024.[196] Similar to battery-electric locomotives, hydrogen fuel tenders may be necessary to increase the operational range of line haul locomotives. Hydrogen fuel-cell locomotives are at least 30% more efficient than diesel engines, and, combined with a tender car, they may be comparable to diesel-electric freight line haul locomotives in terms of range and refueling time.[197]

Overhead catenary systems transfer electricity to locomotives via overhead lines, and the electricity is supplied to the catenary system through substations located along the railway line. These substations convert the high voltage AC power from the grid into current (AC or

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[189] *Id.* at 31; Appx. F at 24, 31.
[190] Appx. F at 22, 24-26 (battery-electric models), 31-35 (hydrogen fuel-cell models); *see also* Noah Bovenizer, *Intramotev launches first battery-electric railcar in freight train*, RAILWAY TECHNOLOGY (Apr. 4, 2024), *https://www.railway-technology.com/news/intramotev-battery-electric-railcar-freight-train/?cf-view*.
[191] Appx. F at 22-23; *see e.g.*, *IRT to Deliver NUCOR's First Battery-Electric Locomotive to Hertford County*, INNOVATIVE RAIL TECHNOLOGIES (July 31, 2023), accessed April 17, 2024, *https://innovativerailtech.com/innovative-rail-technologies-chooses-nmc/*.
[192] Authorization Support Doc. at 28; Appx C. at 9-10.
[193] Appx. F at 22-23.
[194] *See* Becky Schultz, *Battery-electric power rides the rails*, POWER PROGRESS (Feb. 13, 2024), accessed April 17, 2024, *https://www.powerprogress.com/news/battery-electric-power-rides-the-rails/8035095.article* (explaining significant development in battery technology for battery-electric locomotives from pilot project in 2021 to mainline service heavy-haul locomotive in 2023, and noting that "[t]he technology surrounding the batteries…will continue to evolve rapidly and drive even further advances in design").
[195] Authorization Support Doc. at 31.
[196] Trains Staff, *CPKC orders more hydrogen fuel cell engines*, TRAINS (Nov. 7, 2023), accessed April 17, 2024, *https://www.trains.com/trn/news-reviews/news-wire/cpkc-orders-more-hydrogen-fuel-cell-engines/*; *Ballard receives follow-on order from CPKC Rail for 12 additional fuel cell engines*, GREEN CAR CONGRESS (Feb. 5, 2024), *https://www.greencarcongress.com/2024/02/20240205-cpkc.html*.
[197] Authorization Support Doc. at 31-32.

DC) suitable for the train.[198] This is then fed into the contact wire, which is suspended by supports at a precise height above the tracks to ensure proper contact with the pantograph. A pantograph is a spring-loaded device that is mounted to the roof of the train. It can consist of one or more collector arms and will automatically adjust to maintain proper contact with the overhead wires. Once the pantograph collects electricity from the contact wire, the electricity is transmitted to the train's electrical system through a series of cables and transformers. On board transformers step down the high voltage power from the contact wires into the necessary voltage and frequency required by the train's traction motors and other subsystems.[199] The converted power is then distributed to various components of the train, such as the traction motor, lighting systems, heating and air condition units, and other auxiliary systems. The current returns through the running rail to end back at the substation (a dual parallel overhead wire can be used to return the current as well).[200, 201]

Catenary technology enables locomotive operators to configure any diesel-electric locomotive in their fleet to operate using a ZE power source, and it is feasible for all locomotive types, as demonstrated by its use around the globe,[202] as exemplified in Table 1.

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[198] Kristian, *What Is the Primary Function of a Traction Power Substation*, SWARTZ ENGINEERING (May 6, 2023), accessed April 17, 2024, *https://www.swartzengineering.com/blog/what-primary-function-traction-power-substation*.

[199] *Traction transformers for locomotives*, HITACHI ENERGY, accessed April 17, 2024, *https://www.hitachienergy.com/us/en/products-and-solutions/transformers/special-application-transformers/traction-transformers/traction-transformers-for-locomotives*.

[200] *Electric Traction Power*, THE RAILWAY TECHNICAL WEBSITE , accessed April 17, 2024, *http://www.railway-technical.com/infrastructure/electric-traction-power.html*.

[201] Bill Schweber, *Electric locomotives and catenary power systems – Part 3: power delivery*, POWER ELECTRONIC TIPS (Jan. 15, 2020), accessed April 17, 2024, *https://www.powerelectronictips.com/electric-locomotives-catenary-power-systems-part-3-power-delivery/*.

[202] Authorization Support Doc. at 26-27 ("[Overhead catenary systems are] not only a feasible solution in line haul and passenger operations, but also a feasible solution for switching operations in ports and railyards.").

Table 1: Example Overhead Catenary System Railroad Projects

Name	Location	Length (miles)	Starting Year	Type
Dedicated Freight Corridor	India	2,098	2024	Freight
Brightline West	California and Nevada	218	2028 (planned)	Passenger High Speed
Chemins de fer du Jura	Switzerland	53	1953	Passenger and Freight
Northeast Corridor[203]	U.S.	457	1917	Passenger and Freight
Shinkansen[204]	Japan	1,802	1964	Passenger High Speed
Al Boraq[205]	Morocco	306	2018	Passenger High Speed
Trans-Siberian Railway[206]	Russia and China	5,771	1916 (Fully electrified 2002)	Passenger and Freight

"Any of these ZE locomotives provide operators with another feasible compliance option, particularly in light of the [six to eleven years of] lead time provided before ZE operations are required" for any locomotives.[207] And, even then, operators have substantially more lead time for any locomotive that has not exceeded the age limit restrictions.

Alternative Compliance Pathways. Finally, the Locomotive Regulation provides compliance flexibilities that locomotive operators may use in place of directly complying with the In-Use

[203] *The Northeast Corridor*, NORTHEAST CORRIDOR COMMISSION , accessed April 17, 2024, *https://nec-commission.com/corridor/*.
[204] *Shinkansen Bullet Train: Brief Overview of Shinkansen Bullet Train*, ENCYCLOPEDIA JAPAN, accessed April 17, 2024, *https://doyouknowjapan.com/shinkansen/*.
[205] Mariya Sahnouni, *Morocco's High-Speed Train Trial Run Finishes in Marrakech*, MOROCCO WORLD NEWS (Jan. 25, 2023), accessed April 17, 2024, *https://www.moroccoworldnews.com/2023/01/353710/moroccos-high-speed-train-trial-run-finishes-in-marrakech*.
[206] Sanat Pai Raikar, *Trans-Siberian Railroad*, BRITTANICA, accessed April 17, 2024, *https://www.britannica.com/topic/Trans-Siberian-Railroad*.
[207] Authorization Support Doc. at 32.

Operational Requirements.[208] Using an Alternative Compliance Plan, locomotive operators may do a project that achieves equivalent emissions reductions within three miles of the operator's locomotive activities within California.[209] Locomotive operators may also rely on the Alternative Fleet Milestone Option, under which an operator must demonstrate that 50% of their operations are accomplished by Tier 4 or cleaner locomotives by 2030, that 100% of their operations are accomplished by Tier 4 or cleaner operations by 2035, that at least 50% of their operations are ZE by 2042, and that 100% of their operations are ZE by 2047.[210]

The Locomotive Regulation also includes provisions for one-year compliance extensions, which may be granted successively, when certain requirements including the In-Use Operational Requirements cannot be met because compliant equipment cannot be obtained due to unavailability.[211] In combination with additional flexibilities provided through exemptions,[212] these alternative compliance pathways further support the technological feasibility of the In-Use Operational Requirements by providing even greater flexibility as to when technologies must be applied and expanding the means of compliance such that some operators (using an ACP) may not need to apply locomotive technologies at all.

Given that the technologies necessary to meet the In-Use Operational Requirements either already exist or are being developed, and that there is 6 to 11 years of lead time before gradual phase-ins begin, there is no basis to determine that the Locomotive Regulation will render California's nonroad emissions control program as technologically infeasible.

V. The Costs of Compliance Are Reasonable

Under the statute's plain text, it is only the compliance costs related to the technology required by the Locomotive Regulation that is relevant for this analysis.[213] Thus, costs incurred in complying with the Spending Account Requirements, Idling Requirements, and Recordkeeping and Reporting Requirements are not at issue.[214] Only the In-Use Operational Requirements require the development and/or application of additional technologies.

As discussed, all of the technology required to comply with the In-Use Operational Requirements currently exists or is reasonably forecast to be available in the relevant

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[208] *Id.* at 6-7.
[209] *Id.* at 6.
[210] *Id.* at 6-7.
[211] Cal. Code Regs., tit. 13, § 2478.6(b)(3).
[212] Authorization Support Doc. at 8.
[213] 42 U.S.C. § 7521(a)(2) (requiring "appropriate consideration" of "the cost of compliance" to "develop[] and appl[y] … the requisite technology"); *see e.g.,* 76 Fed. Reg. 77,515, 77,520 (Dec. 13, 2011) (rejecting consideration of cost-effectiveness).
[214] While operators may choose to install MWh meters to track usage in California, this is not mandatory. Operators can calculate usage using a formula set forth in the Locomotive Regulation. Cal. Code Regs., tit. 13, § 2478.3 (defining "usage").

timeframe. Tier 4 locomotives have been available since 2015. Certain ZE locomotives have been put into service and the technology necessary to enable the locomotives to serve longer line haul routes is projected to develop within the lead time provided in the Locomotive Regulation.

CARB assessed the overall compliance costs for locomotive operators[215] and determined that the addition of the Locomotive Regulation to California's nonroad emissions control program remains feasible in light of the associated costs of compliance over the lead-time provided.[216]

While the costs of compliance with the In-Use Operational Requirements may vary depending on each locomotive operator's chosen compliance pathway, the incremental costs of compliance with each are reasonable. To model the related costs, CARB analyzed the ZE technologies that are best suited for each locomotive type's duty cycle.[217] CARB determined that hydrogen fuel-cell locomotives are well suited to the high duty cycles of Class I line haul and passenger locomotives, because they are required to travel over longer ranges with limited intervals.[218] CARB also concluded that battery-electric locomotives are well suited to the duty cycles of switcher locomotives for Class I, Class III, and industrial locomotive operators given their more limited range and power demands, the lower price of electricity compared to hydrogen, and the easier access to charging infrastructure.[219]

CARB estimates the cost to convert an existing diesel-electric switcher locomotive to a Tier 4 or full ZE locomotive to be approximately $2.3 million and $2.9 million, respectively.[220] The cost of converting a passenger locomotive to Tier 4 or full ZE would be approximately $6.9 million and $9 million, respectively.[221] Because it is relatively straightforward process akin to the mother-slug configuration already in use, the costs of configuring an existing diesel-electric locomotive to be capable of running on a ZE fuel tender such as a battery tender car would be minimal, and the cost of acquiring a ZE tender car to use in this configuration is estimated to range from $1 to $5 million.[222]

If locomotive operators choose to comply with the In-Use Operational Requirements by purchasing a new ZE locomotive, CARB estimates the following incremental costs of purchasing a ZE locomotive over a Tier 4 locomotive: Class I line haul locomotive operators would be $2.15 million to acquire a new hydrogen fuel cell locomotive (including a

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[215] *See* SRIA at 59-90.
[216] Authorization Support Doc. at 34.
[217] SRIA at 67.
[218] *Id.* at 67.
[219] *Id.* at 67.
[220] *Id.* at 68, Table 3.2; *see also* CARB, Preliminary Cost Document for the In-Use Locomotive Regulation, March 16, 2021, at 6-7, *https://ww2.arb.ca.gov/sites/default/files/2021-03/3.16.21%20Locomotive%20Reg%20-%20Preliminary%20Cost%20Document_Final.pdf*.
[221] *Id.*
[222] *Id.* at 11, 15.

hydrogen fuel tender); Class I and Class III switcher locomotive operators would be $700,000 to acquire a new battery electric locomotive; industrial yard switcher locomotive operators would be $940,000 to acquire a new battery electric locomotive; and passenger locomotive operators would be $5.5 million.[223]

Moreover, these upfront costs to locomotive operators could be offset by lifetime fuel savings—especially for battery-electric locomotives[224]—as well as federal and state grant funds. For example, over $1.4 billion was available in fiscal year 2022 through the federal Consolidated Rail Infrastructure and Safety Improvements Program for projects that improve rail safety, efficiency, and reliability, including for the rehabilitation, remanufacture, procurement, or overhaul of locomotives for emissions reduction.[225] The Carl Moyer Air Quality Standards Program provides over $60 million each year for cleaner vehicle engines in California, including Tier 4 and ZE locomotive engines.[226] The Port and Freight Infrastructure Program provided over $1.2 billion for port and freight infrastructure in California, including funding for ZE locomotives and infrastructure.[227] The Transit and Intercity Rail Capital Program has awarded over $10 billion in California, including for ZE locomotives and infrastructure.[228]

Additionally, the continually-decreasing price of batteries combined with continually-increasing battery energy densities and access to cheap renewable electricity supports that the compliance costs for battery-electric locomotives will be reasonable by 2030 (and 2035).[229] "Battery sales have been doubling every two or three years, and we are on track for a six to eight times increase by 2030 . . . ."[230] And, "for every doubling of battery

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[223] *Id.* at 68, Table 3.2.
[224] *See* Appx. F at 28-29 (noting that "electricity costs are cheaper than diesel fueling costs").
[225] U.S. Department of Transportation, Federal Railroad Administration, *Consolidated Rail Infrastructure and Safety Improvements (CRISI) Program*, accessed on April 17, 2024, *https://railroads.dot.gov/grants-loans/consolidated-rail-infrastructure-and-safety-improvements-crisi-program*.
[226] CARB, *Carl Moyer Program: Locomotives*, accessed on April 17, 2024, *https://ww2.arb.ca.gov/our-work/programs/carl-moyer-program-locomotives*.
[227] California State Transportation Agency, *Port and Freight Infrastructure Program Selected Projects – Project Detail Summary* , July 6, 2023, *https://calsta.ca.gov/-/media/calsta-media/documents/pfip-awards-summary-narrative-7-6-23-a11y.pdf*.
[228] California State Transportation Agency, *2022 Transit and Intercity Rail Capital Program: Final Guidelines for General Fund Augmentation*, Nov. 15, 2022, *https://calsta.ca.gov/-/media/calsta-media/documents/tircp-cycle-6-final-guidelines_a11y.pdf* ; California State Transportation Agency, *Transit and Intercity Rail Capital Program*, accessed on April 17, 2024, *https://calsta.ca.gov/subject-areas/transit-intercity-rail-capital-prog*.
[229] Popovich et al., Economic, environmental and grid-resilience benefits of converting diesel trains to battery-electric; Daan Walter, et al., Rocky Mountain Institute, The Rise of Batteries in Six Charts and Not Too Many Numbers (Jan. 25, 2024), accessed April 17, 2024, *https://rmi.org/the-rise-of-batteries-in-six-charts-and-not-too-many-numbers/*.
[230] Daan Walter et al., Rocky Mountain Institute, X-Change: Batteries, The Battery Domino Effect, at 3 (Dec. 2023), *https://rmi.org/wp-content/uploads/dlm_uploads/2023/12/xchange_batteries_the_battery_domino_effect.pdf*.

production, costs fall by 19–29% and the density of leading batteries rises by 7–18%."[231] The cost of lithium-ion batteries hit a record low in 2023 and technological innovation and manufacturing improvements are expected to drive further significant declines by 2030.[232]

In sum, CARB determined that the total compliance costs for all components of the Locomotive Regulation from 2023 to 2050 would be $13.8 billion for all regulated entities, or on average slightly over $500 million per year.[233] For context, the two Class I railroads operating in California who are estimated to bear about 85% of the total costs between them, each posted annual net incomes exceeding $5 billion in 2023.[234] Furthermore, CARB expects that the railroads will pass some or all of these costs through to consumers of freight moved by rail.[235] And, as discussed, the Locomotive Regulation contains multiple alternative compliance options that operators can utilize to fit their particular financial conditions. Therefore, the compliance costs for locomotive operators satisfy the Section 209(b)(1)(C) standard, and there is no basis to determine that the addition of the Locomotive Regulation to California's nonroad emissions control program will render it technologically infeasible.

VI. The Locomotive Regulation Does Not Include Testing and Certification Procedures, and Thus Cannot Be Inconsistent with Federal Test Requirements

Under EPA's section 209(b)(1)(C) analysis, the addition of the Locomotive Regulation to CARB's nonroad program may also be deemed inconsistent with section 202(a) if "federal and state testing procedures impose inconsistent certification requirements."[236] Because the Locomotive Regulation does not impose any testing or certification procedures, it cannot conflict with federal testing or certification requirements.[237] Thus, there is no basis for EPA to deny authorization on this ground.

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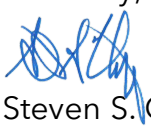
[231] *Id.*
[232] BloombergNEF, Lithium-Ion Battery Pack Prices Hit Record Low of $139/kWh, Nov. 26, 2023, accessed April 17, 2024, *https://about.bnef.com/blog/lithium-ion-battery-pack-prices-hit-record-low-of-139-kwh/*; Goldman Sachs, Electric vehicle battery prices are falling faster than expected, Nov. 1, 2023, accessed April 17, 2024, *https://www.goldmansachs.com/intelligence/pages/electric-vehicle-battery-prices-falling.html*.
[233] Authorization Support Doc. at 33.
[234] BNSF Annual Form 10-K, p. 19; UP Annual Form 10-K, p. 43; SRIA at 85.
[235] Authorization Support Doc. at 34; *see also* 76 Fed. Reg. at 77,520.
[236] 89 Fed. Reg. at 14,486; *see* 88 Fed. Reg. at 72,469 ("California's accompanying enforcement procedures would also be inconsistent with section 202(a) if the Federal and California test procedures conflicted, *i.e.*, if manufacturers would be unable to meet both the California and Federal test requirements with the same test vehicle.").
[237] *Cf.* 80 Fed. Reg. 76,685, 76,689 (Dec. 10, 2015) (finding no inconsistency with federal test procedures, given no comments contradicting CARB's determination that "the amendments do not alter any test procedures, and EPA does not have comparable in-use standards and test procedures; thus, by definition, there is no inconsistency with federal test procedures").

VII. Conclusion

For the foregoing reasons, there is no basis to deny CARB's Authorization Request for the Locomotive Regulation. CARB is not aware of any additional data, and none was provided at the hearing regarding CARB's requested authorization, that would change the fact that EPA must grant the request. CARB accordingly requests that EPA expeditiously grant California the requested Authorization.

Sincerely,



Steven S. Cliff, Ph.D., Executive Officer, California Air Resources Board

Enclosure: materials referenced in footnotes separately filed this date.

cc: Edie Chang, Deputy Executive Officer, California Air Resources Board

Heather Arias, Chief, Transportation and Toxics Division, California Air Resources Board