State of California
Air Resources Board

Public Hearing to Consider the Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Staff Report: Initial Statement of Reasons

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Executive Summary

California Air Resources Board (CARB or Board) staff are proposing amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate (TRU ATCM; title 13, California Code of Regulations, section 2477),[1] hereafter referred to as the "Proposed Amendments." CARB adopted the TRU ATCM in 2004 (and amended it in 2010 and 2011) to reduce diesel particulate matter (diesel PM) emissions from diesel-powered TRUs and TRU generator sets (gen set), and near-source health risk at facilities where TRUs operate. This Initial Statement of Reasons presents staff's proposal to amend the TRU ATCM to achieve additional emission reductions from TRUs by transitioning diesel-powered truck TRUs to zero-emission (ZE), as well as requiring a PM emission standard for newly-manufactured TRUs in the remaining categories, the use of lower global warming potential (GWP) refrigerant, facility registration and reporting, expanded TRU reporting and labeling, and fees. Driven by the Governor's Executive Order (EO) N-79-20,[2] which set a goal for 100 percent ZE off-road vehicles and equipment by 2035, the Proposed Amendments begin the transition of diesel-powered TRUs to ZE technology and are a part of California's holistic plan to meet the State's multiple public health, air quality, and climate goals.

A. What are TRUs and TRU Gen Sets?

TRUs are refrigeration systems powered by integral (inside the TRU housing) diesel engines designed to control the environment of temperature-sensitive products transported in insulated trucks, trailers, shipping containers, or railcars. TRU gen sets are diesel internal combustion engine-powered generators designed to provide electric power to electrically-powered refrigeration units of any kind. This includes, but is not limited to, TRU gen sets that provide electricity to electrically-powered refrigeration systems for shipping containers when they are not plugged into ocean-going ship electric power or dock shore power. TRUs are capable of both cooling and heating.

B. Why are TRUs Regulated in California?

TRUs emit multiple air pollutants, such as diesel PM, fine particulate matter (PM2.5), oxides of nitrogen (NOx), and greenhouse gases (including hydrofluorocarbons and

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[1] California Air Resources Board, Public Hearing to Consider the Adoption of the Proposed Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU), TRU Generator Sets, and Facilities where TRUs Operate, Staff Report: Initial Statement of Reasons, October 2003. (web link: https://ww3.arb.ca.gov/regact/trude03/isor.pdf)

[2] Executive Order N-79-20, State of California Executive Order signed by Governor Gavin Newsom, September 23, 2020. (web link: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf)

black carbon). TRUs typically operate at refrigerated warehouses or distribution centers (which include cold storage warehouses), grocery stores, seaport facilities, intermodal railyards, and other locations that are often near sensitive receptors, such as schools, hospitals, senior care facilities, and residential neighborhoods. Emissions from diesel-powered TRUs contribute to community health risk, regional air pollution, and global climate change.

- Diesel PM: In 1998, CARB identified diesel PM as a toxic air contaminant based on its potential to cause lung cancer and other health problems. These health issues include premature death, increased hospital admissions for cardiovascular and respiratory illnesses, and increased emergency room visits for asthma. This is especially true for children, the elderly, outdoor workers, and other sensitive populations.
- PM2.5 and NOx: These pollutants are directly emitted from diesel-powered TRUs and can react in the atmosphere with other chemicals to create regional air pollutants over a larger geographic area. For example, NOx emissions contribute to both regional ozone and PM2.5 levels. The non-cancer health impacts from exposure to PM2.5 are consistent with those described above for diesel PM, with the primary concern being adverse cardiac and respiratory effects.
- Greenhouse Gases (GHG): Hydrofluorocarbons (emitted when refrigerant leaks from TRUs due to normal wear and fatigue of refrigerant fittings), black carbon (a subset of PM2.5), and carbon dioxide from diesel-powered TRUs contribute to climate change. Climate change is one of the most serious environmental threats facing the world today. California is already feeling the effects of climate change, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.[3]
- Impacts on Communities: Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions from the diesel engines that power TRUs. Several communities across the State contain "groups" or "clusters" of facilities where TRUs operate. In many cases, these facilities are in or near communities that the California Environmental Protection Agency (CalEPA) classifies as disadvantaged. CalEPA uses the California Communities Environmental Health Screening Tool to score California communities based on environmental pollution burden and

[3] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf)

socio-economic indicators.[4] Exposure to diesel pollution is a main contributor to many communities scoring in the top 10th percentile statewide.

C. What are the Current Requirements of the TRU ATCM?

The TRU ATCM requires TRU engines that operate in California to meet specific in-use performance standards that require diesel PM emissions to be reduced in accordance with a phased compliance schedule. The phased compliance schedule is based on the model year (MY) of the TRU engine, and requires compliance with the in-use performance standard seven years after the engine MY. Ultimately, all TRU engines are required to meet the ultra-low emission TRU (ULETRU) performance standard and have 85 percent PM control (compared to an uncontrolled Tier 0 engine) to be fully compliant with the TRU ATCM. TRU owners have the following compliance options under the TRU ATCM:

- Use a TRU equipped with an engine that meets the United States Environmental Protection Agency (U.S. EPA) Tier 4 final off-road emission standards for 25-50 horsepower engines (meets ULETRU).
- Retrofit the existing TRU with a Level 3 Verified Diesel Emission Control Strategy with 85 percent PM control (meets ULETRU).
- Use an alternative technology that eliminates TRU diesel engine operation (and emissions) while at a facility. Alternative technologies include electrification, cryogenic refrigeration systems, alternative fuel systems, exclusive use of alternative diesel fuel, fuel cell-powered refrigeration systems, and other technologies that eliminate emissions while at a facility (meets ULETRU).
- Replace the existing unit (engine and refrigeration system) with a new TRU equipped with an engine that meets the U.S. EPA Tier 4 final off-road emission standards for less than 25 horsepower engines, which would be in compliance until the seventh year after the replacement TRU's engine MY (does not meet ULETRU).

D. Why are Staff Proposing Amendments to the TRU ATCM?

CARB's current programs, coupled with efforts at the local and federal level, have achieved success in reducing emissions and resulted in cleaner vehicles and equipment in operation today. Nonetheless, meeting all of California's public health, air quality, and climate goals will require large reductions beyond those occurring under current programs. Staff are proposing amendments to the TRU ATCM to achieve additional emission reductions from diesel-powered TRUs and increase the use of ZE technology

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[4] Office of Environmental Health Hazard Assessment, CalEnviroScreen 3.0, June 25, 2018. (web link: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)

in the off-road sector, which is needed to meet these complementary goals, as well as the directive of EO N-79-20.[5]

Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions generated from activity associated with diesel-powered TRUs. Assembly Bill 617 (C. Garcia, Chapter 136, Statutes of 2017)[6] highlights the need for further emission reductions in communities with high exposure burdens, such as those located near facilities where TRUs operate. In addition, staff performed a health risk assessment (HRA) to evaluate the localized cancer risk impacts attributable to emissions from diesel-powered TRUs operating at cold storage warehouses and grocery stores. The HRA estimated the increase in potential cancer risk that would result under the TRU ATCM and indicated a need for further emission reductions from TRUs to provide public health benefits and reduce the cancer risk burden to communities near facilities where they operate.

Challenges remain in meeting the federal ambient air quality standards for ozone and PM2.5 in two areas of the State: the South Coast Air Basin and San Joaquin Valley. Legally-obligated deadlines require these areas to attain the federal ambient air quality standards. These deadlines are established by the federal Clean Air Act and implemented by U.S. EPA each time a new standard is promulgated based on updated information showing health impacts at increasingly lower levels. The near-term targets for these areas are a 2023 deadline for attainment of the 80 parts per billion (ppb) 8-hour ozone standard, 2024 for the 35 microgram per cubic meter (µg/m3) 24-hour PM2.5 standard, and 2025 for the 12 µg/m3 annual PM2.5 standard. There are also mid-term attainment years of 2031 and 2037 for the more recent 8-hour ozone standards of 75 ppb and 70 ppb, respectively.[7]

Reductions in GHGs, including short-lived climate pollutants like black carbon and hydrofluorocarbons, from TRUs are needed to help achieve the State's multiple GHG emission reduction targets and climate goals required by Senate Bill 32 (Pavley,

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[5] EO N-79-20 set a goal for 100 percent ZE off-road vehicles and equipment by 2035.
[6] California Health and Safety Code § 40920.6, 42400, 42402, 39607.1, 40920.8, 42411, 42705.5, and 44391.2, Division 26, Assembly Bill No. 617, Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants, July 26, 2017. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617)
[7] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)

Chapter 249, Statutes of 2016)[8] and Senate Bill 1383 (Lara, Chapter 395, Statutes of 2016).[9]

The Proposed Amendments are also needed to address multiple State policies and plans directing CARB to achieve additional diesel emission reductions, including the 2020 Mobile Source Strategy,[10] the 2016 State Strategy for the State Implementation Plan,[11] California's 2017 Climate Change Scoping Plan,[12] the Sustainable Freight Pathways to Zero and Near-Zero Discussion Document,[13] Executive Order B-32-15,[14] and the California Sustainable Freight Action Plan.[15]

Lastly, the Proposed Amendments are needed to address the emergence and growth in the number of trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets equipped with engines less than 25 horsepower, which have less stringent emission standards; strengthen the regulation by including requirements for owners and operators of facilities where TRUs operate and vehicle owners, as well as expanded TRU reporting and labeling to monitor compliance; and collect fees from TRU and applicable facility owners to cover CARB's reasonable costs associated with the certification, audit, and compliance of TRUs, as allowed by Senate Bill 854.

E. Why are Staff Developing Two Rulemakings to Transition Diesel-Powered TRUs to ZE Technology?

In October 2020, staff posted an update on the TRU Regulation website announcing the bifurcation of the draft TRU concept to transition diesel-powered TRUs to ZE technology in two parts. In addition to the ZE truck TRU requirements in the Proposed Amendments (Part 1), staff intend to develop an additional rulemaking to transition

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[8] California Health and Safety Code § 38566, Division 25.5, Senate Bill No. 32, September 8, 2016. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32)
[9] California Health and Safety Code § 39730, Division 30, Senate Bill No. 1383, Short-lived climate pollutants: methane emissions: dairy and livestock: organic waste: landfills, September 19, 2016. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1383)
[10] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)
[11] California Air Resources Board, Revised Proposed 2016 State Strategy for the State Implementation Plan, March 7, 2017. (web link: https://www.arb.ca.gov/planning/sip/2016sip/rev2016statesip.pdf)
[12] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf)
[13] California Air Resources Board, Sustainable Freight Pathways to Zero and Near-Zero Emissions Discussion Document, April 23, 2015. (web link: https://www.arb.ca.gov/gmp/sfti/sustainable-freight-pathways-to- zero-and-near-ZEs-discussion-document.pdf)
[14] Executive Order B-32-15, State of California Executive Order signed by Governor Edmund G. (Jerry) Brown Jr., July, 17, 2015. (web link: https://www.ca.gov/archive/gov39/2015/07/17/news19046/index.html)
[15] California Department of Transportation, et al., California Sustainable Freight Action Plan, July 2016. (web link: https://ww2.arb.ca.gov/sites/default/files/2019-10/CSFAP_FINAL_07272016.pdf)

trailer TRUs and the remaining TRU categories to ZE technology (Part 2). The decision to bifurcate the TRU rulemaking was made in response to EO N-79-20, which directs CARB, in coordination with other State agencies, U.S. EPA, and local air districts, to develop and propose technologically feasible and cost-effective strategies to achieve 100 percent ZE from off-road vehicles and equipment operations in the State by 2035. Previously, staff presented a draft TRU concept at public workshops held in 2019. Although the draft TRU concept included requirements for ZE truck TRUs, trailer TRUs, DSC TRUs, and TRU gen sets were only subject to ZE requirements while stationary at certain facilities in the State. Staff determined that the ZE-operation-while-stationary requirement did not meet the objective of the EO, and it is necessary to transition trailer TRUs and the remaining TRU categories to ZE like the truck TRUs.

While the return-to-base operations of truck TRUs make them suitable for commercially available ZE technology now, currently questions exist as to the range capability and cost-effectiveness of ZE technology for long-haul transport. Questions include use of ZE in TRUs that do not return to a home base each night as well as questions concerning charging infrastructure availability. The two-part rulemaking allows staff to complete an assessment of ZE technologies for trailer TRUs and the remaining TRU categories to inform the development of requirements to transition all TRUs to ZE that are technologically feasible and cost-effective. Transitioning truck TRUs to ZE in Part 1 also provides a strong signal for the development of ZE TRU technologies, which staff believe will result in technology improvements, such as improvements to battery weight and range, earlier than they would have otherwise occurred. These improvements will enable advanced TRU technologies to expand further into extended range applications and support the development of requirements to transition trailer TRUs and the remaining TRU categories to ZE technology in Part 2.

F. What Amendments to the TRU ATCM are Staff Proposing in this Rulemaking?

Staff are proposing amendments to the TRU ATCM to transition diesel-powered truck TRUs to ZE, as well as require a PM standard for newly-manufactured TRU engines in the remaining categories and the use of lower-GWP refrigerant. The Proposed Amendments also include new requirements for owners and operators of applicable facilities where TRUs operate, as well as TRU reporting, compliance labels, and fees. Key elements of the Proposed Amendments include the following:

By December 31, 2022:

- All newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California shall use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all.

- MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines shall meet a PM emission standard of 0.02 grams per brake horsepower-hour (g/hp-hr) or lower.
    - Note: MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines would continue to operate under the current TRU ATCM requirements, in which they shall meet ULETRU by December 31 of the seventh year after the engine MY. For example, a trailer TRU equipped with a MY 2020 engine would have to meet ULETRU by December 31, 2027.

By December 31, 2023:

- Applicable facility[16] owners shall register their facility with CARB, pay registration fees every three years, and report all TRUs that operate at their facility to CARB quarterly, or alternatively attest that only compliant TRUs (i.e., those with a valid CARB compliance label or showing as compliant on CARB's website) operate at their facility.
- TRU owners shall report all TRUs that operate in California to CARB, regardless of where they are based.
- TRU owners shall pay TRU operating fees and affix CARB compliance labels to their TRU every three years, for each TRU operated in California.
- TRU owners shall turnover at least 15 percent of their truck TRU fleet (defined as truck TRUs operating in California) to ZE technology each year (for 7 years). All truck TRUs operating in California shall be ZE by December 31, 2029.

G. What Authority does CARB have to adopt the Proposed Amendments?

Several sections of the California Health and Safety Code (Health & Saf. Code) provide CARB with authority to adopt the Proposed Amendments. More specifically, this regulatory action is proposed under the authority granted to CARB in California Health & Saf. Code sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1. This action is proposed to implement, interpret, or make specific, Health & Saf. Code sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1.

Health & Saf. Code sections 39600 (General Powers) and 39601 (Standards, Definitions, Rules, and Measures) confer to CARB the general authority and obligation to adopt rules and measures to execute the Board's powers and duties imposed by

[16] An applicable facility is defined in the Proposed Amendments as a refrigerated warehouse or distribution center with a building size greater than or equal to 20,000 square feet, a grocery store with a building size greater than or equal to 15,000 square feet, a seaport facility, or an intermodal railyard if one or more TRUs operate within the legal property boundary of the facility.

State law. In addition, Health & Saf. Code sections 43013 and 43018(a) provide broad authority to achieve the maximum feasible and cost-effective emission reductions from all mobile source categories, including off-road diesel engines.

California's Air Toxics Program, established under California law by AB 1807 (Chapter 1047, Statutes of 1983),[17] and set forth in Health & Saf. Code section 39650 through 39675, mandates the identification and control of air toxics in California. In 1998, CARB identified diesel PM as a toxic air contaminant, and in September 2000, adopted the Diesel Risk Reduction Plan.[18] The Diesel Risk Reduction Plan was the first formal product of the risk management phase and serves as the needs assessment under the AB 1807 process. The plan identified options to reduce diesel PM and the recommended control measures to achieve reductions, including a measure to reduce diesel PM from diesel fueled TRUs and TRU gen sets. The Proposed Amendments fulfill the goals of the Diesel Risk Reduction Plan and complies with the requirements of Health & Saf. Code sections 39666 and 39669.5 to prevent an endangerment to public health. The Proposed Amendments are also in accordance with Health & Saf. Code section 39618, which directs CARB to treat refrigerated trailers as mobile sources and develop regulations to reduce emissions from refrigerated trailers.

Health & Saf. Code sections 39674 and 39675 authorize CARB to impose civil penalties for violations of Health & Saf. Code section 39658, 39659, or Article 4 (beginning with section 39665). Sections 42400 et seq. provide that violation of CARB regulations is a misdemeanor offense and establish different levels of civil penalties for such violations.

Health & Saf. Code section 43019.1 authorizes CARB to adopt a schedule of fees to cover its reasonable costs associated with the certification, audit, and compliance of off-road or non-vehicular engines and equipment, aftermarket parts, and emissions control components sold in the state. The Proposed Amendments include a schedule of fees to recover CARB's reasonable costs associated with these categories.

While the current requirements of the TRU ATCM primarily place compliance obligations on TRU owners and operators, the Proposed Amendments require owners and operators of applicable facilities where TRUs operate to ensure that only compliant TRUs operate on their properties. TRU operations at facilities generate harmful emissions and impact surrounding communities. Therefore, facility owners and operators should bear some responsibility for ensuring TRUs operating on their

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[17] California Air Resources Board, AB 1807 - Toxics Air Contaminant Identification and Control (web link: https://ww2.arb.ca.gov/resources/documents/ab-1807-toxics-air-contaminant-identification-and-control, last accessed May 10, 2021)

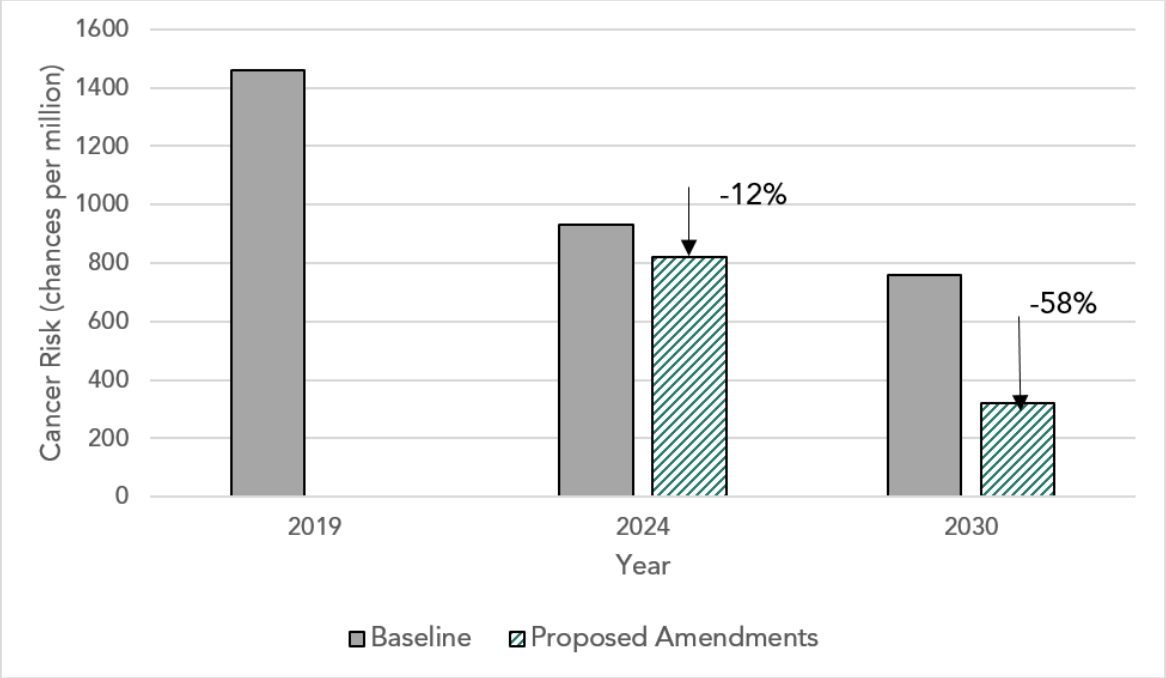
[18] California Air Resources Board, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, October 2000. (web link: https://ww2.arb.ca.gov//sites/default/files/classic/diesel/documents/rrpfinal.pdf)

properties are compliant with emissions requirements. CARB's statutory mandates, particularly its air toxics and GHG related mandates, are not limited to vehicular and mobile sources. Therefore, CARB has determined that assigning certain compliance obligations to facility owners and operators, in addition to TRU owners and operators, is necessary and proper for satisfying CARB's statutory mandates to reduce air pollution and the associated health risk from diesel-powered TRUs.

H. What Health Benefits will the Proposed Amendments Provide?

Exposure to pollution from the diesel engines that power TRUs has both potential cancer and non-cancer health impacts. Staff conducted an HRA to evaluate the benefits of the Proposed Amendments regarding potential cancer risk resulting from direct exposure to diesel PM from TRUs operating at cold storage warehouses and grocery stores. Figure ES-1 shows the Proposed Amendments are expected to reduce potential individual residential cancer risk from TRU operations at cold storage warehouses by approximately 12 percent in 2024 and 58 percent after full implementation in 2030.

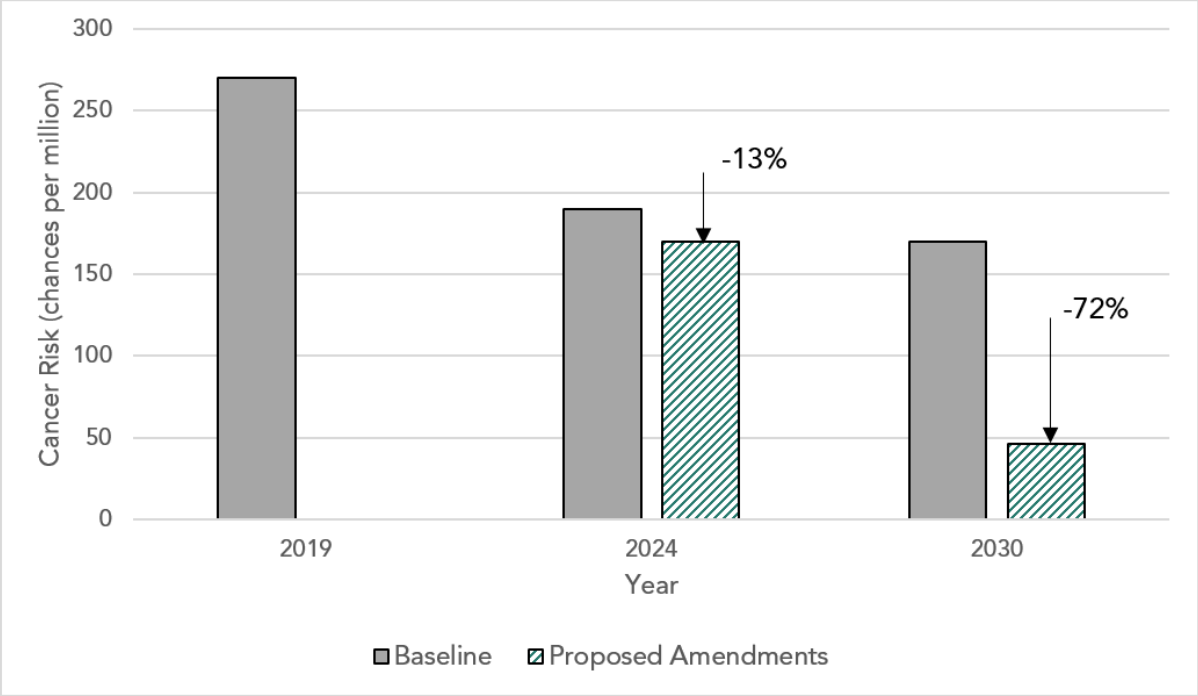
Figure ES-1. Potential Individual Resident Cancer Risk and Risk Reduction for Cold Storage Warehouses[19]



[19] Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy method (95th percentile/80th percentile daily breathing rates. Fraction of time at home equals 1 for age bins <16 years and 0.73 for age bin 16-70 years.

Figure ES-2 shows the Proposed Amendments are expected to reduce potential individual residential cancer risk from TRU operations at grocery stores (with 7 daily trucks, 2 daily trailers, and 1 seasonal trailer) by approximately 13 percent in 2024 and 72 percent after full implementation in 2030.

Figure ES-2. Potential Individual Resident Cancer Risk and Risk Reduction for Grocery Stores (7 Trucks, 2 Trailers, 1 Seasonal Trailer Scenario)[20]



CARB staff evaluated a limited number of statewide non-cancer health benefits associated with reductions in exposure to PM2.5 and NOx emissions resulting from the Proposed Amendments. NOx includes nitrogen dioxide, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled. However, the most serious quantifiable impacts of NOx emissions occur through the conversion of NOx to fine particles of ammonium nitrate aerosol through chemical processes in the atmosphere. PM2.5 formed in this manner is termed secondary PM2.5. Both directly emitted (primary) PM2.5 and secondary PM2.5 is associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for cardiovascular and respiratory illnesses, and emergency room visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these adverse health outcomes. Staff estimates that the total reduction in the number of cases statewide

[20] Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy method (95th percentile/80th percentile daily breathing rates. Fraction of time at home equals 1 for age bins <16 years and 0.73 for age bin 16-70 years.

due to the implementation of the Proposed Amendments from 2022 to 2034 would be as follows:

- 177 fewer premature deaths (138 to 217, 95 percent confidence interval (CI))
- 57 fewer hospital admissions for cardiovascular and respiratory illnesses (7 to 106, 95 percent CI)
- 87 fewer emergency room visits for asthma (55 to 119, 95 percent CI)

Table ES-1 shows the total statewide valuation of avoided adverse health outcomes as a result of the Proposed Amendments from 2022 to 2034, which is estimated to be $1.75 billion (compared to approximately $1.04 billion in total net costs).

Table ES-1. Statewide Valuation of Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034 (2019$)

Outcome	Valuation
Avoided Premature Deaths	$1,749,747,000
Avoided Hospitalizations	$3,092,000
Avoided Emergency Room Visits	$73,000
Total	$1,752,912,000

Note: Values have been rounded to the nearest thousand.

While CARB's PM2.5 mortality and illness analysis has been, and continues to be, a useful method for valuing the health benefits of regulations, it only represents a portion of those benefits. The full health benefits of the Proposed Amendments are underestimated because not all the adverse health outcomes associated with PM2.5 and additional pollutants such as air toxics are evaluated and monetized. Also, CARB's current evaluation methodology does not take into account all PM2.5 precursor emissions. Expansion of the emissions inputs and health outcomes, including, but not limited to, additional cardiovascular and respiratory illnesses, nonfatal/fatal cancers, nervous system diseases, and work loss days would provide a more comprehensive picture of the benefits from reduced exposure to air pollution.

I. What Air Quality and Climate Benefits will the Proposed Amendments Provide?

The Proposed Amendments will reduce PM2.5, NOx, and GHG emissions from diesel-powered TRUs beyond levels that would be achieved under the current TRU ATCM. From 2022 to 2034, the Proposed Amendments are expected to further reduce cumulative statewide TRU emissions by approximately 1,258 tons of PM2.5, 3,515 tons of NOx, and 1.42 million metric tons of GHGs. Table ES-2 shows the estimated annual emission reductions from the Proposed Amendments from 2022 to 2034.

Table ES-2. Estimated Annual NOx, PM2.5, and GHG Emission Reductions as a Result of the Proposed Amendments from 2022 to 2034

Year	PM2.5 (tons)	NOx (tons)	GHG (MMTCO2e)[21]
2022	0	0	0.00
2023	16	0	0.01
2024	32	59	0.03
2025	48	119	0.05
2026	65	181	0.07
2027	83	246	0.09
2028	115	312	0.12
2029	133	381	0.14
2030	148	430	0.16
2031	151	436	0.17
2032	153	443	0.18
2033	155	451	0.19
2034	158	458	0.20
Total	1,258	3,515	1.42

Figure ES-3, Figure ES-4, and Figure ES-5 show the PM2.5, NOx, and GHG emissions impact of the Proposed Amendments relative to the Baseline from 2022 to 2034.

[21] Includes GHG emission reductions from TRU engine and refrigerant in million metric tonnes of carbon dioxide equivalent (MMTCO2E).

Figure ES-3. Statewide PM2.5 Emissions from TRUs in the Baseline and under the Proposed Amendments from 2022 to 2034

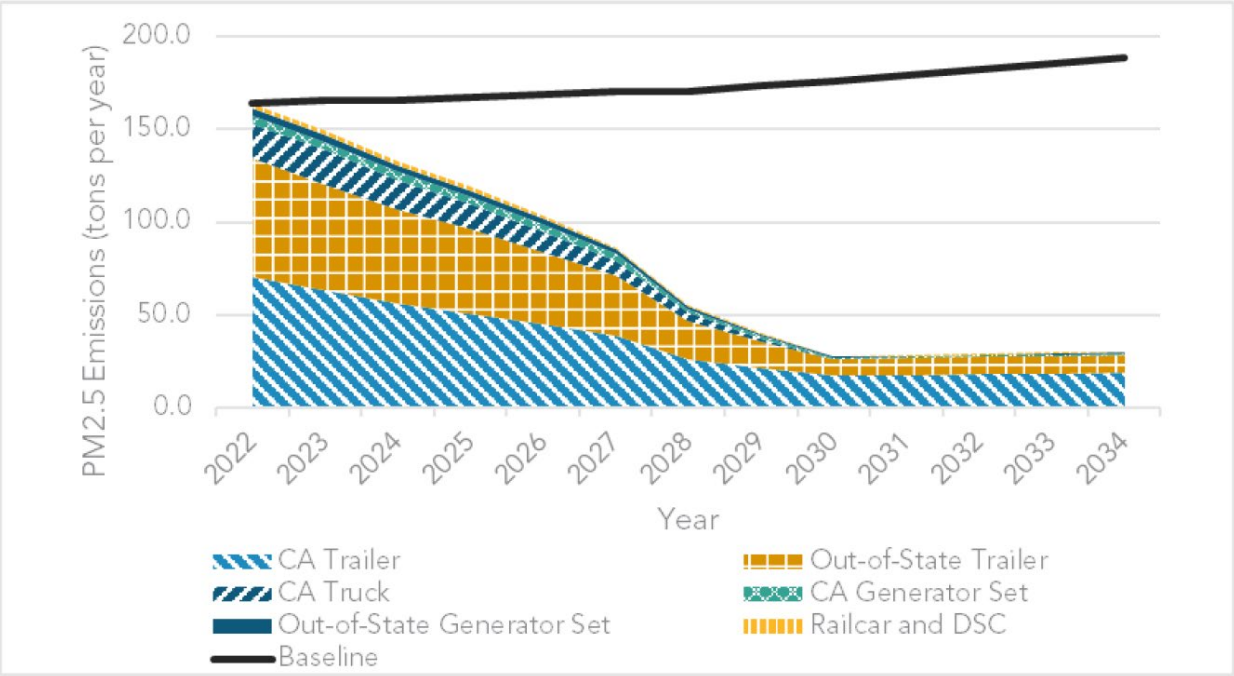


Figure ES-4. Statewide NOx Emissions from TRUs in the Baseline and under the Proposed Amendments from 2022 to 2034

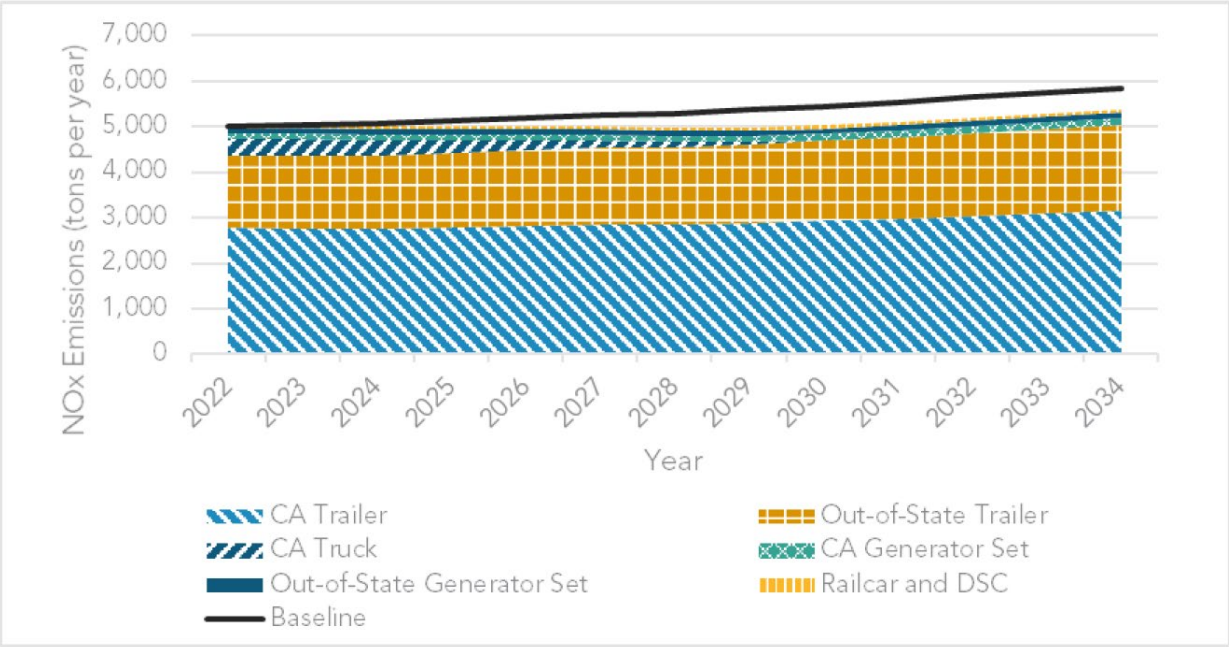
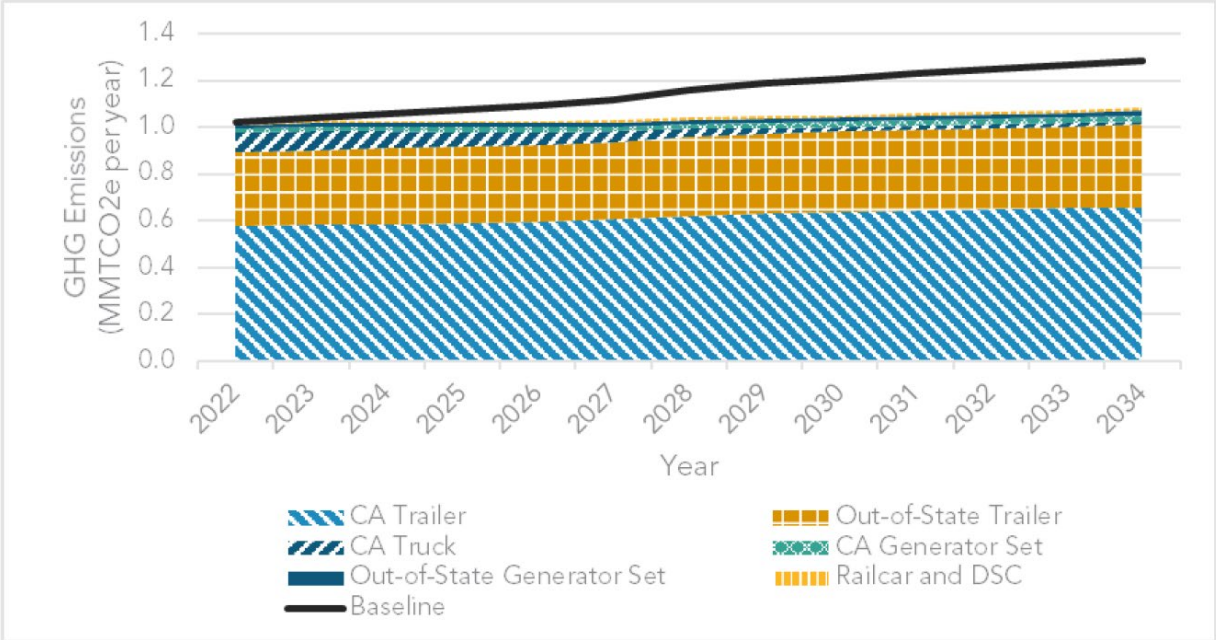


Figure ES-5. Statewide GHG Emissions from TRUs in the Baseline and under the Proposed Amendments from 2022 to 2034



J. What Other Benefits will the Proposed Amendments Provide?

Transitioning diesel-powered truck TRUs to ZE under the Proposed Amendments will provide an opportunity to increase ZE technology in the off-road sector. As more truck TRU fleets use ZE technologies as a result of the Proposed Amendments, industry acceptance of advanced technologies will improve. The state of ZE TRU technology will progress and expand into extended range applications, as well as other off-road sectors. Purchases of ZE truck TRUs will also benefit ZE TRU manufacturers, as well as various businesses in the ZE TRU supply chain, including those involved in battery, fuel cell, cold plate, and solar photovoltaic technology throughout the State.

The Proposed Amendments will increase the installation of electric charging and fueling infrastructure needed to support the use of ZE truck TRUs. Advanced TRU technologies are underutilized due in part to limited access to supporting infrastructure at the facilities where TRUs operate. Additional installations of electric charging and fueling infrastructure will support the use of these technologies, as well as other advanced technology equipment and vehicles onsite.

Electric charging and fueling infrastructure installations will provide opportunities for design, engineering, construction, and project management firms to design new and expanded infrastructure at approximately 1,000 truck TRU home base facilities statewide. The increase in electric charging and fueling infrastructure will also benefit suppliers, equipment installers, electricians, and ZE fuel providers. All of the

installations will be in California, and some of the infrastructure equipment may be manufactured in California.

The increased use of electric charging infrastructure will increase the amount of electricity supplied by utility providers and help the State's investor-owned utilities meet the goals of Senate Bill 350.[22] Senate Bill 350 requires the State's investor-owned utilities to develop programs to accelerate widespread transportation electrification with goals to reduce dependence on petroleum, increase the uptake of ZE vehicles, help meet air quality standards, and reduce GHGs.

Lastly, the Proposed Amendments will result in noise reduction benefits. Diesel-powered TRUs can produce a substantial amount of noise, which also results in adverse health impacts. This is of concern when TRUs operate in and near places where people live, work, and play. Staff have received several noise complaints regarding TRU activity near schools, hospitals, elder care facilities, and residential neighborhoods. The Proposed Amendments will transition diesel-powered truck TRUs to ZE technology, which produces little to no noise. This will eventually eliminate the use of diesel-powered truck TRUs and reduce noise levels.

K. Are the Proposed Amendments Technically Feasible?

The Proposed Amendments require diesel-powered truck TRUs to transition to ZE technology. According to the statewide TRU emission inventory, truck TRUs operating in the State are California-based. Truck TRUs are generally used for local and regional delivery, and return to a home base each night. Based on their daily operational characteristics and operating range of current technologies, TRUs installed on trucks are well suited for ZE, because they would not require additional refueling or recharging infrastructure outside their home terminals or distribution centers before dispatch.

Truck TRU owners can comply with the ZE truck TRU requirement using a combination of commercially available battery-electric, solar, cold plate, and cryogenic ZE technologies. All of the commercially-available ZE truck TRU technologies achieve the key performance parameters required for transport refrigeration with the ability to perform their duty cycles by maintaining optimum set point temperature and providing fast pre-cool of the cargo area. All of the commercially available ZE truck TRUs also achieve the necessary operating range of 8 to 10 hours of daily operation between refueling, which is dependent on factors specific to each operation, including the length of the route, product being transported, temperature of the load, number of door openings on the route, and outdoor temperature. Solar assist may extend the range of battery-electric and cryogenic TRU systems by an additional 1 to 2 hours a

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[22] California Legislature, Senate Bill No. 350, signed October 7, 2015. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB350)

day. There is minimal impact on the payload capacity because the weight of the battery, solar panels, cold plates, or cryogenic fuel tank is offset by the removal of the diesel engine.

The Proposed Amendments require newly-manufactured trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines to meet a PM emission standard of 0.02 g/hp-hr. The proposed PM standard aligns with the U.S. EPA Tier 4 final PM emission standard for engines greater than 25 horsepower, regardless of horsepower. Both of the two major TRU manufacturers, Carrier Transicold (Carrier) and Thermo King, offer units with engines certified to meet the PM standard.

The Proposed Amendments require newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California to use a refrigerant with a GWP value less than or equal to 2,200, or use no refrigerant at all. The current predominant refrigerant used in TRUs is R-404A. Despite being non-ozone-depleting, R-404A refrigerant has a high GWP value of 3,922, which is above the proposed threshold of 2,200. R-452A refrigerant is a hydrofluoroolefin-based replacement for R-404A. Like R-404A, R-452A is non-ozone depleting, but has a lower-GWP of 2,140 and will meet the proposed threshold. R-452A is a "design-compatible" replacement for R-404A because it offers similar levels of refrigeration performance, fuel efficiency, reliability, and refrigerant charge.[23] R-452A can be used in new transport refrigeration equipment and for the retrofit of existing systems. U.S. EPA approved R-452A for use in transport refrigeration applications in 2017[24] and both Carrier and Thermo King offer R-452A refrigerant as an alternative in their units.

Staff have worked closely with TRU manufacturers to ensure the requirements and regulatory compliance dates in the Proposed Amendments are feasible. In addition, the Proposed Amendments retain the provisions in the current TRU ATCM for a compliance extension that may be granted to TRU owners if there is no compliance technology available for a specific TRU within six months of a compliance date, and include new provisions for a compliance extension that may be granted to truck TRU owners for the ZE truck TRU requirements due to unforeseen, temporary, or extenuating circumstances outside of the TRU owner's control that prevents the installation of ZE charging or fueling Infrastructure.

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[23] Refrigerated Transporter, "Carrier Transicold will offer R-452A for reefer transport," July 28, 2017. (web link: https://www.refrigeratedtransporter.com/going-green/article/21721031/carrier-transicold-will-offer-r452a-for-reefer-transport)

[24] United States Environmental Protection Agency, Federal Register, Vol. 82, No. 139, Page 33823, July 21, 2017. (web link: https://www.govinfo.gov/content/pkg/FR-2017-07-21/pdf/2017-15379.pdf)

L. What Cost Impacts will the Proposed Amendments have?

The total net cost of the Proposed Amendments from 2022 to 2034 is estimated to be $1.04 billion, which is less than the approximate $1.75 billion in expected monetized health benefits. Direct costs include capital costs for ZE truck TRUs and supporting infrastructure, new TRUs equipped with engines certified to meet the PM emission standard, lower-GWP refrigerant, TRU refrigerant maintenance costs, truck TRU infrastructure maintenance costs, electricity usage, CARB fees, and administrative costs for registration and reporting. Cost savings include truck TRU capital costs (ZE truck TRUs would no longer need to take compliance action every seven years), truck TRU maintenance cost savings, truck TRU diesel fuel savings, and Low Carbon Fuel Standard credit revenue. Table ES-3 shows the annual direct costs, cost savings, and net cost of the Proposed Amendments from 2022 to 2034.

Table ES-3. Annual Direct Costs, Cost Savings, and Net Cost of the Proposed Amendments from 2022 to 2034 (2019$)

Year	Annual Direct Costs	Annual Cost Savings	Annual Net Cost
2022	$0	$0	$0
2023	$32,800,000	$0	$32,800,000
2024	$47,600,000	(-$4,200,000)	$43,400,000
2025	$70,700,000	(-$9,200,000)	$61,500,000
2026	$111,600,000	(-$13,500,000)	$98,100,000
2027	$144,900,000	(-$20,100,000)	$124,800,000
2028	$155,300,000	(-$24,700,000)	$130,600,000
2029	$159,200,000	(-$29,400,000)	$129,800,000
2030	$151,000,000	(-$32,200,000)	$118,800,000
2031	$134,100,000	(-$32,300,000)	$101,800,000
2032	$113,600,000	(-$38,000,000)	$75,600,000
2033	$113,200,000	(-$50,000,000)	$63,200,000
2034	$116,800,000	(-$57,200,000)	$59,600,000
Total	$1,350,800,000	(-$310,800,000)	$1,040,000,000

M. How will the Proposed Amendments be enforced?

The Proposed Amendments include additional compliance mechanisms beyond traditional inspections and investigations of TRUs alone to ensure industry-wide compliance, maximize emission reductions, and level the playing field between owners of compliant and non-compliant TRUs, as well as in-state and out-of-state TRUs.

These mechanisms include multiple-party responsibilities, added requirements for owners and operators of applicable facilities to ensure that only compliant TRUs operate on their property, and expanded TRU reporting and labeling requirements. In addition to these new requirements, staff will continue to enforce the Proposed

Amendments by conducting unit, fleet, and facility inspections, and fleet and facility investigations. Inspections and investigations may result in corrective actions, including Department of Motor Vehicle registration holds on trucks where authorized, and substantial civil penalties for violations of the Proposed Amendments.

N. What was the Public Process for Developing the Proposed Amendments?

Staff have engaged in an extensive public process since development of the Proposed Amendments began in early 2016. Staff conducted eight public workshops to solicit stakeholder feedback and discuss regulatory concepts, methodology and data used to develop the emission inventory and conduct an HRA, infrastructure considerations, and compliance and enforcement mechanisms. Staff posted information regarding these workshops and any associated materials on the TRU Regulation website[25] and distributed notice of these meetings through several public list serves that include over 17,000 recipients.[26] In addition, staff held three work group meetings to solicit feedback on regulatory concepts, as well as discuss infrastructure and enforcement issues related to the Proposed Amendments.

As of June 2021, staff have conducted more than 160 informal meetings, phone calls, and site visits with a broad group of stakeholders to discuss the Proposed Amendments and gather input and information. This includes members of impacted communities, environmental justice advocates, air districts, TRU owners and operators, trade associations, TRU original equipment manufacturers, TRU dealers and service centers, truck and trailer dealers, truck and trailer leasing companies, freight brokers, forwarders, shippers, receivers, freight facility owners and operators, and other interested parties.

In addition to meeting with a wide range of stakeholders, staff also conducted targeted outreach to potential applicable facilities. This includes mailing over 40,000 postcards to facilities with refrigerated operations potentially affected by the Proposed Amendments to notify them of upcoming workshops and direct them to the TRU Regulation website for more information. Staff also visited several facilities, including refrigerated warehouses, distribution centers, cold storage warehouses, port terminals, and railyards to learn more about their business operations and to better

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[25] California Air Resources Board, New Transport Refrigeration Unit Regulation in Development Website. (web link: https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit/new-transport-refrigeration-unit-regulation, last accessed May 10, 2021)

[26] Number of subscribers for the following CARB lists as of January 28, 2021: Agricultural Activities, Community Air, Environmental Justice ChERRP, Commerce, Environmental Justice ChERRP, Mira Loma, Environmental Justice ChERRP, Wilmington, Goods Movement Emission Reduction Program, Port Truck, Reduction of GHG Emissions from Refrigerated Shipping Containers, Stationary Equipment Refrigerant Management Program, Sustainable Freight Transport Initiative, and Transport Refrigeration Units.

understand potential implementation challenges associated with the Proposed Amendments.

I. Introduction and Background

California Air Resources Board (CARB) staff are proposing amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate (TRU ATCM; title 13, California Code of Regulations (CCR), section 2477), herein referred to as the "Proposed Amendments." CARB adopted the TRU ATCM in 2004 (and amended it in 2010 and 2011) to reduce diesel particulate matter (diesel PM) emissions and resulting health risk from diesel-powered TRUs used to control the environment of temperature-sensitive products transported in insulated trucks, trailers, shipping containers, or railcars, as well as diesel-powered TRU generator sets (gen set) that provide electric power to electrically-powered refrigeration units of any kind.

This Initial Statement of Reasons (Staff Report) presents the Proposed Amendments. Chapter III provides a detailed summary of the Proposed Amendments. The Staff Report also summarizes the information that staff used in developing the Proposed Amendments. The Staff Report is organized as follows:

- Chapter I provides an introduction and background information.
- Chapter II describes the problem this rulemaking is intended to address.
- Chapter III provides a summary of the staff proposal.
- Chapter IV summarizes the specific purpose and rationale for each amendment.
- Chapter V summarizes the benefits anticipated from the Proposed Amendments.
- Chapter VI summarizes the air quality, climate, and health benefits of the Proposed Amendments.
- Chapter VII presents the Environmental Analysis prepared to comply with the California Environmental Quality Act (CEQA).
- Chapter VIII describes how the proposal is consistent with CARB's environmental justice policies.
- Chapter IX summarizes the technical feasibility of the Proposed Amendments.
- Chapter X summarizes the cost and economic impact analysis for the Proposed Amendments.
- Chapter XI summarizes the alternative proposals considered.
- Chapter XII provides a justification for the adoption of regulations different from federal regulations.
- Chapter XIII describes enforcement and compliance mechanisms for the Proposed Amendments.
- Chapter XIV summarizes the public process for development of the Proposed Amendments.
- Chapter XV lists references used.

A. Need for Proposed Amendments

CARB's current programs, coupled with efforts at the local and federal level, have achieved success in reducing emissions, resulting in significantly cleaner vehicles and equipment in operation today. Nonetheless, meeting all of California's public health, air quality, and climate goals will require large reductions beyond those occurring under existing programs.

Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions from the diesel engines that power TRUs. There are several occurrences across the State where communities contain "groups" or "clusters" of facilities where TRUs operate. In many cases, these facilities are located in or near communities that are classified as disadvantaged by the California Environmental Protection Agency (CalEPA). CalEPA uses the California Communities Environmental Health Screening Tool (CalEnviroScreen) to rank California communities based on environmental pollution burden and socio-economic indicators.[27] Exposure to diesel PM is a main contributor to many communities ranked in the top 10th percentile statewide on CalEnviroScreen. In recognition that air pollution heavily impacts disadvantaged communities in California, the State of California signed into law Assembly Bill (AB) 617 (C. Garcia, Chapter 136, Statutes of 2017)[28] in 2017. AB 617 is a significant piece of air quality legislation that highlights the need for further emission reductions in communities with high exposure burdens, such as those located near facilities where TRUs operate.

Despite progress in improving air quality, challenges remain in meeting the ambient air quality standards for ozone and fine particulate matter (PM2.5) in two areas of the State: the South Coast Air Basin and San Joaquin Valley. The near-term targets for these areas are a 2023 deadline for attainment of the 80 parts per billion (ppb) 8-hour ozone standard, 2024 for the 35 microgram per cubic meter (µg/m3) 24-hour PM2.5 standard, and 2025 for the 12 µg/m3 annual PM2.5 standard. There are also mid-term attainment years of 2031 and 2037 for the more recent 8-hour ozone standards of 75 ppb and 70 ppb, respectively.[29]

In addition, climate change is one of the most serious environmental threats facing the world today. Climate scientists agree that global warming and other shifts in the

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[27] Office of Environmental Health Hazard Assessment, CalEnviroScreen 3.0, June 25, 2018. (web link: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)

[28] California Health and Safety Code § 40920.6, 42400, 42402, 39607.1, 40920.8, 42411, 42705.5, and 44391.2, Division 26, Assembly Bill No. 617, Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants, July 26, 2017. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617)

[29] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)

climate system observed over the past century are caused by human activities and that these recorded changes are occurring at an unprecedented rate.[30] California is already feeling the impacts of climate change, including raging wildfires, coastal erosion, disruption of water supply, threats to agriculture, spread of insect-borne diseases, and continuing health threats from air pollution.[31] Projections show that these effects will continue and worsen. The Office of Environmental Health Hazard Assessment documented the impacts of climate change on California in the Indicators of Climate Change Report.[32]

Driven by the Governor's Executive Order (EO) N-79-20,[33] which set a goal for 100 percent zero-emission (ZE) off-road vehicles and equipment by 2035, the Proposed Amendments begin the transition of diesel-powered TRUs to ZE technology and are a part of California's holistic plan to meet the State's multiple public health, air quality, and climate goals.

B. Regulatory Authority

Several sections of the California Health and Safety Code (Health & Saf. Code) provide CARB with authority to adopt the Proposed Amendments. More specifically, this regulatory action is proposed under the authority granted to CARB in California Health & Saf. Code sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1. This action is proposed to implement, interpret, or make specific, Health & Saf. Code sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1.

Health & Saf. Code sections 39600 (General Powers) and 39601 (Standards, Definitions, Rules, and Measures) confer to CARB the general authority and obligation to adopt rules and measures to execute the Board's powers and duties imposed by State law. In addition, Health & Saf. Code sections 43013 and 43018(a) provide broad authority to achieve the maximum feasible and cost-effective emission reductions from all mobile source categories, including off-road diesel engines.

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[30] Cook et al., "Unprecedented 21st Century Drought Risk in the American Southwest and Central Plains," February 12, 2015. (web link: https://advances.sciencemag.org/content/1/1/e1400082)
[31] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf)
[32] Office of Environmental Health Hazard Assessment, "Indicators of Climate Change in California," May 2018. (web link: https://oehha.ca.gov/media/downloads/climate-change/report/2018caindicatorsreportmay2018.pdf)
[33] Executive Order N-79-20, State of California Executive Order signed by Governor Gavin Newsom, September 23, 2020. (web link: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf)

California's Air Toxics Program, established under California law by AB 1807 (Chapter 1047, Statutes of 1983),[34] and set forth in Health & Saf. Code section 39650 through 39675, mandates the identification and control of air toxics in California. The identification phase of the Air Toxics Program requires CARB, with participation of other state agencies, such as the Office of Environmental Health Hazard Assessment, to evaluate the health impacts of and exposure to substances and to identify those substances that pose the greatest health threat as toxic air contaminants. CARB's evaluation is provided to the public and is formally reviewed by the Scientific Review Panel, established under Health & Saf. Code section 39670. Following CARB's evaluation and the Scientific Review Panel's review, CARB may formally identify a toxic air contaminant at a public hearing. Following the identification of a substance as a toxic air contaminant, Health & Saf. Code sections 39658 and 39665 require CARB, with the participation of the local air districts, and in consultation with affected sources and interested parties, to prepare a report on the need and appropriate degree of regulation for that substance (risk management phase).

In 1998, CARB identified diesel PM as a toxic air contaminant, and in September 2000, adopted the Diesel Risk Reduction Plan. The Diesel Risk Reduction Plan was the first formal product of the risk management phase and served as the needs assessment under the AB 1807 process. The plan identified options to reduce diesel PM and the recommended control measures to achieve reductions, including a measure to reduce diesel PM from diesel fueled TRUs and TRU gen sets.[35] The Proposed Amendments fulfill the goals of the Diesel Risk Reduction Plan and complies with the requirements of Health & Saf. Code sections 39666 and 39669.5 to prevent an endangerment to public health. The Proposed Amendments are also in accordance with Health & Saf. Code section 39618, which directs CARB to treat refrigerated trailers as mobile sources and develop regulations to reduce emissions from refrigerated trailers.

Health & Saf. Code sections 39674 and 39675 authorize CARB to impose civil penalties for violations of Health & Saf. Code section 39658, 39659, or Article 4 (beginning with section 39665). Sections 42400 et seq. provide that violation of CARB regulations is a misdemeanor offense and establish different levels of civil penalties for such violations.

Health & Saf. Code section 43019.1 authorizes CARB to adopt a schedule of fees to cover its reasonable costs associated with the certification, audit, and compliance of off-road or non-vehicular engines and equipment, aftermarket parts, and emissions

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[34] California Air Resources Board, AB 1807 - Toxics Air Contaminant Identification and Control (web link: https://ww2.arb.ca.gov/resources/documents/ab-1807-toxics-air-contaminant-identification-and-control, last accessed May 10, 2021)

[35] California Air Resources Board, Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles, October 2000. (web link: https://ww2.arb.ca.gov//sites/default/files/classic/diesel/documents/rrpfinal.pdf)

control components sold in the state. The Proposed Amendments include a schedule of fees to recover CARB's reasonable costs associated with these categories.

While the current requirements of the TRU ATCM primarily place compliance obligations on TRU owners and operators, the Proposed Amendments require owners and operators of facilities where TRUs operate to ensure that only compliant TRUs operate on their properties. TRU operations at facilities generate harmful emissions and impact surrounding communities. Therefore, facility owners and operators should bear some responsibility for ensuring TRUs operating on their properties are compliant with emissions requirements. CARB's statutory mandates, particularly its air toxics and greenhouse gas (GHG) related mandates, are not limited to vehicular and mobile sources. Therefore, CARB has determined that assigning certain compliance obligations to facility owners and operators, in addition to TRU owners and operators, is necessary and proper for satisfying CARB's statutory mandates to reduce air pollution and the associated health risk from diesel-powered TRUs.

C. Background on TRUs and TRU Facilities

1. TRUs and TRU Gen Sets

TRUs are refrigeration systems powered by integral (inside the TRU housing) diesel engines used to control the environment of temperature-sensitive products transported in insulated trucks, trailers, shipping containers, or railcars. TRU gen sets are diesel internal combustion engine-powered generators designed to provide electric power to electrically-powered refrigeration units of any kind. TRUs are capable of both cooling and heating. Table I-1 shows the 2020 population of TRUs and TRU gen sets, and the number operating in California per day.

Table I-1. 2020 TRU and TRU Gen Set Populations

TRU Type	Population	Number Operating in California per Day
Truck TRU	6,930	6,930
CA-Based Trailer TRU	33,550	26,200
Out-of-State-Based Trailer TRU	120,770	14,980
Domestic Shipping Container TRU and Railcar TRU	4,020	760
CA-Based Gen Set	4,920	3,840
Out-of-State-Based Gen Set	24,830	3,080
Total	195,020	55,790

a. Truck TRUs

Truck TRUs are used to control the environment of temperature-sensitive cargo in straight trucks where the trailer is permanently attached to the truck cab. Truck TRUs

are generally used for local and regional delivery, and return to a home base each night. Due to their daily operational characteristics, TRUs installed on trucks are well suited for ZE technologies, such as battery-electric. A straight truck that is equipped with a TRU is shown in Figure I-1.

Figure I-1. Truck TRU

b. Trailer TRUs

Trailer TRUs are used to control the environment of temperature-sensitive cargo in semi-trailers that detach from the truck cab. Trailer TRUs often have longer loading times due to larger cargo capacity. Trailer TRUs are used in long-haul transport, visit other states to deliver or bring in loads, and generally do not return to a home base each night. A trailer TRU is shown in Figure I-2.

Figure I-2. Trailer TRU

c. Domestic Shipping Container TRUs and Railcar TRUs

Domestic shipping container (DSC) TRUs are used to control the environment of temperature-sensitive products transported in DSCs that move by truck and rail. Similar to trailer TRUs, DSC TRUs are used in long haul transport, visit other states to deliver or bring in loads, and generally do not return to a home base each night. Railcar TRUs are used to control the environment of temperature-sensitive products transported in railcars. Railcar TRUs are generally unattended during use and trips may exceed a week. A DSC TRU and railcar TRU are shown in Figure I-3 and Figure I-4, respectively.

Figure I-3. DSC TRU

Figure I-4. Railcar TRU

d. TRU Gen Sets

TRU gen sets are designed and used to provide electric power to electrically-powered refrigeration units of any kind. This includes, but is not limited to gen sets that provide electricity to electrically-powered refrigeration systems for shipping containers when they are not plugged into ocean-going ship electric power or dock shore power. Refrigerated shipping containers are intermodal in that they can be loaded onto ocean-going vessels for marine transport, then upon arrival at a seaport they can be transferred to a chassis for over-the-road truck transport, or transferred to a rail stack car or flatcar, for rail transport.

There are several types of TRU gen sets, including "pin-on" and "under-slung." Pin-on TRU gen sets are pinned onto the front of refrigerated shipping containers, just above the container's all-electric refrigeration system, which is built into the shipping container. A pin-on TRU gen set is shown in Figure I-5.

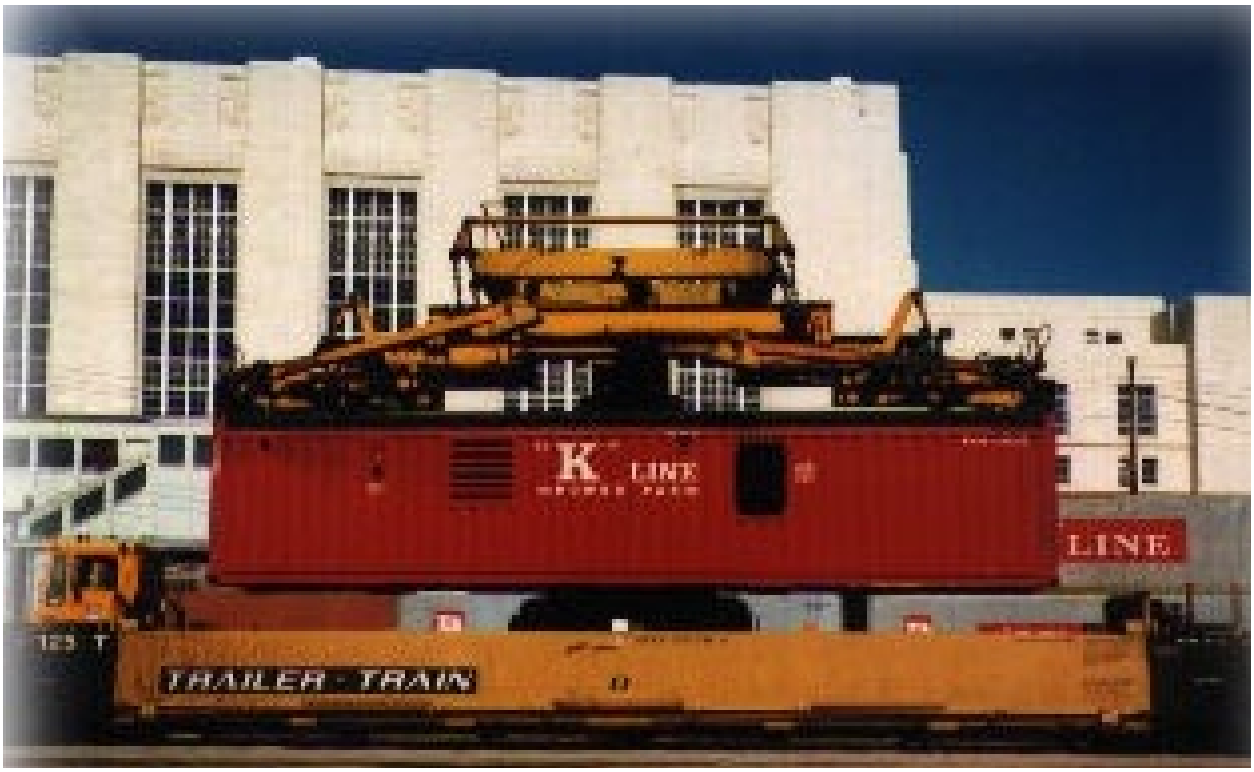
Figure I-5. Pin-on TRU Gen Set

Under-slung TRU gen sets are clamped to the frame rails of a trailer chassis that is designed for the sole purpose of transporting shipping containers on the roadway. This arrangement is also called a "belly mount." An under-slung TRU gen set is shown in Figure I-6. Both pin-on and under-slung TRU gen sets are designed to provide electric power for only one refrigerated shipping container.

Figure I-6. Under-slung TRU Gen Set

A third type of TRU gen set, called a "powerpack," provides power for a number of refrigerated shipping containers, in which several diesel generators are installed on a shipping container. These powerpack containers are loaded onto railcars and connected to multiple refrigerated shipping containers on adjacent railcars. A powerpack TRU gen set is shown in Figure I-7.

Figure I-7. Powerpack TRU Gen Set



2. TRU Applicable Facilities

TRUs emit harmful pollutants while in transit and during stationary operation at facilities that are often in close proximity to sensitive receptors, such as schools, hospitals, elder care facilities, and residential neighborhoods. The Proposed Amendments include requirements for refrigerated warehouses or distribution centers (WHDC) with a building size of 20,000 square feet or greater, grocery stores with a building size of 15,000 square feet or greater, seaport facilities, and intermodal railyards (applicable facilities). The square-foot thresholds are based on the amount of TRU activity and associated health risk relative to facility size; there are no proposed size thresholds for seaport facilities or intermodal railyards because activity is not based on facility size and TRUs operate for longer periods of time at these facility types compared to refrigerated WHDCs and grocery stores.

The Proposed Amendments require owners and operators of applicable facilities to ensure that only compliant TRUs operate on their properties. Not allowing non-compliant TRUs to operate at an applicable facility incentivizes TRU owners to comply with regulatory requirements and achieves immediate emission reductions in impacted communities. As an alternative, owners and operators of applicable facilities may choose to report all TRU activity to CARB. Reporting accurate and comprehensive

information on all TRUs that operate at applicable facilities will help staff better identify non-compliant TRUs operating in California and bring them into compliance.

More information on the applicable facilities included in the Proposed Amendments is provided in Appendix F.

D. Current TRU ATCM

CARB adopted the TRU ATCM in 2004 to reduce diesel PM from TRUs and TRU gen sets, as well as near-source health risk at facilities where TRUs operate. The TRU ATCM requires that TRU engines that operate in California meet specific in-use performance standards that require diesel PM emissions to be reduced in accordance with a phased compliance schedule. The phased compliance schedule is based on the model year (MY) of the TRU engine, and requires compliance with the in-use performance standard seven years after the engine MY. The TRU ATCM includes two levels of stringency that were phased-in over time. The first phase, beginning in 2008, is the low emission TRU (LETRU) performance standards. The second phase, beginning in 2010, is the ultra-low emission TRU (ULETRU) performance standards. Ultimately, all TRU engines are required to meet the ULETRU performance standards and have 85 percent PM control (compared to an uncontrolled Tier 0 engine) to be fully compliant with the TRU ATCM.

CARB subsequently amended the TRU ATCM in 2010 and 2011. The 2010 amendments included additional recordkeeping and reporting requirements for TRU original equipment manufacturers (OEM) that directly or indirectly sell, or offer for sale, TRUs to the California market. The amendments also included more stringent definitions for compliance. The 2011 amendments extended certain TRU performance standard compliance deadlines from those originally contained in the 2004 regulation and included provisions to improve enforceability. The TRU ATCM is fully implemented and TRU owners have the following compliance options:

- Use a TRU equipped with an engine that meets the United States Environmental Protection Agency (U.S. EPA) Tier 4 final off-road emission standards for 25-50 horsepower engines (meets ULETRU).
- Retrofit the existing TRU with a Level 3 Verified Diesel Emission Control Strategy (VDECS) with 85 percent PM control (meets ULETRU).
- Use an alternative technology that eliminates TRU diesel engine operation (and emissions) while at a facility. Alternative technologies include electrification, cryogenic refrigeration systems, alternative fuel systems, exclusive use of alternative diesel fuel, fuel cell-powered refrigeration systems, and other technologies that eliminate emissions while at a facility (meets ULETRU).
- Replace the existing unit (engine and refrigeration system) with a new TRU equipped with an engine that meets the U.S. EPA Tier 4 final off-road emission standards for less than 25 horsepower engines, which would be in compliance

until the seventh year after the replacement TRU's engine MY (does not meet ULETRU).

E. Proposed Amendments

This section presents a broad overview of the Proposed Amendments. Chapter III provides a detailed summary of the staff proposal. Chapter IV provides the specific purpose and rationale for each proposed amendment. Key elements of the Proposed Amendments include the following:

By December 31, 2022:

- All newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California shall use refrigerant with a global warming potential (GWP) less than or equal to 2,200, or use no refrigerant at all.
- MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines shall meet a PM emission standard of 0.02 grams per brake horsepower-hour (g/hp-hr) or lower.
    - Note: MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines would continue to operate under the current TRU ATCM requirements, in which they shall meet ULETRU by December 31 of the seventh year after the engine MY. For example, a trailer TRU equipped with a MY 2020 engine would have to meet ULETRU by December 31, 2027.

By December 31, 2023:

- Applicable facility[36] owners shall register their facility with CARB, pay fees every three years, and report all TRUs that operate at their facility to CARB quarterly, or alternatively attest that only compliant TRUs (i.e., those with a valid CARB compliance label or showing as compliant on CARB's website) operate at their facility.
- TRU owners shall report All TRUs that operate in California to CARB, regardless of where they are based.
- TRU owners shall pay TRU operating fees and affix CARB compliance labels to their TRU every three years, for each TRU operated in California.
- TRU owners shall turnover at least 15 percent of their truck TRU fleet (defined as truck TRUs operating in California) to ZE technology each year (for 7 years). All truck TRUs operating in California shall be ZE by December 31, 2029.

[36] An applicable facility is defined in the Proposed Amendments as a refrigerated warehouse or distribution center with a building size greater than or equal to 20,000 square feet, a grocery store with a building size greater than or equal to 15,000 square feet, a seaport facility, or an intermodal railyard if one or more TRUs operate within the legal property boundary of the facility.

F. Summary of Public Process

To ensure an open and transparent rulemaking, staff have engaged in an extensive public process since development of the Proposed Amendments began in early 2016. Staff conducted eight public workshops to discuss regulatory concepts, methodology and data used to develop the emission inventory and conduct a health risk assessment (HRA), infrastructure considerations, compliance and enforcement mechanisms, as well as solicit stakeholder feedback. Staff posted information regarding these workshops and any associated materials on the TRU Regulation website[37] and distributed notice of these meetings through several public list serves that include over 17,000 recipients.[38] In addition, staff held three work group meetings to solicit feedback on regulatory concepts, as well as discuss infrastructure and enforcement issues related to the Proposed Amendments.

As of June 2021, staff have conducted more than 160 informal meetings, phone calls, and site visits with a broad group of stakeholders to discuss the Proposed Amendments and gather input and information. This includes members of impacted communities, environmental justice advocates, air districts, TRU owners and operators, trade associations, TRU OEMs, TRU dealers and service centers, truck and trailer dealers, truck and trailer leasing companies, freight brokers, forwarders, shippers, receivers, freight facility owners and operators, and other interested parties.

In addition to meeting with a wide range of stakeholders, staff also conducted targeted outreach to potential applicable facilities. This includes mailing over 40,000 postcards to facilities with refrigerated operations potentially affected by the Proposed Amendments to notify them of upcoming workshops and direct them to the TRU Regulation website for more information. Staff also visited several facilities, including refrigerated WHDCs, cold storage warehouses (CSW), port terminals, and railyards to learn more about their business operations and to better understand potential implementation challenges associated with the Proposed Amendments. A detailed summary of all stakeholder outreach activities is included in Chapter XIV.

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[37] California Air Resources Board, New Transport Refrigeration Unit Regulation in Development Website. (web link: https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit/new-transport-refrigeration-unit-regulation, last accessed May 10, 2021)

[38] Number of subscribers for the following CARB lists as of January 28, 2021: Agricultural Activities, Community Air, Environmental Justice ChERRP, Commerce, Environmental Justice ChERRP, Mira Loma, Environmental Justice ChERRP, Wilmington, Goods Movement Emission Reduction Program, Port Truck, Reduction of GHG Emissions from Refrigerated Shipping Containers, Stationary Equipment Refrigerant Management Program, Sustainable Freight Transport Initiative, and Transport Refrigeration Units.

G. Funding Opportunities

The State of California is committed to providing incentives to help with the transition to advanced technologies. Several incentive funding programs exist to reduce the incremental costs associated with zero and near-zero emission technologies, as well as supporting infrastructure. Table I-2 lists available incentive programs that may provide funding for cleaner TRUs, as well as supporting electric charging or fueling infrastructure. Note that many of these programs are competitive and some fund a variety of projects other than TRUs.

Table I-2. TRU Funding Programs

Program	Description
AB 617 Community Air Protection Incentives https://ww2.arb.ca.gov/our-work/programs/community-air-protection-incentives	Incentives directed by local air districts to put advanced technologies, including ZE TRUs, to work for cleaner air in the California communities that are most heavily impacted by air pollution.
Carl Moyer Memorial Air Quality Standards Attainment Program https://ww2.arb.ca.gov/our-work/programs/carl-moyer-memorial-air-quality-standards-attainment-program	Grant funding for cleaner-than-required engines, equipment, and other sources of air pollution, implemented as a partnership between CARB and California's 35 local air districts.
Clean Diesel and Diesel Emissions Reduction Act Programs https://www.epa.gov/dera	Incentive program that provides support for projects that protect human health and improve air quality by reducing harmful emissions from diesel engines. This program includes grants and rebates funded under the Diesel Emissions Reduction Act.
Clean Off-Road Equipment Voucher Incentive Project https://californiacore.org	A streamlined voucher process for buyers to receive funding to offset the higher costs of clean, commercial ready ZE TRUs, supporting infrastructure, and other equipment.
Electric Utility Transportation Electrification Programs https://www.cpuc.ca.gov/sb350te/	Many of California's electric utilities provide incentives that support transportation electrification activities, including TRUs and supporting infrastructure. Opportunities vary by region.
Low Carbon Fuel Standard https://ww2.arb.ca.gov/our-work/programs/low-carbon-fuel-standard	Electricity utilized for electric TRUs may generate Low Carbon Fuel Standard credits that can offset costs for facility upgrades.
Proposition 1B: Goods Movement Emission Reduction Program https://ww2.arb.ca.gov/our-work/programs/proposition-1b-goods-movement-emission-reduction-program	Partnership between CARB and local agencies to reduce air pollution emissions and health risk from freight movement through financial incentives to reduce the cost of cleaner freight equipment.

II. The Problem that the Proposal is Intended to Address

In the coming years, California needs to continue to build upon its successful efforts to meet critical risk reduction, air quality, and climate goals. Achieving these goals will provide needed public health protection for the millions of Californians that still breathe unhealthy air, reduce exposure to air toxics in disadvantaged communities, and help to meet State Implementation Plan (SIP) commitments. Additionally, meeting California's GHG emission reduction targets is an essential part of the global action needed to slow global warming and achieve climate stabilization. The Proposed Amendments will achieve PM, oxides of nitrogen (NOx), and GHG emission reductions from diesel-powered TRUs and increase the use of ZE technology in the off-road sector, which will help to meet these complementary goals. This chapter provides a description of the problems the Proposed Amendments are intended to address. Chapter IV provides the description, purpose, and rationale for each proposed amendment.

A. Need to Reduce Risk

Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions from the diesel engines that power TRUs. There are several occurrences across the State where communities contain "groups" or "clusters" of facilities where TRUs operate. In many cases, these facilities are located in or near communities that are classified as disadvantaged by CalEPA. CalEPA uses CalEnviroScreen to rank California communities based on environmental pollution burden and socio-economic indicators.[39] Exposure to diesel PM is a main contributor to many communities ranked in the top 10th percentile statewide on CalEnviroScreen. Additionally, AB 617 highlights the need for further emission reductions in communities with high exposure burdens, such as those located near facilities where TRUs operate.

Staff performed an HRA to evaluate the localized cancer risk impacts attributable to emissions from the diesel engines that power TRUs at a CSW and grocery store. The HRA estimated the increase in potential cancer risk that would result under the baseline scenario and emphasizes the need for further emission reductions from TRUs to provide public health benefits and reduce the cancer risk burden to communities surrounding facilities where they operate. The complete health analyses can be found in Appendix I.

[39] Office of Environmental Health Hazard Assessment, CalEnviroScreen 3.0, June 25, 2018. (web link: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)

B. Need to Reduce PM2.5 and NOx Emissions

Diesel-powered TRUs emit multiple pollutants, including PM2.5 and NOx. While NOx emissions are harmful, NOx is also a precursor to ozone, which can cause irritation and damage lung tissue, worsen asthma and chronic illnesses including obstructive pulmonary disease and reduce lung function. Studies have linked short-term ozone exposure with increased risk of death.[40] In addition to contributing to ozone, the biggest impact on health from NOx emissions occurs when atmospheric processes convert NOx into fine particles of ammonium nitrate. PM2.5 formed in this manner is termed secondary PM2.5.

PM2.5 pollution contributes to more fatalities than other air pollutants and can lodge deep in the lungs or pass through the lungs to enter the blood stream and affect the heart, brain, and other organs. Short-term exposure to PM2.5 pollution is associated with increased hospitalizations and emergency room visits for heart and lung illnesses and can lead to premature death. Adverse health effects from long-term exposure to PM2.5 pollution include increased risk of heart attacks and heart disease, impaired lung development in children, the development and exacerbation of asthma, and premature death.[41]

Despite progress in improving air quality, challenges remain in meeting the federal ambient air quality standards for ozone and PM2.5 in two areas of the State: the South Coast Air Basin and San Joaquin Valley. Legally-obligated deadlines require these areas to attain the federal ambient air quality standards. These deadlines are established by the federal Clean Air Act and implemented by U.S. EPA each time a new standard is promulgated based on updated information showing health impacts at increasingly lower levels. The near-term targets for these areas are a 2023 deadline for attainment of the 80 ppb 8-hour ozone standard, 2024 for the 35 µg/m3 24-hour PM2.5 standard, and 2025 for the 12 µg/m3 annual PM2.5 standard. There are also mid-term attainment years of 2031 and 2037 for the more recent 8-hour ozone standards of 75 ppb and 70 ppb, respectively.[42] Additional PM2.5 and NOx reductions from diesel-powered TRUs are needed to help meet these air quality standards.

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[40] U.S. EPA, Policy Assessment for the Review of the National Ambient Air Quality Standards for Particulate Matter, External Review Draft, 2019. (web link: http://blogs.edf.org/climate411/files/2019/12/EDF-PM-PA-Comments-11-12-FINAL.pdf)
[41] U.S. EPA, Integrated Science Assessment for Ozone and Related Photochemical Oxidants (External Review Draft), 2019. (web link: https://cfpub.epa.gov/ncea/isa/recordisplay.cfm?deid=344670)
[42] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)

C. Need to Reduce GHG Emissions

Climate change is one of the most serious environmental threats facing the world today. Climate scientists agree that global warming and other shifts in the climate system observed over the past century are caused by human activities and that these recorded changes are occurring at an unprecedented rate.[43] California is already feeling the impacts of climate change, and projections show that these effects will continue and worsen. The impacts of climate change on California have been documented by the Office of Environmental Health Hazard Assessment in the Indicators of Climate Change Report.[44]

Diesel-powered TRUs emit black carbon (soot) and carbon dioxide (CO2), while leakage of TRU refrigerant contributes to emissions of hydrofluorocarbons (HFC). Black carbon and HFCs are short-lived climate pollutants (SLCP) which are powerful climate forcers that remain in the atmosphere for a much shorter period of time than longer-lived climate pollutants, such as CO2, but are more potent when measured in terms of GWP, which can be tens, hundreds, or even thousands of times greater than CO2.[45]

To date, California has made significant progress towards meeting the goals of AB 32 (Nuñez, Chapter 488, Statutes of 2006),[46] including a reduction in GHG emissions to 1990 levels by 2020. Senate Bill (SB) 32 (Pavley, Chapter 249, Statutes of 2016)[47] furthered the goals of AB 32 and set a 2030 goal of reducing statewide GHG emissions 40 percent from 2020 levels, while SB 1383 (Lara, Chapter 395, Statutes of 2016) set targets for statewide reductions in short-lived climate pollutant (SLCP) emissions of 40 percent below 2013 levels by 2030 for methane and HFC) and 50 percent below 2013 levels by 2030 for black carbon.[48] Reductions in GHGs, including SLCPs like black carbon and HFCs, from diesel-powered TRUs are needed to achieve the State's multiple GHG reduction targets and related climate goals.

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[43] Cook et al., "Unprecedented 21st Century Drought Risk in the American Southwest and Central Plains," February 12, 2015. (web link: https://advances.sciencemag.org/content/1/1/e1400082)
[44] Office of Environmental Health Hazard Assessment, "Indicators of Climate Change in California," May 2018. (web link: https://oehha.ca.gov/media/downloads/climate-change/report/2018caindicatorsreportmay2018.pdf)
[45] California Air Resources Board, Short-Lived Climate Pollutant Reduction Strategy, March 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/2018-12/final_slcp_report%20Final%202017.pdf)
[46] California Health and Safety Code § 38500 - 38599, Division 25.5, Assembly Bill No. 32, California Global Warming Solutions Act of 2006, September 27, 2006. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201920200AB32)
[47] California Health and Safety Code § 38566, Division 25.5, Senate Bill No. 32, September 8, 2016. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32)
[48] California Health and Safety Code § 39730, Division 30, Senate Bill No. 1383, Short-lived climate pollutants: methane emissions: dairy and livestock: organic waste: landfills, September 19, 2016. (web link: http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383)

D. Need to Address Increase in Population of Less than 25 Horsepower Units

The Proposed Amendments are needed to address the emergence and growth in the number of units equipped with engines less than 25 horsepower. The 2021 update to the statewide TRU emission inventory (Appendix H) indicates growing sales of units with less than 25 horsepower engines, which contrasts with previous inventories where all trailer TRU engines were over 25 horsepower. The California and federal PM off-road emission standard for engines less than 25 horsepower is 15 times higher (i.e., less stringent) than the standard for engines greater than 25 horsepower. As a result, diesel PM emissions have not been reduced under the TRU ATCM as expected. Similar trends are also expected for DSC TRUs, railcar TRUs, and TRU gen sets. Based on the TRU emission inventory, the number of units equipped with engines less than 25 horsepower will become responsible for the majority of PM emissions from TRUs in the near future, if current trends continue. The Proposed Amendments address this growth in emissions by requiring all MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines to meet a PM standard that aligns with the U.S. EPA Tier 4 final PM emission standard for engines greater than 25 horsepower, regardless of horsepower.

E. Need to Address State Policy and Plans Directing CARB to Achieve Additional Diesel Emission Reductions

The Proposed Amendments are needed to address the State policies and plans summarized below directing CARB to achieve additional diesel emission reductions.

1. Executive Order N-79-20

In September 2020, Governor Newsom issued EO N-79-20, which directs CARB, in coordination with other State agencies, U.S. EPA, and local air districts, to develop and propose technologically-feasible and cost-effective strategies to achieve 100 percent ZE from off-road vehicles and equipment operations in the State by 2035. The Proposed Amendments support the directive of the EO by transitioning diesel-powered truck TRUs to ZE technology.

2. 2020 Mobile Source Strategy

CARB released the Revised Draft 2020 Mobile Source Strategy (MSS)[49] in April 2021. The strategy document looks at existing and emerging technologies to reduce emissions from California's transportation sector, including cars, trucks, trains, ships, and other on-road and off-road sources. The strategies laid out in the MSS illustrate the technology mixes needed for the State to meet its various clean air goals,

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[49] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)

including federal ambient air quality standards, community risk reduction, and ambitious mid-and long-term climate change targets. The MSS includes a rapid electrification scenario for TRUs, increasing 10 percent each year beginning in 2024, highlighting the need to transition diesel-powered TRUs to ZE.

3. 2016 State Strategy for the State Implementation Plan

The federal Clean Air Act requires areas that exceed the health-based ambient air quality standards to develop SIPs that demonstrate how they will attain the standards by specified dates. In March 2017, the Board adopted the State Strategy for the SIP (State SIP Strategy), which outlined CARB's comprehensive strategy to reduce emissions from mobile sources to meet critical air quality and climate goals over the next 15 years and outlined statewide control measures CARB committed to bring to the Board for adoption to achieve the NOx reductions needed for attainment by 2023 and 2031.[50] The Proposed Amendments are one of the control measures that is committed in the SIP.

4. Assembly Bill 617

The State of California placed additional emphasis on protecting local communities from the harmful effects of air pollution through the passage of AB 617, which highlights the need for further emission reductions in communities with high exposure burdens. AB 617 requires CARB to pursue new community-focused and community-driven actions to reduce air pollution and improve public health in communities that experience disproportionate burdens from exposure to air pollutants. The Proposed Amendments will reduce diesel TRU emissions and exposure statewide and will be of particular benefit in disadvantaged communities experiencing disproportionate burdens.

5. California's 2017 Climate Change Scoping Plan

In 2006, Governor Schwarzenegger signed AB 32 to address global climate change. AB 32 directed CARB to develop a scoping plan identifying integrated and cost-effective regional, national, and international GHG reduction programs. CARB adopted the AB 32 Scoping Plan in 2008 and subsequent updates in 2013 and 2017. California's 2017 Climate Change Scoping Plan[51] outlines the State's strategy to achieve its 2030 GHG target and includes control measures for high-GWP refrigerants and diesel-powered TRUs.

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[50] California Air Resources Board, Revised Proposed 2016 State Strategy for the State Implementation Plan, March 7, 2017. (web link: https://www.arb.ca.gov/planning/sip/2016sip/rev2016statesip.pdf)
[51] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf)

6. Executive Order B-32-15 and Sustainable Freight Action Plan

In July 2015, Governor Brown issued EO B-32-15,[52] which directed the secretaries of the California State Transportation Agency, CalEPA, and California Natural Resources Agency to lead other relevant State departments in developing an integrated action plan by July 2016 that "establishes clear targets to improve freight efficiency, transition to ZEs technologies, and increase competitiveness of California's freight system." In response to the directive, the California State Transportation Agency, CalEPA, California Natural Resources Agency, CARB, California Department of Transportation, California Energy Commission, and Governor's Office of Business and Economic Development developed the "California Sustainable Freight Action Plan." The plan establishes clear targets to improve freight efficiency, transition to ZE technologies (deployment of over 100,000 freight vehicles and equipment capable of ZE operation and maximize near-ZE freight vehicles and equipment powered by renewable energy by 2030), and increase competitiveness of California's freight system. The 2016 California Sustainable Freight Action Plan includes a measure to reduce emissions from diesel-powered TRUs as a State agency action to advance the objectives of the EO and the California Sustainable Freight Action Plan.

7. Sustainable Freight Pathways to Zero and Near-Zero Discussion Document

In April 2015, CARB released the "Sustainable Freight Pathways to Zero and Near-Zero Discussion Document" (Discussion Document) in response to Board Resolution 14-2, which directed CARB to engage with stakeholders to identify and prioritize actions to move California toward a sustainable freight transport system.[53,54] The Discussion Document set out CARB's vision of a clean freight system, and listed immediate and potential near-term CARB actions that staff would develop for future Board consideration. The near-term CARB measures identified in the Discussion Document included the development of a regulation to achieve additional emission reductions from diesel-powered TRUs.

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[52] Executive Order B-32-15, State of California Executive Order signed by Governor Edmund G. (Jerry) Brown Jr., July, 17, 2015. (web link: https://www.ca.gov/archive/gov39/2015/07/17/news19046/index.html)

[53] CARB Board Resolution 14-2, Sustainable Freight Strategy Update, January 23, 2014. (web link: https://arb.ca.gov/board/res/2014/res14-2.pdf)

[54] California Air Resources Board, Sustainable Freight Pathways to Zero and Near Zero Emissions Discussion Document, April 23, 2015. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-09/Sustainable%20Freight%20Pathways%20to%20Zero%20and%20Near-Zero%20Emissions%20Discussion%20Document.pdf)

III. Summary of Proposed Action

The Proposed Amendments will achieve additional emission reductions by transitioning diesel-powered truck TRUs to ZE, as well as requiring newly-manufactured TRUs in the remaining categories to meet a PM emission standard and the use of lower-GWP refrigerant. The Proposed Amendments apply to TRU owners and operators, owners and operators of applicable facilities where TRUs operate, TRU OEMs, as well as vehicle owners and drivers who share responsibility in the operation of compliant TRUs. The Proposed Amendments are summarized below.

A. ZE Truck TRUs

Truck TRUs are generally used for local and regional delivery, and return to a home base each night. Based on their daily operational characteristics and the operating range of current technologies, TRUs installed on trucks are well suited for ZE technology because they would generally not require additional refueling or recharging infrastructure outside their home terminals or distribution centers before dispatch. The Proposed Amendments require TRU owners to transition 15 percent of their truck TRU fleet to ZE technology each year beginning December 31, 2023. Table III-1 shows the phase-in compliance schedule for ZE truck TRU fleets required by the Proposed Amendments.

Table III-1. Phase-in Compliance Schedule for ZE Truck TRU Fleets

Compliance Date as of December 31	Required ZE Truck TRU Fleet Percentage
2023	15%
2024	30%
2025	45%
2026	60%
2027	75%
2028	90%
2029 and thereafter	100%

The annual 15 percent ZE truck TRU requirement aligns with the seven-year compliance schedule already established by the TRU ATCM, in which TRU owners have been required to meet more stringent in-use performance standards at seven-year intervals until the TRU meets ULETRU; and generally aligns with the 7-to-10-year useful life for a truck TRU. The Proposed Amendments require all truck TRUs operating in California to be ZE by December 31, 2029.

B. PM Emission Standard

The 2021 update to the statewide TRU emission inventory (Appendix H) indicates growing sales of trailer TRUs with less than 25 horsepower engines, which contrasts

with previous inventories where all trailer TRU engines were over 25 horsepower. The California and federal PM off-road emission standard for engines less than 25 horsepower is 15 times higher (i.e., less stringent) than the standard for engines greater than 25 horsepower. As a result, diesel PM emissions have not been reduced under the TRU ATCM as expected. Similar trends are also expected for DSC TRUs, railcar TRUs, and TRU gen sets. Based on the TRU emission inventory, the number of units equipped with engines less than 25 horsepower will become responsible for the majority of PM emissions from TRUs in the near future, if current trends continue. Staff are proposing to address the higher PM emissions from smaller TRU engines by requiring newly-manufactured engines to meet a PM standard that aligns with the U.S. EPA Tier 4 final PM emission standard for engines greater than 25 horsepower, regardless of horsepower. The Proposed Amendments require TRU owners and operators to meet the following requirement:

- Beginning December 31, 2022, newly-manufactured (MY 2023 and newer) trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines shall meet a PM emission standard of 0.02 g/hp-hr or lower.

MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines would continue to operate under the seven-year compliance deadline provided in the current TRU ATCM, in which they shall meet ULETRU by December 31 of the seventh year after the engine MY. For example, a trailer TRU equipped with a MY 2020 engine would have to meet ULETRU by December 31, 2027. Truck TRUs are not subject to the PM emission standard because they will be required to transition to ZE as described above.

C. Lower-GWP Refrigerant

TRUs produce HFC emissions when refrigerant leaks from the unit due to normal wear and fatigue of refrigerant fittings. Requiring the use of lower-GWP refrigerant will reduce HFC emissions from TRUs. The Proposed Amendments establish a refrigerant requirement for TRUs operating in California. Beginning December 31, 2022, newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs will be required to use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all.

TRUs using R-452A refrigerant, which has a GWP of 2,141, are commercially available from both of the two major TRU manufacturers.[55,56] Staff are proposing a GWP limit of 2,200 to ensure a quick transition to a lower-GWP alternative that is commercially available for the three equipment types (truck TRU, trailer TRU, and DSC TRU). The refrigerant requirement for truck TRUs, trailer TRUs, and DSC TRUs aligns with the U.S. EPA's approval of the use of R-452A for transport applications, which does not include railcar TRUs or TRU gen sets.[57]

D. TRU Reporting, Operating Fees, and Compliance Labels

Staff are proposing to amend the TRU reporting requirements to include out-of-state-based units. Beginning December 31, 2023, TRU owners will be required to report all TRUs operating in California to CARB, regardless of where they are based. Reporting of all TRUs that operate in California will enable CARB enforcement staff, as well as applicable facility owners and operators, vehicle owners, drivers, and freight contractors, to look-up the compliance status of a given TRU. Amending the TRU reporting requirements to include out-of-state based units will also help to level the playing field between TRUs based in-state and out-of-state.

The Proposed Amendments also include new operating fee and compliance label requirements for TRUs operating in California. Beginning December 31, 2023, for each TRU operated in California, TRU owners will be required to pay TRU operating fees and affix a CARB-issued compliance label to both sides of the TRU housing every three years.

The proposed TRU operating fees will offset the costs to CARB as allowed by Health & Saf. Code section 43019.1,[58] which authorizes CARB to adopt a schedule of fees to cover all or part of CARB's reasonable costs associated with certification, audit, and compliance of off-road or non-vehicular engines and equipment, aftermarket parts, and emission control components sold in the State.

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[55] Carrier Press Release, Carrier Transicold Strengthens Sustainability Initiatives with Lower GWP Refrigerant for North America Truck and Trailer Systems, December 15, 2020. (web link: https://www.carrier.com/truck-trailer/en/north-america/news/news-article/carrier_transicold_strengthens_sustainability_initiatives_with_lower_gwp_refrigerant_for_north_america_truck_and_trailer_systems.html)

[56] Fleet Owner, Thermo King offers products to help reduce emissions, July 28, 2017. (web link: https://www.fleetowner.com/running-green/emissions/article/21696418/thermo-king-offers-products-to-help-reduce-emissions)

[57] United States Environmental Protection Agency, Federal Register, Vol. 82, No. 139/Friday, July 21, 2017/Rules and Regulations. (web link: https://www.govinfo.gov/content/pkg/FR-2017-07-21/pdf/2017-15379.pdf)

[58] California Health and Safety Code § 43019.1, Division 26, Senate Bill No. 854, July 27, 2018. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB854)

Compliance labels will assist both CARB enforcement and applicable facility staff to easily determine the compliance status of a TRU. Non-compliant units will not be issued a new compliance label. This will help to ensure that non-compliant TRUs are brought into compliance in a timely manner.

E. Applicable Facility Registration, Registration Fees, and Reporting

Applicable facilities include refrigerated WHDCs with a building size greater than or equal to 20,000 square feet, grocery stores with a building size greater than or equal to 15,000 square feet, seaport facilities, and intermodal railyards. The square foot thresholds are based on the amount of TRU activity and associated health risk relative to facility size; there are no proposed size thresholds for seaport facilities or intermodal railyards because activity is not based on facility size and TRUs operate for longer periods of time at these facility types compared to refrigerated WHDCs and grocery stores.

Applicable facility owners will be required to register their facility with CARB and pay a registration fee every three years beginning December 31, 2023. Applicable facility registration requires information about the facility, including address, owner contact information, and building size. The Proposed Amendments also require applicable facilities to ensure that TRUs operating onsite are compliant with the TRU ATCM. There are two ways applicable facilities may fulfill this requirement:

- Option 1: Report all TRUs that operate within the applicable facility property boundary to CARB (or)
- Option 2: Provide a declaration to CARB, under penalty of perjury, that non-compliant TRUs subject to the Proposed Amendments will not be permitted to operate within the property boundary.

Reporting all TRUs (compliant and non-compliant) ensures accurate and comprehensive data from facilities. As an alternative to reporting, an applicable facility may choose to not allow non-compliant units to operate at their facility. Staff are proposing to include applicable facility registration, registration fee, and reporting requirements because TRU emissions are generated at applicable facilities and impact surrounding communities. The proposed registration fee offsets CARB's cost in ensuring compliance of TRUs operating at these facilities. Applicable facility owners and operators should bear some responsibility for the TRU activity at their facility and ensure that TRUs are compliant with regulatory requirements.

F. Vehicle Owner and Driver Requirements

The Proposed Amendments include new compliance responsibilities for vehicle owners. Vehicle owners of TRU-equipped trucks or tractor-trailers equipped with a TRU will be required to ensure the TRU is compliant (i.e., those with a valid CARB compliance label or showing as compliant on CARB's website). Drivers will be required

to allow CARB enforcement staff to conduct a visual inspection of TRUs to determine whether emission control components have been tampered with, inadequately maintained, or are defective. Adding responsibilities for all of the key parties playing a role in the operation of TRUs is needed to ensure compliance and achieve the emission reduction and health benefit goals of the Proposed Amendments.

G. OEM Requirements

Staff are proposing to add the following TRU OEM requirements to ensure newly-manufactured TRUs are compliant with the TRU ATCM:

- Beginning May 31, 2023, TRU OEMS shall not manufacture, for sale or use in California, a trailer TRU, DSC TRU, railcar TRU, or TRU gen set, unless it is equipped with an engine that meets the PM emission standard.
- Beginning December 31, 2023, TRU OEMS shall not manufacture, for sale or use in California, a truck TRU, unless it is a ZE truck TRU.

The requirements will help to ensure that only compliant TRUs are manufactured for sale or use in California. The May 31, 2023, date provides TRU OEMs sufficient time to use leftover stock of MY 2022 TRU engines that are not required to meet the PM emission standard.

Additionally, staff are proposing to amend the OEM reporting requirements. OEMs are currently required to report unit and engine data for the coming production year and prior production years, as well as provide monthly production reports. Staff are proposing to remove the requirements for current and prior production reports. OEMs would only be required to submit monthly production reports. The monthly production report will enable staff to verify information reported by TRU owners and lessen the burden on OEMs to comply with reporting requirements.

H. Compliance Extension Based on Infrastructure Delays

Staff have worked closely with the electric utilities to ensure the regulatory compliance dates and annual ZE truck TRU percentages required by the Proposed Amendments are feasible. Although delays to the installation of charging or fueling infrastructure needed to support ZE truck TRUs are not anticipated, staff understand that there are various circumstances that may prevent infrastructure from being installed in a timely manner.

The Proposed Amendments include a compliance extension, in which truck TRU owners may apply for a year-long extension, up to a maximum of two years, due to unforeseen, temporary, or extenuating circumstances outside of the truck TRU owner's control that prevents the installation of ZE infrastructure at the truck TRU home base facility. This may include delays in the manufacture and shipment of infrastructure equipment, obtaining construction permit(s), obtaining power from a utility, private

financing, installation of infrastructure, or due to a natural disaster or discovery of archeological, historical, or tribal cultural resources under CEQA. An additional compliance extension beyond the first two year-long extensions may be granted due to a delay in obtaining power from a utility.

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

Government Code section 11346.2(b)(1) requires CARB to describe the specific purpose for each proposed amendment and a description of the rationale for CARB's determination that each proposed amendment is: 1) reasonably necessary to carry out the purposes that the action is implementing, interpreting, or making specific, and 2) reasonably necessary to address the problems described in Chapter II. This chapter provides the specific purpose and rationale for each proposed amendment.

The full text of the Proposed Amendments can be found in Appendix A.1 and Appendix A.2. For ease of reference and readability, Appendix A.1 will show complete proposed regulation text with amendments in underline to show additions and strikeout to show deletions, and Appendix A.2 will be a Microsoft Word version showing complete proposed regulation text amendments in "Track Changes" (underline/strikeout to show amendments), with the option to view the document with all amendments integrated into the text for a cleaner/more accessible version to improve readability.

General Proposed Amendments:

Staff are proposing to add "California" to each mention of the "Air Resources Board" throughout the regulatory text to reflect the current identification of the State Board within CalEPA and to be consistent with how the Agency is referring to itself generally. Therefore, staff are also proposing to modify uses of "ARB" to "CARB" as the acronym for the California Air Resources Board throughout the regulatory text. These proposed amendments are non-substantive, and will not change the meaning, interpretation, or implementation of the Proposed Amendments.

Staff are proposing to replace the words "can," "may," "must," and "will" with "shall." The current regulatory text uses "can," "may," "must," "shall," and "will" interchangeably. The change is necessary to make the regulatory text consistent by using the word "shall" throughout the regulatory text. These proposed amendments are non-substantive, and will not change the meaning, interpretation, or implementation of the Proposed Amendments.

Staff are proposing to amend the authority cited in each section of the regulatory text by removing reference to Health & Saf. Code section 40717.9 and adding Health & Saf. Code section 43019.1. Health & Saf. Code section 40717.9 relates to employee trip reduction programs and does not confer to CARB any authority related to the regulation of TRUs or TRU gen sets. The addition of Health & Saf. Code section 43019.1 is needed to identify the provision authorizing CARB to collect the reasonable costs to cover all or a portion of CARB's costs associated with the certification, audit, and compliance of off-road or nonvehicular engines and equipment, aftermarket parts,

and emissions control components sold in the State, as proposed in section 2477.5(h) and section 2477.17(d).

§ 2477 Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units and Transport Refrigeration Unit Generator Sets, and Facilities Where Transport Refrigeration Units Operate

Purpose of section 2477

This amendment adds language to specify that title 13, CCR, section 2477 through 2477.22 shall be known as the Transport Refrigeration Unit Regulation, or TRU Regulation.

Rationale of section 2477

This amendment is necessary because the regulation is codified in CCR, title 13, division 3, chapter 9, which also includes the "Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards."

A. Section 2477.1 – Purpose

Purpose of section 2477.1

This amendment adds NOx and GHG and deletes "in-use."

Rationale of section 2477.1

This amendment is necessary to include all the pollutants the Proposed Amendments aim to reduce. While the purpose of the current regulation is to reduce diesel PM emissions from TRUs and TRU gen sets, the purpose of the Proposed Amendments is to reduce PM, NOx, and GHG emissions needed to help meet the State's multiple risk reduction, air quality, and climate goals. The deletion of "in-use" is necessary because staff are proposing amendments to reduce emissions from both in-use and newly-manufactured TRUs.

B. Section 2477.2 – Applicability

Purpose of section 2477.2

This amendment adds language to specify that the exemptions provided in section 2477.3 apply to all regulated entities.

Rationale of section 2477.2

This amendment is necessary to specify that the exemptions provided in section 2477.3 apply to all regulated entities. As currently written, the exemptions only apply to owners and operators.

Purpose of section 2477.2(a)

This amendment deletes the reference to section 2477.4.

Rationale of section 2477.2(a)

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.2(b)

This amendment deletes applicability of the regulation to terminal operators and adds applicability to vehicle owners.

Rationale of section 2477.2(b)

This amendment is necessary because staff are proposing to delete the terminal operator requirements. The current regulation includes provisions for operators of TRUs that are assigned to California terminals where these units are operated, garaged, maintained, or dispatched from, requiring them to submit an operator report. In addition to providing basic information about the operator's company and contact information, the terminal address, and a list of all CARB IDN's for units assigned to the terminal are required. Staff are proposing to replace the terminal operator requirements with applicable facility owner and operator requirements. Please see the rationale of section 2477.2(m) on the addition of applicability to applicable facility owners and operators.

This amendment is also necessary to establish applicability of the regulation to vehicle owners. The Proposed Amendments would require vehicle owners of trucks or tractors pulling TRU equipped trailers or shipping containers that use TRUs or TRU gen sets on California highways to ensure the TRU or TRU gen set is compliant (i.e., those with a valid CARB compliance label or showing as compliant on CARB's website). Adding responsibilities for all the key parties playing a role in the operation of TRUs, including vehicle owners, is needed to ensure compliance and achieve the emission reduction and health benefit goals of the Proposed Amendments.

Purpose of section 2477.2(c)

This amendment deletes the reference to section 2477.4 and adds the word "tractor."

Rationale of section 2477.2(c)

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

This amendment is also necessary to correct incorrect wording in that a driver cannot drive a trailer.

Purpose of section 2477.2(d) and (e)

These amendments delete the reference to section 2477.4.

Rationale of section 2477.2(d) and (e)

These amendments are necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.2(f) and (g)

These amendments delete language specifying that the regulation only applies to "California-based" shippers and receivers; and deletes the reference to section 2477.4.

Rationale of section 2477.2(f) and (g)

These amendments are necessary to expand the applicability of the regulation to any shipper or receiver that arranges, tenders contracts for, or dispatches the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in the State of California, regardless of whether the shipper or receiver is based in California. This will help to ensure all TRUs operating in California are compliant to achieve the emission reduction and health benefit goals of the Proposed Amendments.

This amendment is also necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.2(i)

This amendment deletes the reference to section 2477.4 and adds applicability to OEMs of ZE truck TRUs.

Rationale of section 2477.2(i)

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

This amendment is also necessary to establish applicability to OEMs that direct ZE truck TRUs sales to the California market. As defined, a TRU is a refrigeration system powered by an integral internal combustion engine. Thus, the OEM requirements would not apply to ZE truck TRU OEMs because ZE truck TRUs do not have a diesel-powered engine. Staff are proposing to require ZE Truck TRU OEMs to report the same information to CARB that is currently required for TRU and TRU gen set OEMs. This will enable staff to verify information reported by TRU owners on the ZE truck TRUs used to comply with section 2477.5(b).

Purpose of section 2477.2(m)

This amendment deletes applicability of the regulation to facilities and adds applicability to owners or operators of an applicable facility located in California.

Rationale of section 2477.2(m)

This amendment is necessary because staff are proposing to delete applicability of the regulation to facilities. The current regulation requires large facilities with 20 or more doors serving refrigerated storage areas to submit a Facility Report in January 2006 for TRU activity that occurred in 2005. The compliance date for these requirements has passed. Staff are proposing new requirements for owners and operators of an "Applicable Facility," as well as a new definition for the facilities that will be subject to the requirements. Applicable facilities include refrigerated WHDCs with a building size greater than or equal to 20,000 square feet, grocery stores with a building size greater than or equal to 15,000 square feet, seaport facilities, and intermodal railyards. There are no size thresholds for seaport facilities or intermodal railyards. The square foot thresholds are based on the amount of TRU activity and associated health risk relative to facility size; there are no proposed size thresholds for seaport facilities or intermodal railyards because activity is not based on facility size and TRUs operate for longer periods of time at these facility types compared to refrigerated WHDCs and grocery stores.

Purpose of section 2477.2(o)

This amendment deletes section 2477.2(o).

Rationale of section 2477.2(o)

This amendment is necessary to make the regulatory text consistent. Staff are proposing to move section 2477.2(o) in its entirety to be with the other defined terms in section 2477.4(b).

C. Section 2477.3 – Exemptions

Purpose of section 2477.3(a)

This amendment adds "TRU."

Rationale of section 2477.3(a)

This amendment is necessary to specify that the exemptions in section 2477.3 apply to the TRU Regulation that is codified in title 13, CCR, section 2477 through 2477.22.

Purpose of section 2477.3(b)

This amendment specifies which sections non-operational TRUs or TRU gen sets are exempt from and deletes the language in section 2477.3(b) that defines a non-operational TRU or TRU gen set.

Rationale of section 2477.3(b)

This amendment is necessary to specify that non-operational TRUs or TRU gen sets are exempt from the regulation, except that the prohibitions in section 2477.18 apply. As currently written, it was unclear as to which sections non-operational TRUs or TRU gen sets are exempt from.

This amendment is also necessary to make the regulatory text consistent. Staff are proposing to move the language in section 2477.3(b) that defines what a non-operational TRU or TRU gen set is to be with the other defined terms in section 2477.4.

Purpose of section 2477.3(c)

This amendment adds language to specify that ZE truck TRUs used to comply with the requirements in section 2477.5(b) are not exempt from the regulation.

Rationale of section 2477.3(c)

This amendment is necessary because as defined, a TRU is a refrigeration system powered by an integral internal combustion engine. Thus, the regulation would not apply to ZE truck TRUs because they do not have a diesel-powered engine. TRU owners will be required to report ZE truck TRUs to CARB and comply with TRU

compliance label requirements, which will enable staff to determine the compliance status of truck TRU fleets with the ZE truck TRU requirements.

Purpose of section 2477.3(d)

This amendment replaces "in-use performance standards" with "requirements," updates the reference to section 2477.5 "(a)" to "(a), (b), (c), and (d)" and section 2477.5 "(j)" to "(l)," deletes the emergency exemption expiration date, deletes "California-based," replaces "ARBER registration" with "TRU reporting," updates the reference to section 2477.5 "(e)" to "(g)," and makes other non-substantive changes for grammar.

Rationale of section 2477.3(d)

The replacement of "in-use performance standards" with "requirements" is necessary because staff are proposing new refrigerant and ZE truck TRU requirements that do not fall in the category of "performance standards," that TRUs used during an emergency would be exempt from.

The update of the reference to section 2477.5 "(a)" to "(a), (b), (c), and (d)" is necessary to specify that TRUs used during an emergency are exempt from all the above requirements, not just the in-use performance standards.

The update of the reference to section 2477.5 "(j)" to "(l)" is necessary because new items were added to section 2477.5 and the subsection that contains the mobile catering company exemption requirements has been updated.

The deletion of the emergency exemption expiration date is necessary because as currently written, the exemption provided to TRUs used during an emergency would expire on January 1, 2025. This amendment is needed to provide the emergency exemption to TRUs past January 1, 2025.

The deletion of "California-based" is necessary to reflect that TRUs used during an emergency are not exempt from the TRU reporting requirements, regardless of whether they are based in California or not. Reporting of all TRUs, regardless of where they are based, is needed to ensure robust compliance monitoring and enforcement of all TRUs operating in California and help to level the playing field between TRUs based in-state and out-of-state.

The replacement of "ARBER registration" with "TRU reporting" is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

Purpose of section 2477.3(e)

This amendment updates the numbering of section 2477.3(e)(1) to 2477.3(e), 2477.3(e)(2) to 2477.3(e)(1), 2477.3(e)(3) to 2477.3(e)(2), 2477.3(e)(4) to 2477.3(e)(3), and 2477.3(e)(5) to 2477.3(e)(4); adds "a compliance plan shall include a" to section 2477(e)(2)(B), updates the reference to section 2477.3 "(e)(2) and (e)(3)" to "(e)(1) and (e)(2)" in section 2477.3(e)(3); and makes other non-substantive changes for grammar.

Rationale of section 2477.3(e)

This amendment is necessary because items in section 2477.3(e) were deleted and the numbering of this subsection has been updated. The words "a compliance plan shall include a" is being added to section 2477(e)(2)(B) to be consistent with the rest of the regulatory text.

D. Section 2477.4 – Definitions

Purpose of section 2477.4

This amendment deletes numbering from section 2477.4.

Rationale of section 2477.4

This amendment is necessary to facilitate future amendments to section 2477.4 because numbering the defined terms in the regulatory text requires updates each time a new term is added or deleted.

Purpose of section 2477.4(a)

This amendment adds "TRU" to specify that the definitions in section 2477.4 apply to the TRU Regulation that is codified in title 13, CCR, section 2477 through 2477.22.

Rationale of section 2477.4(a)

This amendment is necessary because the regulation is codified in CCR, title 13, division 3, chapter 9, which also includes the "Regulation for Mobile Cargo Handling Equipment at Ports and Intermodal Rail Yards."

Affiliate or Affiliation

Purpose

This amendment deletes the definition of "Affiliate or Affiliation."

Rationale

This amendment is necessary because staff are proposing to delete the definition of "Facility" and "Facility Control (of TRUs or TRU Gen Set)" in which the term "Affiliate or Affiliation" was referenced, thereby removing the term from the regulatory text. Therefore, the definition of affiliate or affiliation is no longer needed in the regulation. Please see the rationale of the deletion of "Facility."

Alternative Diesel Fuel

Purpose

This amendment moves the definition of "Alternative Diesel Fuel" to follow the definition of "Affiliate or Affiliation."

Rationale

This amendment is necessary because "Alternative Diesel Fuel" was not listed in correct alphabetical order.

ARB

Purpose

This amendment deletes the definition of "ARB."

Rationale

This amendment is necessary because staff are proposing to update the acronym for the California Air Resources Board, from ARB to CARB, thereby removing the term "ARB" from the regulatory text. The definition of ARB is no longer needed in the regulation.

ARBER

Purpose

This amendment deletes the definition of "ARBER."

Rationale

This amendment is necessary because staff are proposing to delete the definition of "ARBER" and replace it with "CARB online system," thereby removing the term "ARBER" from the regulatory text. The definition of ARBER is no longer needed in the regulation.

Applicable Facility

Purpose

This amendment adds the definition of "Applicable Facility" as any refrigerated WHDC with a building size greater than or equal to 20,000 square feet; grocery store with a building size greater than or equal to 15,000 square feet; seaport facility or intermodal railyard any of the following facilities if one or more TRUs operate within the facility fence line or legal property boundary.

Rationale

This amendment is necessary because the Proposed Amendments place specific requirements on owners and operators of an "Applicable Facility." As such, it is necessary to establish what constitutes an applicable facility, so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for owners and operators of an applicable facility. Please see the earlier rationale of section 2477.2(m) on the addition of applicability to applicable facility owners and operators.

Applicable Facility Operator

Purpose

This amendment adds the definition of "Applicable Facility Owner" as any person who leases, operates, controls, or supervises an applicable facility.

Rationale

This amendment is necessary because the Proposed Amendments place specific requirements on "Applicable Facility Operators." As such, it is necessary to establish what constitutes an applicable facility operator, so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for applicable facility operators.

Applicable Facility Owner

Purpose

This amendment adds the definition of "Applicable Facility Owner" as the person legally holding title (or its equivalent) to an applicable facility.

Rationale

This amendment is necessary because the Proposed Amendments place specific requirements on "Applicable Facility Owners." As such, it is necessary to establish what constitutes an applicable facility owner so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for applicable facility owners.

Applicable Facility Owner/Operator

Purpose

This amendment adds the definition of "Applicable Facility Owner/Operator" to mean a requirement applies to the owner and/or operator of an applicable facility, as determined by agreement or contract between the parties if the two are separate business entities.

Rationale

This amendment is necessary because the Proposed Amendments place specific requirements on "Applicable Facility Owner/Operators." As such, it is necessary to establish what constitutes an applicable facility owner/operator, so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for applicable facility owner/operators.

California

Purpose

This amendment adds the definition of "California" to mean the State of California.

Rationale

This amendment is necessary to specify that for the purposes of this regulation, California means the State of California and does not include Indian Countries in California under Indian or federal jurisdiction.

California-Based Shipper

Purpose

This amendment deletes the definition of "California-Based Shipper."

Rationale

This amendment is necessary because staff are proposing to extend applicability of the regulation to any shipper that arranges, tenders contracts for, or dispatches the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in the State of California, regardless of whether the shipper is based in California. This will help to ensure all TRUs operating in California are compliant to achieve the emission reduction and health benefit goals of the Proposed Amendments. As such, staff are proposing to replace the definition of "California-Based Shipper" with "Shipper," thereby removing the term "California-Based Shipper" from the regulatory text.

California-Based Receiver

Purpose

This amendment deletes the definition of "California-Based Receiver."

Rationale

This amendment is necessary because staff are proposing to extend applicability of the regulation to any receiver that arranges, tenders contracts for, or dispatches the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in the State of California, regardless of whether the receiver is based in California. This will help to ensure all TRUs operating in California are compliant to achieve the emission reduction and health benefit goals of the Proposed Amendments. As such, staff are proposing to replace the definition of "California-Based Receiver" with "Receiver," thereby removing the term "California-Based Receiver" from the regulatory text.

CARB

Purpose

This amendment adds the definition of "CARB" as the acronym for the California Air Resources Board.

Rationale

This amendment is necessary to better reflect the current identification of the State Board within CalEPA that is responsible for implementing the regulation and to be consistent with how the Agency is referring to itself generally.

CARB Online System

Purpose

This amendment adds the definition of "CARB Online System" as a CARB online system that TRU and applicable facility owners or owner/operators shall report information to for the purposes of the regulation and may be found at: https://arber.arb.ca.gov.

Rationale

This amendment is necessary because the current regulation requires ARBER registration and CARB is in the process of developing a replacement system for ARBER, which is based on an outdated technology platform. The use of the general term "CARB Online System" will allow CARB to continue to collect reported TRU data, as required by the regulation, without future amendments to the regulation to update the specific name of the online system being used.

Class I Railroad

Purpose

This amendment adds the definition of "Class I Railroad" as a railroad that is defined as Class I by the Surface Transportation Board.

Rationale

This amendment is necessary because the term "Class I Railroad" is used to define an "Intermodal Railyard," which is one type of "Applicable Facility" subject to the Proposed Amendments. As such, it is necessary to establish what constitutes a Class I railroad, so readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for intermodal railyards or Class I Railroads.

Emergency

Purpose

This amendment deletes the reference to section 2477.4; adds language to the definition of "Emergency" to include instances when the Executive Officer has determined that an emergency event arising from sudden and reasonably unforeseen natural disaster such as earthquake, flood, fire, or other unforeseen events that threaten public health and safety has occurred that requires the immediate temporary operation TRUs or TRU gen sets; and makes other non-substantive changes for grammar.

Rationale

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

This amendment is also necessary to provide the Executive Officer the authority to declare an emergency event that requires the immediate temporary operation TRUs or TRU gen sets. This authority is necessary in circumstances where the emergency event is outside the purview of the President of the United States or the Governor of the State of California, or other emergency events that require the use of TRUs or TRU gen sets unrelated to providing foodservice to incident responders.

Facility

Purpose

This amendment deletes the definition of "Facility."

Rationale

This amendment is necessary because staff are proposing to delete the facility reporting requirements, thereby removing the term "Facility" from the regulatory text. The current regulation requires large facilities with 20 or more doors serving refrigerated storage areas to submit a Facility Report in January 2006 for TRU activity that occurred in 2005. The compliance date for these requirements has passed. The Proposed Amendments include new requirements for owners and operators of an "Applicable Facility."

Facility Control (of TRUs and TRU Gen Sets)

Purpose

This amendment deletes the definition of "Facility Control (of TRUs or TRU Gen Sets)."

Rationale

This amendment is necessary because staff are proposing to delete the definition of "Facility" and replace it with "Applicable Facility." The definition of facility includes the only reference to "Facility Control (of TRUs or TRU Gen Sets)," thereby removing the term from the regulatory text. The definition of facility control (of TRUs or TRU gen sets) is no longer needed in the regulation.

Flexibility engine

Purpose

This amendment deletes the definition of "Flexibility engine."

Rationale

This amendment is necessary because staff are proposing to delete the provisions related to the use of flexibility engines, thereby removing the term "Flexibility engine" from the regulatory text. A flexibility engine is an engine installed in new equipment by an OEM under the Transitional Program for Equipment Manufacturers in accordance with title 40, Code of Federal Regulations, sections 89.102 and 1039.625, and title 13, CCR, section 2423(d). The flexibility rules allow pre-approved OEMs to use previous-Tier engines in lieu of Tier 4i or Tier 4 final engines for up to a seven-year phase-in period. The Tier 4i and Tier 4 final engine standards went into effect in 2008 and 2013, respectively. Therefore, the phase-in period ended, and these provisions no longer apply. The definition of flexibility engine is no longer needed in the regulation.

Fleet

Purpose

This amendment adds the definition of "Fleet" as one or more TRUs or TRU gen sets, owned by a person, business, military installation, or government agency operating in the State of California, and does not include TRUs that do not operate in California.

Rationale

This amendment is necessary because the Proposed Amendments establish specific ZE truck TRU requirements for TRU owners based on the size of their truck TRU fleet. As such, it is necessary to establish what constitutes a fleet. This is a new definition, as the current regulation does not include requirements based on the number of TRUs or TRU gen sets in a TRU owner's fleet.

Global Warming Potential Value or GWP Value

Purpose

This amendment adds the definition of "Global Warming Potential value or GWP value."

Rationale

This amendment is necessary because the Proposed Amendments set specific requirements for newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs to use refrigerant with a GWP value less than or equal to 2,200, or use no refrigerant at all. This definition is necessary to establish what a Global Warming Potential Value or GWP Value is under the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for refrigerant and did not need to define GWP or GWP value.

Grocery Store

Purpose

This amendment adds the definition of "Grocery Store" as a retail facility that sells food products, which includes, but is not limited to establishments commonly known as supermarkets, food stores, grocery stores, food warehouses, and any other food merchandising stores.

Rationale

This amendment is necessary because grocery stores are one type of "Applicable Facility" subject to the Proposed Amendments. As such, it is necessary to establish what constitutes a grocery store, so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for grocery stores.

Hybrid Cryogenic Temperature Control System

Purpose

This amendment moves the definition of "Hybrid Cryogenic Temperature Control System" to follow the definition of "Highway."

Rationale

This amendment is necessary because "Hybrid Cryogenic Temperature Control System" was not listed in correct alphabetical order.

Independently Owned and Operated

Purpose

This amendment deletes the definition of "Independently Owned and Operated."

Rationale

This amendment is necessary because staff are proposing to delete the definition of "Facility" and replace it with "Applicable Facility." The definition of facility includes the only reference to "Independently Owned and Operated," thereby removing the term from the regulatory text. Please see the rationale of the deletion of "Facility."

Intermodal Railyard

Purpose

This amendment adds the definition of "Intermodal Railyard" as an intermodal facility owned or operated by a Class I Railroad.

Rationale

This amendment is necessary because an intermodal railyard is one type of "Applicable Facility" subject to the Proposed Amendments. As such, it is necessary to establish what constitutes an intermodal railyard, so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for intermodal railyards.

Low Emission TRU (LETRU or L)

Purpose

This amendment deletes the definition of "Low Emission TRU (LETRU or L)."

Rationale

This amendment is necessary because all compliance dates for LETRU have passed. Under the current regulation, there are two levels of in-use standard stringency: the LETRU in-use standard, which reduces diesel PM by at least 50 percent, and the more stringent ULETRU in-use standard, which reduces diesel PM by at least 85 percent. LETRU applies to MY 2002 and older TRU engines. Seven years after complying with LETRU, these MY 2002 and older engines are required to meet the ULETRU in-use standard. For example, a MY 2002 engine is required to meet the LETRU in-use standard by December 31, 2009, and then meet the ULETRU in-use standard by December 31, 2016. Therefore, the definition of LETRU is no longer needed in the regulation.

Military Installation

Purpose

This amendment adds the definition of "Military Installation" and defines it as having the same meaning as defined in title 10, United States Code, section 2801(c)(4).

Rationale

This amendment is necessary because the term "Military Installation" is used to define a "Fleet" and the Proposed Amendments establish specific ZE truck TRU requirements for TRU owners based on the size of their truck TRU fleet. This definition is a new definition because the current regulation does not include requirements based on fleet size and did not need to define fleet or military installation.

Military Tactical Support Equipment (TSE)

Purpose

This amendment adds "vehicles" and "or operated," and makes other non-substantive changes for grammar.

Rationale

This amendment is necessary to specify that military tactical support equipment includes equipment or vehicles owned or operated by the U.S. Department of Defense and/or the U.S. military services, and are used in combat, combat support, combat service support, tactical or relief operations, or training for such operations. This is needed to include TRU-equipped trucks, as well as equipment or vehicles operated but not owned by the U.S. Department of Defense and/or the U.S. military services.

New TRU, TRU Gen Set, or Engine

Purpose

This amendment deletes the reference to section 2477.4.

Rationale

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Non-operational

Purpose

This amendment adds the definition of "Non-operational" as any TRU that is deleted or separated from the truck, trailer, shipping container, or railcar on which it was originally mounted. This does not include TRU Gen Sets that are not attached to a shipping container or trailer chassis.

Rationale

This amendment is necessary to make the regulatory text consistent by moving language in section 2477.4(b) that defines a non-operational TRU or TRU gen set to be with the other defined terms in section 2477.4.

Operator

Purpose

This amendment deletes the words "as defined."

Rationale

This amendment is necessary to delete unneeded wording and limit redundancy. It is not necessary to specify every time a defined word is used in the regulatory text.

Owner

Purpose

This amendment adds language to specify who the owner of lease or rental units is; deletes the words "see definition;" replaces "register" with "report;" and deletes references to ARBER.

Rationale

The addition of language to specify the owner of a lease or rental unit is necessary to establish who is responsible for the owner/operator requirements in section 2477.5.

The deletion of the words "see definition" is necessary to delete unneeded wording and limit redundancy. It is not necessary to specify every time a defined word is used in the regulatory text.

The replacement of "register" with "report" is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER

registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

The deletion of the reference to "ARBER" is necessary because staff are proposing to replace "ARBER" with "CARB online system."

Parent Company

Purpose

This amendment deletes the definition of "Parent Company."

Rationale

This amendment is necessary because staff are proposing to delete the definition of "Facility Control (of TRUs or TRU Gen Sets)." The definition of facility control (of TRUs or TRU gen sets) includes the only reference to "Parent Company," thereby removing the term from the regulatory text.

Railcar TRU

Purpose

This amendment adds the definition of "Railcar TRU" as a TRU designed to control the environment of temperature-sensitive products in a railcar when that railcar is located on an active rail line.

Rationale

This amendment is necessary because the Proposed Amendments include specific requirements for railcar TRUs; as such, it is necessary to expand on the different types of TRUs subject to the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for railcar TRUs.

Real Emissions Reductions

Purpose

This amendment deletes the definition of "Real Emissions Reductions."

Rationale

This amendment is necessary because staff are proposing to delete provisions related to the "Early Compliance with LETRU In-Use Performance Standards," which includes the only reference to "Real Emissions Reductions," thereby removing the term from

the regulatory text. Under the current regulation, if a TRU owner brings a TRU into compliance with LETRU earlier than required, they can apply for a ULETRU compliance date extension. This only applies to TRUs that are required to first meet LETRU and then ULETRU. For each year that LETRU compliance was early, a year of delay in meeting ULETRU is granted. These provisions no longer apply because all compliance dates for LETRU have passed.

Refrigerated Warehouse or Distribution Center (WHDC)

Purpose

This amendment adds the definition of "Refrigerated Warehouse or Distribution Center" as a facility with cold storage used for the reception and storage of products. This includes but is not limited to cold storage warehouses, packing houses, cross-dock facilities, and third-party logistics centers.

Rationale

This amendment is necessary because refrigerated WHDCs are one type of "Applicable Facility" subject to the Proposed Amendments. As such, it is necessary to establish what constitutes a refrigerated WHDC, so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for refrigerated WHDCs.

Repower

Purpose

This amendment deletes the definition of "Repower."

Rationale

This amendment is necessary because staff are proposing to delete provisions related to "ULETRU Extension for Compliance by Original Compliance Date" and "ULETRU Extension for Compliance with LETRU," which include the only references to "Repower," thereby removing the term from the regulatory text. These provisions no longer apply because the ULETRU extension for compliance by original compliance date was available to owners that complied with the original December 31, 2008 compliance date, and all compliance dates for LETRU have passed.

Rotating Outage

Purpose

This amendment deletes the reference to section 2477.4.

Rationale

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Seaport Facility

Purpose

This amendment adds the definition of "Seaport Facility" as any non-military operational seaport where the seaport functions as a terminal operator or independent marine terminal.

Rationale

This amendment is necessary because seaport facilities are a type of "Applicable Facility" that are subject to the Proposed Amendments. As such, is necessary to establish what constitutes a "Seaport facility." This is a new definition, as the current regulation does not have specific requirements for seaport facilities.

Square Footage

Purpose

This amendment adds the definition of "Square Footage" as the square footage of all buildings on properties owned and operated by one business entity, as calculated from the building floor plan(s) or blueprint(s) archived by the local permitting agency or records office. For businesses leasing all or part of a building, the square footage is the usable area, as specified in the lease agreement.

Rationale

This amendment is necessary because applicability of the Proposed Amendments is based on facility type and building square footage. As such, it is necessary to define what "Square Footage" is so that readers understand which facilities are subject to the Proposed Amendments. This is a new definition, as the current regulation does not apply to facilities based on their building size or square footage.

Statement of Accuracy

Purpose

This amendment adds the definition of "Statement of Accuracy" to mean the person responsible for submitting information under the TRU Regulation submits and signs

the following statement along with the information provided: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."

Rationale

This amendment is necessary because staff proposing to require all information submitted to CARB for the purposes of the regulation to include a statement of accuracy. The statement of accuracy is needed to ensure that submitted information is true, accurate, and complete.

Terminal Operator

Purpose

This amendment deletes the definition of "Terminal Operator."

Rationale

This amendment is necessary because staff are proposing to delete the terminal operator requirements, thereby removing the term "Terminal Operator" from the regulatory text. Staff are proposing to replace the terminal operator and facility reporting requirements with applicable facility owner and operator requirements. Please see the rationale of section 2477.2(m) on the addition of applicability to applicable facility owners and operators.

Third Party Agreement Confirmation Information

Purpose

This amendment moves the definition of "Third Party Agreement Confirmation Information" to follow the definition of "Terminal" and replaces "register in ARBER" with "report to CARB."

Rationale of section 2477.14(a)(3)

This amendment is necessary because "Third Party Agreement Confirmation Information" was not listed in correct alphabetical order.

This amendment is also necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

Trailer

Purpose

This amendment moves the definition of "Trailer" to follow the definition of "Tier 4 Nonroad/Off-road Emission Standards."

Rationale

This amendment is necessary because "Trailer" was not listed in correct alphabetical order.

Trailer TRU

Purpose

This amendment adds the definition of "Trailer TRU" as a TRU that is mounted on or in a trailer or domestic shipping container that can be attached and detached to a tractor, commonly referenced together as a "tractor-trailer."

Rationale

This amendment is necessary because the Proposed Amendments include specific requirements for trailer TRUs; as such, it is necessary to expand on the different types of TRUs subject to the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for trailer TRUs.

Truck TRU

Purpose

This amendment adds the definition of "Truck TRU" as a TRU that is mounted on or in a truck cargo box permanently attached to a truck, in contrast to a detachable trailer.

Rationale

This amendment is necessary because the Proposed Amendments include specific requirements for truck TRUs; as such, it is necessary to expand on the different types of TRUs subject to the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for truck TRUs.

Ultra-Low-Aromatic Synthetic Diesel Fuel

Purpose

This amendment adds the letter "n" to the word "cotent" in Table 2.

Rationale

This amendment is necessary because the word "content" was spelled incorrectly.

Ultra-Low Emission TRU (ULETRU or U)

Purpose

This amendment updates the references to subparagraphs 2477.5 "(a)(1)," "(a)(2)," and (a)(3)" to "(c)(1)," "(c)(2)," and (c)(3)."

Rationale

This amendment is necessary because the performance standard requirements were moved from section 2477.5(a) to 2477.5(c) as part of changes to section 2477.5.

Vehicle Owner

Purpose

This amendment adds the definition of "Vehicle Owner" as the Person as defined in this section registered as the owner or lessee of a vehicle by the California Department of Motor Vehicles or its equivalent in another state, province, or as evidenced on the vehicle registration document carried in the vehicle to which the TRU is attached.

Rationale

This amendment is necessary because vehicle owners are subject to the requirements of the Proposed Amendments. As such, it is necessary to establish what constitutes a "Vehicle Owner," so that readers understand who is subject to the requirements of the Proposed Amendments. This is a new definition, as the current regulation does not have specific requirements for vehicle owners.

Zero-Emission Fueling Infrastructure

Purpose

This amendment adds the definition of "Zero-Emission Fueling Infrastructure" as a fueling system that provides the appropriate fuel type to power a ZE truck TRU (e.g., electric charging infrastructure or cryogenic fueling tank and dispenser).

Rationale

This amendment is necessary because the Proposed Amendments include provisions that would allow TRU owners to apply for a compliance extension to the ZE truck TRU requirements in section 2477.5(b) due to unforeseen, temporary, or extenuating circumstances outside the TRU owner's control that prevents the installation of ZE fueling infrastructure. This is a new definition, as the current regulation does not have a specific compliance extension based on delays to ZE fueling infrastructure.

Zero-Emission Truck TRU (ZE truck TRU)

Purpose

This amendment adds the definition of "Zero-Emission Truck TRU (ZE truck TRU)" as a truck refrigeration system whose operation results in zero exhaust emissions of any criteria pollutant (or precursor pollutant) or GHG under any possible operational modes or conditions. The ZE truck TRU may draw power from the truck or stored energy source that is recharged by the truck only if the truck produces zero exhaust emissions while operating. The stored energy source may not be recharged by a CI engine coupled to a generator as a source of electricity. Weight of the stored energy source does not alone qualify as "a decrease in fuel efficiency."

Rationale

This amendment is necessary because the Proposed Amendments establish specific requirements for ZE truck TRUs in section 2477.5(b). As such, it is necessary to establish what constitutes a "ZE truck TRU." This is a new definition, as the current regulation does not have specific requirements for ZE truck TRUs.

Purpose of section 2477.4(b)

This amendment adds language moved from section 2477.2(o).

Rationale of section 2477.4(b)

This amendment is necessary to make the regulatory text consistent. Staff are proposing to move section 2477.2(o) in its entirety to new section 2477.4(b) to be with the other defined terms in section 2477.4.

E. Section 2477.5 – Requirements for Owners or Owner/Operators

2477.5(a) Refrigerant Requirements

Purpose of section 2477.5(a)

This amendment adds new language to establish refrigerant requirements for GWP and labeling that apply to newly-manufactured TRUs. Beginning December 31, 2022, newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs would be required to use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all. TRU owners would also be required to ensure that TRU OEM supplied refrigerant labels are maintained so that they are readily visible and legible.

Rationale of section 2477.5(a)

This amendment is necessary because TRUs produce direct GHG emissions when refrigerant leaks from the unit due to normal wear and fatigue of refrigerant fittings. Requiring the use of lower-GWP refrigerant will reduce GHG emissions from TRUs, which is needed to help meet the State's GHG emission reduction targets and climate goals.

TRUs using R-452A refrigerant, which has a GWP of 2,141, are commercially available from both of the two major TRU manufacturers. Staff are proposing a GWP limit of 2,200 to ensure a quick transition to a lower-GWP alternative that is commercially available for the three equipment types (truck TRU, trailer TRU, and DSC TRU). The refrigerant requirement for truck TRUs, trailer TRUs, and DSC TRUs aligns with the U.S. EPA's approval of the use of R-452A for transport applications, which does not include railcar TRUs or TRU gen sets.

Labeling requirements are necessary to ensure proper refrigerant maintenance of TRUs and to aid CARB enforcement personnel during inspections and fleet audits.

2477.5(b) Zero-Emission Truck TRUs

Purpose of section 2477.5(b) and (b)(1)

This amendment establishes ZE truck TRU requirements, including the required ZE truck TRU fleet percentages and phase-in compliance schedule in Table 3, and proposes the methodology for the calculation of the minimum number of ZE truck TRUs required each year. The required minimum number of ZE truck TRUs is based on the truck TRU fleet size reported to CARB on December 31, 2023 or December 31 of each year, whichever is greater.

Rationale of section 2477.5(b) and (b)(1)

The ZE truck TRU requirements are necessary to achieve PM, NOx, and GHG emission reductions needed to help meet the State's multiple risk reduction, air quality, and climate goals, as well as to meet the directive of State policies and plans directing CARB to achieve additional diesel emission reductions. This includes EO N-79-20, which set a goal for 100 percent ZE off-road vehicles and equipment by 2035. Truck TRUs are generally used for local and regional delivery, and return to a home base each night. Based on their daily operational characteristics and the operating range of current technologies, TRUs installed on trucks are well suited for ZE, because they would not require additional refueling or recharging infrastructure outside their home terminals or distribution centers before dispatch.

It is necessary to include the equation, annual ZE truck TRU fleet percentages, and phase-in compliance schedule so truck TRU owners can determine the number of ZE truck TRUs per year needed to comply with the ZE truck TRU requirement.

The Proposed Amendments would require TRU owners to transition 15 percent of their truck TRU fleet to ZE technology each year beginning December 31, 2023. The annual 15 percent ZE truck TRU requirement (over seven years) aligns with the seven-year compliance schedule already established by the current regulation, in which TRU owners are required to meet more stringent performance standards at seven-year intervals until the TRU meets ULETRU.

Purpose of section 2477.5(b)(2)

This amendment adds language to establish the requirements for downsizing a truck TRU fleet. A TRU owner may downsize their truck TRU fleet size, so long as the TRU owner has not purchased additional direct-drive refrigeration units to replace the original diesel-powered units being sold or retired.

Rationale of section 2477.5(b)(2)

This amendment is necessary to prevent owners from replacing diesel-powered truck TRUs with direct-drive refrigeration units, which are exempt from the regulatory requirements. Direct-drive units are not zero-emission and therefore would not achieve the emission and health risk reductions expected under the Proposed Amendments.

Purpose of section 2477.5(b)(3)

This amendment adds language on the rounding methodology for the calculation of ZE truck TRUs required by the Proposed Amendments.

Rationale of section 2477.5(b)(3)

This amendment is necessary because the number of ZE truck TRUs required by the Proposed Amendments may not always result in a whole number and TRU owners cannot purchase a partial ZE truck TRU to comply with the ZE truck TRU requirement.

2477.5(c) In-Use Performance Standards

Purpose of section 2477.5(c)

This amendment adds language to specify in-use performance standard requirements for MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines; updates the reference to paragraph "(b)" to "(c)(4);" adds language to specify that the in-use performance standards also apply to owners or owner/operators that cause a TRU or TRU gen set to be operated in California; deletes references to LETRU or L; updates footnote 4; and makes other non-substantive changes for grammar.

Rationale of section 2477.5(c)

The addition of language to specify in-use performance standard requirements for MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines amendment is necessary because staff are proposing different requirements for MY 2022 and older versus MY 2023 and newer engines. The Proposed Amendments would require newly-manufactured engines to meet a PM emission standard that aligns with the U.S. EPA Tier 4 final PM emission standard for engines greater than 25 horsepower, regardless of horsepower. This is needed to address the increase in PM emissions from TRU engines less than 25 horsepower. The federal and California PM emission standard for TRU engines less than 25 horsepower is 15 times higher than that for TRU engines greater than 25 horsepower. Based on the updated TRU inventory, the population of TRUs equipped with engines less than 25 horsepower is increasing and will become responsible for the majority of PM emissions from TRUs in the near future, if current trends continue. MY 2022 and older engines would continue

to operate under the current requirements, in which they shall meet ULETRU by December 31 of the seventh year after the engine MY. This is necessary to allow for the full useful life of units purchased to comply with the current regulation.

The update of paragraph "(b)" to "(c)(4)" is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the alternative technology provisions has been updated.

The addition of language to specify that the in-use performance standards also apply to owners or owner/operators that cause a TRU or TRU gen set to be operated in California is needed to specify that the requirements apply to TRU owners that may not operate the TRU.

The deletion of references to LETRU or L is necessary because all compliance dates for LETRU have passed.

The update to the numbering of section 2477.5(c)(1)(A)2. to 2477.5(c)(1)(A)1. is necessary because section 2477.5(c)(1)(A)2. was deleted and the numbering of this section has been updated.

The amendment to footnote 4 is necessary to update the status of the Tier 4 "final" Nonroad/Off-road Emission Standards that went into effect in 2013.

<u>Purpose of section 2477.5(c)(3)</u>

This amendment updates the reference to section 2477.5 "(a)(1) and (2)" to "(c)(1) or (2)," and adds language to specify that the alternative to meeting the ULETRU in-use performance standards apply to MY 2022 and older units.

<u>Rationale of section 2477.5(c)(3)</u>

This amendment is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the in-use performance standard requirements for MY 2022 and older TRU and TRU gen set engines has been updated.

This amendment is also necessary to specify that the alternative technology provisions apply to MY 2022 and older units to allow for the full useful life of alternative technology units purchased to comply with the current regulation.

<u>Purpose of section 2477.5(c)(3)(A)</u>

This amendment adds the words "all of."

Rationale of section 2477.5(c)(3)(A)

This amendment is necessary to specify that a hybrid electric TRU or electric-standby TRU shall qualify as an Alternative Technology only if all the conditions in sections 2477.5(c)(3)(A) are met.

Purpose of section 2477.5(c)(3)(A)1., 3., and 4.

This amendment deletes the words "as defined."

Rationale of section 2477.5(c)(3)(A)1., 3., and 4.

This amendment is necessary to delete unneeded wording and limit redundancy. It is not necessary to specify every time a defined word is used in the regulatory text.

Purpose of section 2477.5(c)(3)(A)6.

This amendment deletes language from section 2477.5(c)(3)(A)6. specifying that 50 percent of an owner's hybrid electric or electric-standby equipped TRUs shall be equipped with an electronic tracking system by December 31, 2012.

Rationale of section 2477.5(c)(3)(A)6.

This amendment is necessary because the compliance date has passed. As of December 31, 2013, 100 percent of an owner's hybrid electric or electric-standby equipped TRUs shall be equipped with an electronic tracking system.

Purpose of section 2477.5(c)(3)(A)7.

This amendment replaces "registered in ARBER" with "reported to CARB" and updates the reference to section 2477.5 "(e)" to "(g)."

Rationale of section 2477.5(c)(3)(A)7.

These amendments are necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

Purpose of section 2477.5(c)(3)(B)

This amendment adds the words "all of."

Rationale of section 2477.5(c)(3)(B)

Please see the earlier rationale of section 2477.5(c)(3)(A) as the changes are the same and thus necessary for the same reasons.

Purpose of section 2477.5(c)(3)(B)2.

This amendment deletes the words "as defined."

Rationale of section 2477.5(c)(3)(B)2.

This amendment is necessary to delete unneeded wording and limit redundancy. It is not necessary to specify every time a defined word is used in the regulatory text.

Purpose of section 2477.5(c)(3)(B)5.

This amendment replaces "registered in ARBER" with "reported to CARB" and updates the reference to section 2477.5 "(e)" to "(g)."

Rationale of section 2477.5(c)(3)(B)5.

These amendments are necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

Purpose of section 2477.5(c)(3)(C)

This amendment deletes the reference to section 2477.4.

Rationale of section 2477.5(c)(3)(C)

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.5(c)(3)(D)

This amendment deletes the reference to section 2477.4 and updates the reference to section 2477.5 "(h)(1)" to "(j)(1)."

Rationale of section 2477.5(c)(3)(D)

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

This amendment is also necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the requirements for the use of alternative diesel fuels has been updated.

Purpose of section 2477.5(c)(4)

This amendment updates the lettering of section 2477.5(b) to 2477.5(c)(4); adds language to specify the in-use performance standard compliance dates for MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines; and updates the reference to sections 2477.5 "(f), (g), (k), (l), or (m)" to "(m) or (n)."

Rationale of section 2477.5(c)(4)

The update to the lettering of section 2477.5(b) to 2477.5(c)(4) is necessary because items were added to section 2477.5 and in-use compliance dates were moved from section 2477.5(b) to 2477.5(c)(4) as part of changes to section 2477.5.

This amendment is also necessary to establish the in-use performance standard compliance dates for MY 2022 and older engines. The language in section 2477.5(c)(4) was moved from section 2477.5(b), except for subsections and tables with outdated information or compliance dates that have passed. MY 2022 and older engines would continue to operate under the current requirements, in which they shall meet ULETRU by December 31 of the seventh year after the engine MY. This is necessary to allow for the full useful life of units purchased to comply with the current regulation.

The update of the reference to sections 2477.5 "(f), (g), (k), (l), or (m)" to "(m) or (n)" is necessary because staff are proposing to delete provisions related to "Early Compliance with LETRU In-Use Performance Standards" in section 2477.5(f), "ULETRU Extension for Compliance by Original Compliance Date" in section 2477.5(g), and "ULETRU Extension for Compliance with LETRU" in section 2477.5(m). These provisions no longer apply because the ULETRU extension for compliance by original compliance date was available to owners that complied with the original December 31, 2008 compliance date, and all compliance dates for LETRU have passed. The update to the lettering of section 2477.5(k) to 2477.5(m) and section 2477.5(l) to 2477.5(m) is necessary because items were added to section 2477.5 and provisions related to the "Compliance Extension Based on Unavailability of Compliance Technology" and "Compliance Extension Based on Delays due to Private Financing, Equipment Manufacture Delays or Installer Delays" were moved as part of changes to section 2477.5.

Purpose of section 2477.5(c)(4)(B)

This amendment updates the reference to sections 2477.5 "(b)(1), (2), (3), and (4)" to "(c)(4)(a)."

Rationale of section 2477.5(c)(4)(B)

This amendment is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the in-use compliance dates for MY 2022 and older TRU and TRU gen set engines has been updated.

Purpose of section 2477.5(c)(4)(B)2.

This amendment replaces "apply for an ARB IDN" with "report the TRU to CARB."

Rationale of section 2477.5(c)(4)(B)2.

This amendment is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

2477.5(d) PM Emission Standard for MY 2023 and Newer TRU and TRU Gen Set Engines

Purpose of section 2477.5(d)

This amendment adds language to specify the PM emission standard requirements for MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines.

Rationale of section 2477.5(d)

This amendment is necessary because staff are proposing different requirements for MY 2022 and older versus MY 2023 and newer engines. Please see the earlier rationale of section 2477.5(c) as the changes are necessary for the same reasons.

2477.5(e) VDECS Requirements

Purpose of section 2477.5(e)

This amendment updates the lettering of section 2477.5(c) to 2477.5(e) and adds additional VDECS requirements.

Rationale of section 2477.5(e)

This amendment is necessary because items were added to section 2477.5 and the lettering of this subsection has been updated. The new language is needed to establish requirements for VDECS installation and maintenance in addition to the requirements already established for failure or damage to a VDECS. The additional VDECS requirements are necessary to ensure the VDECS is compatible with the TRU

or TRU gen set and maintained in a specific manner to ensure that TRU engine exhaust emission reductions are reduced by the required levels.

Purpose of section 2477.5(e)(3)(B)

This amendment updates the reference to paragraph "2477.5(a)(1) and 2477.5(a)(2)" to "2477.5(c)."

Rationale of section 2477.5(e)(3)(B)

This amendment is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the in-use performance standards for MY 2022 and older TRU and TRU gen set engines has been updated.

2477.5(f) In-Use Recordkeeping and Reporting

Purpose of section 2477.5(f)

This amendment deletes the provisions related to the "Early Compliance with LETRU In-Use Performance Standards" from section 2477.5(f) and updates the lettering of section 2477.5(d) to 2477.5(f).

Rationale of section 2477.5(f)

This amendment is necessary because all compliance dates for LETRU have passed. Under the current regulation, if a TRU owner brings a TRU into compliance with LETRU earlier than required, they can apply for a ULETRU compliance date extension. This only applies to TRUs that are required to first meet LETRU and then ULETRU. For each year that LETRU compliance was early, a year of delay in meeting ULETRU is granted. These provisions no longer apply.

This amendment is also necessary because items were added section to 2477.5 and the lettering of the subsection that contains the requirements for in-use recordkeeping and reporting has been updated.

Purpose of section 2477.5(f)(1)

This amendment deletes section 2477.5(f)(1) regarding operator reports, updates the numbering of section 2477.5(f)(2) to 2477.5(f)(1), adds a reference to section 2477.5(c)(3)(D), and updates the reference to section 2477.5 "(h)(1)" to "(j)(1)."

Rationale of section 2477.5(f)(1)

This amendment is necessary because staff are proposing to delete the terminal operator requirements. Please see the rationale of section 2477.2(b) on the deletion of applicability to terminal operators.

The update to the numbering of section 2477.5(f)(2) to 2477.5(f)(1) is necessary because items were deleted from section to 2477.5(f) and the lettering of this subsection has been updated.

The addition of the reference to section 2477.5(c)(3)(D) is necessary to specify that the in-use recordkeeping and reporting requirements in section 2477.5(f)(1) apply to owners that elect to comply by using a verified alternative diesel fuel in accordance with that section.

The update to the lettering of section 2477.5 "(h)(1)" to "(j)(1)" is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the requirements for the use of alternative diesel fuels has been updated.

Purpose of section 2477.5(f)(2)

This amendment updates the numbering of section 2477.5(f)(3) to 2477.5(f)(2); adds references to section 2477.5(c)(3)(A) and section (c)(3)(B); and specifies that hybrid electric TRU, electric standby-equipped TRU, or hybrid cryogenic temperature control systems used to comply with the regulation shall use an electronic tracking system that meets the requirements of section 2477.20(d).

Rationale of section 2477.5(f)(2)

The update to the numbering of section 2477.5(f)(3) to 2477.5(f)(2) is necessary because items were deleted from section to 2477.5(f) and the lettering of this subsection has been updated.

The addition of the reference to section 2477.5(c)(3)(A) and 2477.5(c)(3)(B) is necessary to specify that the electronic tracking system requirements in section 2477.20(d) apply to owners that elect to comply by using a hybrid electric TRU, electric standby-equipped TRU, or hybrid cryogenic temperature control system in accordance with that section.

The addition of the reference to section 2477.20(d) is necessary because staff are proposing to move all reporting requirements to section 2477.20. This is necessary to make the regulatory text consistent by establishing one section that contains all reporting requirements and ensuring that all information reported to CARB to comply

with the regulation is subject to the same requirements for submittal and recordkeeping and include a statement of accuracy.

Purpose of sections 2477.5(f)(2)(A) and (B)

These amendments delete sections 2477.5(f)(2)(A) and (B) in their entirety.

Rationale of section 2477.5(f)(2)(A) and (B)

These amendments are necessary because staff are proposing to move sections 2477.5(f)(2)(A) and (B) in their entirety to new section 2477.20(d) to be with the other reporting requirements in section 2477.20.

Purpose of sections 2477.5(f)(4)

This amendment deletes section 2477.5(f)(3) in its entirety.

Rationale of section 2477.5(f)(3)

This amendment is necessary because staff are proposing to move section 2477.5(f)(3) in its entirety to new section 2477.20(d) to be with the other reporting requirements in section 2477.20.

2477.5(g) TRU Reporting Requirements

Purpose of section 2477.5(g)

This amendment deletes the provisions related to the "ULETRU Extension for Compliance by Original Compliance Date" from section 2477.5(g) in its entirety and adds language to establish TRU reporting requirements. The TRU reporting requirements in section 2477.5(g) were retained from the current regulation ("ARB Identification Numbering Requirements" in section 2477.5(e)), except TRU reporting requirements apply to all TRUs that operate in California, not just those that are based in California and include additional information on the date the TRU was purchased, rented, or leased and certification that TRU owners have appraised the TRU operator of their obligations under the regulation.

Rationale of section 2477.5(g)

This amendment is necessary because the ULETRU extension for compliance by original compliance date was available to owners that complied with the original December 31, 2008 compliance date. These provisions no longer apply.

Reporting of California-based and non-California-based TRUs that operate in California and the additional reporting fields are needed to ensure robust compliance monitoring and enforcement of all TRUs operating in California. The reported data

would be used by staff to better target fleets that are not in compliance. This would help ensure better overall enforcement. Staff expect this to lead to further emission reductions from TRUs, thus leading to more health benefits to individuals living in California. This amendment is also necessary to level the playing field between TRUs based in-state and out-of-state.

Purpose of section 2477.5(g)(1)(A)

This amendment deletes section 2477.5(g)(1)(A) in its entirety.

Rationale of section 2477.5(g)(1)(A)

This amendment is necessary because staff are proposing to move section 2477.5(g)(1)(A) in its entirety to new section 2477.20(f) to be with the other reporting requirements in section 2477.20. This is needed to make the regulatory text consistent by establishing one section that contains all reporting requirements and ensuring that all information reported to CARB to comply with the regulation is subject to the same requirements for submittal and recordkeeping and include a statement of accuracy.

Purpose of section 2477.5(g)(6)

This amendment adds language to specify that the ARB IDN labeling requirements in section 2477.5(g)(6) would be superseded by TRU compliance label requirements in section 2477.5(i) beginning December 31, 2023.

Rationale of section 2477.5(g)(6)

This amendment is necessary to specify that beginning December 31, 2023, the TRU compliance label requirements would supersede the ARB IDN labeling requirements in section 2477.5(g)(6), in which owners would be required to affix a CARB-issued label to both sides of the TRU housing every three years. Compliance labels would assist both CARB enforcement staff and applicable facility staff to determine the compliance status of a TRU without having to look-up up the ARB IDN or other identifying information on CARB's website. Non-compliant TRUs would not be issued a new compliance label. This will help to ensure that non-compliant TRUs are brought into compliance in a timely manner, and achieve the emissions and health risk reductions expected under the Proposed Amendments.

2477.5(h) TRU Operating Fees

Purpose of section 2477.5(h)

This amendment adds language to establish TRU operating fee requirements.

Rationale of section 2477.5(h)

This amendment is necessary to specify who must pay TRU operating fees, when the TRU operating fees shall be paid, the fee amounts, and that TRU operating fees shall be submitted to the Executive Officer. Beginning December 31, 2023, TRU owners would be required to pay a TRU operating fee for each TRU or TRU gen set operated in California. Fees would be collected once every three years. The TRU operating fees would offset the costs to CARB as allowed by SB 854,[59] which authorizes CARB to adopt a schedule of fees to cover all or part of CARB's reasonable costs associated with certification, audit, and compliance of off-road or non-vehicular engines and equipment, aftermarket parts, and emission control components sold in the State. The fee amounts are based on the direct labor cost of staff needed to implement and enforce the amendments; indirect labor cost of management, administrative, legal, and information technology resources; and operational costs to support enforcement efforts (compliance labels, envelopes, and postage). More information on the proposed fees can be found in Appendix G.

2477.5(i) TRU Compliance Labels

Purpose of section 2477.5(i)

This amendment adds language to establish TRU compliance label requirements.

Rationale of section 2477.5(i)

This amendment is necessary to specify when TRU compliance labels will be issued, when TRU compliance label requirements will supersede the ARB IDN labeling requirements in section 2477.5(g)(6), where compliance labels shall be placed on the TRU, and that owners may use alternative unique equipment identification markings.

Beginning December 31, 2023, the TRU compliance label requirements would supersede the ARB IDN labeling requirements in section 2477.5(g)(6), in which owners would be required to affix a CARB-issued label to both sides of the TRU housing every three years. Compliance labels would assist both CARB enforcement staff and applicable facility staff to determine the compliance status of a TRU without having to look-up up the ARB IDN or other identifying information on CARB's website. Non-compliant TRUs would not be issued a new compliance label. This will help to ensure that non-compliant TRUs are brought into compliance in a timely manner and achieve the emissions and health risk reductions expected under the Proposed Amendments.

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[59] California Health and Safety Code § 43019.1, Division 26, Senate Bill No. 854, July 27, 2018. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB854)

The provision allowing the use of alternative unique equipment identification markings is necessary because some large TRU fleets and TRU gen set fleets use their own equipment numbers to help them track their equipment. In the case of TRU gen sets and refrigerated shipping containers, the numbering system meets the International Organization for Standardization (ISO) standard 6346 and is administered by the Bureau International des Containers (BIC), an international organization. BIC publishes their assigned company codes in their Intermodal Equipment Registry. Railcars use a similar equipment numbering system with company codes, called reporting marks, assigned by the Association of American Railroads (AAR). As part of the original TRU rulemaking, TRU gen set fleets and railroads requested that BIC-Codes and reporting marks be allowed in lieu of the ARB IDNs to avoid confusion, costs, duplication, and space limitations. As such, the current regulation allows the use of BIC-Codes, or reporting marks in place of ARB IDNs, provided specific requirements are met. The Proposed Amendments would retain these provisions.

2477.5(j) Fuel Requirements

Purpose of section 2477.5(j)

This amendment updates the lettering of section 2477.5(h) to 2477.5(j), updates the reference to section 2477.5 "(a)" to "(c)," deletes the reference to "ARBER," updates the reference to section 2477.5 "(e)" to "(g)," and deletes reference to section 2477.5(f) and section 2477.6.

Rationale of section 2477.5(j)

The update to the lettering of section 2477.5(h) to 2477.5(j) is necessary because items were added to and deleted from section 2477.5 and the lettering of this subsection has been updated.

The update of the reference to section 2477.5 "(a)" to "(c)" is necessary because staff are proposing new refrigerant requirements in section 2477.5(a) and in-use performance standard requirements were moved from section 2477.5(a) to 2477.5(c) as part of changes to section 2477.5.

The deletion of the reference to "ARBER" is necessary because staff are proposing to replace "ARBER" with "CARB online system."

The update of the reference to section 2477.5 "(e)" to "(g)" is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the requirements for TRU reporting has been updated.

The deletion of references to section 2477.5(f) and section 2477.6 is necessary for the same reasons described in section 2477.5(f) and section 2477.2(b).

2477.5(k) Compliance by Replacing Engines

Purpose of section 2477.5(k)

This amendment updates the lettering of section 2477.5(i) to 2477.5(k); updates the reference to section 2477.5 "(a)" to "(c);" updates the reference to section 2477.5 "(b)" to "(c)(4);" and deletes the words "see definition."

Rationale of section 2477.5(k)

The update to the lettering of section 2477.5(i) to 2477.5(k) is necessary because items were added to and deleted from section 2477.5 and the lettering of this subsection has been updated.

The update of the reference to section 2477.5 "(a)" to "(c)" is necessary because items were added to section 2477.5 and the subsection that contains the requirements for in-use performance standards has been updated.

The update of the reference to section 2477.5 "(b)" to "(c)(4)" is necessary because items were added to and deleted from section 2477.5 and the lettering of the subsection that contains the alternative technology provisions has been updated.

The deletion of the words "see definition" is necessary to delete unneeded wording and limit redundancy. It is not necessary to specify every time a defined word is used in the regulatory text.

2477.5(l) Mobile Catering Company Exemption Requirements

Purpose of section 2477.5(l)

This amendment updates the lettering of section 2477.5(j) to 2477.5(l).

Rationale of section 2477.5(l)

The update to the lettering of section 2477.5(j) to 2477.5(l) is necessary because items were added to and deleted from section 2477.5 and the lettering of this subsection has been updated.

Purpose of section 2477.5(l)(1)

This amendment replaces "in-use performance standards" with "requirements" and adds references to section 2477.5(b), (c), and (d).

Rationale of section 2477.5(l)(1)

This amendment is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b) and the in-use performance standard requirements were moved to section 2477.5(c) and 2477.5(d). The new requirements do not fall in the category of "performance standards." The changes are needed to specify that TRUs operated under the mobile catering exemption would be exempt from all the above requirements. As currently written, the exemption would only apply to the in-use standards.

Purpose of section 2477.5(l)(1)(B)

This amendment deletes the words "California-based," replaces "ARBER registration" with "TRU reporting," replaces "registered in ARBER" to "reported to CARB," and updates the reference to section 2477.5 "(e)" to "(g)."

Rationale of section 2477.5(l)(1)(B)

The deletion of the words "California-based" is necessary to specify that all TRUs operating in California under the mobile catering company exemption would be required to report to CARB under section 2477.5(g). Reporting of all TRUs operating under the mobile catering company exemption, regardless of where they are based, would allow staff to identify all TRUs operating under the exemption. This is needed to help ensure robust compliance monitoring and enforcement of all TRUs operating in California.

For the remaining changes, please see the earlier rationale of section 2477.5(c)(3)(A)(7) as the changes are the same and thus necessary for the same reasons.

Purpose of section 2477.5(l)(1)(C)

This amendment specifies that a mobile catering company shall apply for an exemption with the information required under section 2477.20(g); updates the reference to subparagraph "(j)(1)(D)7" to section "2477.5(g)(7);" and deletes the subsections containing the application requirements.

Rationale of section 2477.5(l)(1)(C)

The addition of the reference to section 2477.20(g) and the update to the reference to subparagraph "(j)(1)(D)7" to section "2477.5(g)(7) are necessary because staff are proposing to move all reporting requirements to section 2477.20. The subsection that contains the requirements for mobile catering service exemption applications has been moved to section 2477.20(g).

The deletion of the subsections containing the application requirements is necessary because staff are proposing to move these sections in their entirety to section 2477.20(i) to be with the other reporting requirements in section 2477.20.

Purpose of sections 2477.5(l)(1)(D), (E), (F), and (G)

These amendments update the lettering of section 2477.5(l)(1)(F) to 2477.5(l)(1)(D), 2477.5(l)(1)(G) to 2477.5(l)(1)(E), 2477.5(l)(1)(H) to 2477.5(l)(1)(F), and 2477.5(l)(1)(I) to 2477.5(l)(1)(G).

Rationale of sections 2477.5(l)(1)(D), (E), (F), and (G)

These amendments are necessary because items were deleted from section 2477.5(l)(1) and the lettering of these subsections has been updated.

2477.5(m) Compliance Extension Based on Unavailability of Compliance Technology

Purpose of section 2477.5(m)

This amendment deletes the provisions related to the "ULETRU Extension for Compliance with LETRU" from section 2477.5(m), updates the lettering of section 2477.5(k) to 2477.5(m), and modifies the title of the section.

Rationale of section 2477.5(m)

The deletion of provisions related to "ULETRU Extension for Compliance with LETRU" is necessary because the extension extended the compliance date for ULETRU by one year and was provided to MY 2001 and older engines that complied with LETRU by December 31, 2009; MY 2002 engines that complied with LETRU by December 31, 2009; and MY 2003 engines that complied with LETRU by December 31, 2010. All dates have passed, and the provisions no longer apply.

The update to the lettering of section 2477.5(k) to 2477.5(m) is necessary because items were added to and deleted from section 2477.5 and the lettering of this subsection has been updated.

The modification to the title of the section is necessary to specify that TRUs that are granted an extension based on unavailability of compliance technology would also be given a one-year extension to refrigerant, ZE truck TRU, and PM emission standard requirements. As currently written, the compliance extension would only apply to the in-use performance standards.

Purpose of section 2477.5(m)(1)

This amendment adds references to section 2477.5(b), (c), and (d); specifies that a TRU owner shall apply for a compliance exemption based on unavailability of compliance technology with the information required under section 2477.20(h); and deletes subsections (1) through (6) in their entirety.

Rationale of section 2477.5(m)(1)

This addition of the references to section 2477.5(b), (c), and (d) is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b), new PM emission standard requirements in section 2477.5(d), and the in-use performance standard requirements were moved to section 2477.5(c). The changes are needed to specify that TRUs that are granted an extension based on unavailability of compliance technology would be given a one-year extension to the compliance deadline for all the above requirements. As currently written, the compliance extension would only apply to the in-use standards.

The addition of the reference to section 2477.20(h) is necessary because staff are proposing to move all reporting requirements to section 2477.20. The subsection that contains the requirements for applications for a compliance exemption based on unavailability of compliance technology has been moved to section 2477.20(h).

The deletion of subsections (1) through (6) is necessary because staff are proposing to move these sections in their entirety to section 2477.20(h) to be with the other reporting requirements in section 2477.20.

2477.5(n) Compliance Extension Based on Delays Due to Private Financing, Equipment Manufacture Delays, or Installer Delays

Purpose of section 2477.5(n)

This amendment updates the lettering of section 2477.5(l) to 2477.5(n) and modifies the title of the section.

Rationale of section 2477.5(n)

The update to the lettering of section 2477.5(l) to 2477.5(n) is necessary because items were added to and deleted from section 2477.5 and the lettering of this subsection has been updated.

The modification to the title of the section is necessary to specify that TRUs that are granted an extension based on delays due to private financing, equipment manufacture delays, or installer delays would also be given a four-month extension to refrigerant, ZE truck TRU, and PM emission standard requirements. As currently

written, the compliance extension would only apply to the in-use performance standards.

Purpose of section 2477.5(n)(1)

This amendment deletes reference to in-use performance standards in section 2477.5(b) and adds references to section 2477.5(a), (b), (c), and (d).

Rationale of section 2477.5(n)(1)

This amendment is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b), new PM emissions standard requirements in 2477.5(d), and the in-use performance standard requirements were moved to section 2477.5(c). The changes are needed to specify that TRUs that are granted an extension based delays due to private financing, equipment manufacture delays, or installer delays would be given a four-month extension to the compliance deadlines for all the above requirements.

For the remaining changes, please see the earlier rationale of section 2477.5(c)(3)(A)(7) as the changes are the same and thus necessary for the same reasons.

Purpose of section 2477.5(n)(1)(B)

This amendment replaces "registered in ARBER" with "reported to CARB as required under section 2477.5(g)."

Rationale of section 2477.5(n(1)(B)

This amendment is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

Purpose of section 2477.5(n)(1)(C)

This amendment specifies that a TRU owner shall apply for a compliance exemption based on delays due to private financing, equipment manufacture delays, or installer delays with the information required under section 2477.20(i); and deletes the subsections containing the application requirements.

Rationale of section 2477.5(n)(1)(C)

The addition of the reference to section 2477.20(i) is necessary because staff are proposing to move all reporting requirements to section 2477.20. The subsection that contains the requirements for applications for a compliance exemption based on

delays due to private financing, equipment manufacture delays, or installer delays has been moved to section 2477.20(i).

The deletion of the subsections containing the application requirements is necessary because staff are proposing to move these sections in their entirety to section 2477.20(i) to be with the other reporting requirements in section 2477.20.

2477.5(o) Compliance Extension Based on Delays Due to Installation of Zero-Emission Fueling Infrastructure

Purpose of section 2477.5(o)

This amendment adds language to provide TRU owners a compliance extension for the ZE truck TRU requirements in section 2477.5(b) due to unforeseen, temporary, or extenuating circumstances outside of the owner's control that prevents the installation of ZE fueling infrastructure. This includes delays in the manufacture and shipment of infrastructure equipment, obtaining construction permit(s), obtaining power from a utility, private financing, installation of infrastructure, or due to a natural disaster or discovery of archeological, historical, or tribal cultural resources under CEQA.

Rationale of section 2477.5(o)

This amendment is necessary to establish the process TRU owners shall follow to apply for the compliance extension, including what situations may qualify for the extension, and the type of documentation is required. The compliance extension is necessary to provide flexibility to TRU owners for compliance deadlines because, for reasons that are beyond their control, the owner is unable to install necessary ZE fueling infrastructure to support required ZE truck TRUs by the compliance date.

2477.5(p) Safe Passage for Noncompliant Equipment Traveling in California

Purpose of section 2477.5(p)

This amendment updates the lettering of section 2477.5(n) to 2477.5(p).

Rationale of section 2477.5(p)

This amendment is necessary because items were added to and deleted from section 2477.5 and the lettering of this subsection has been updated.

Purpose of section 2477.5(p)(1)(B)

This amendment deletes provisions related to units that must comply with both the LETRU and ULETRU in-use standards, and makes other non-substantive changes for grammar.

Rationale of section 2477.5(p)(1)(B)

This amendment is necessary because all compliance dates for LETRU have passed and these provisions no longer apply.

Purpose of section 2477.5(p)(1)(E)

This amendment specifies that a TRU owner shall apply for a safe passage with the information required under section 2477.20(j); and deletes the subsections containing the application requirements.

Rationale of section 2477.5(p)(1)(E)

The addition of the reference to section 2477.20(j) is necessary because staff are proposing to move all reporting requirements to section 2477.20. The subsection that contains the requirements for applications for a safe passage permit has been moved to section 2477.20(j).

The deletion of the subsections containing the application requirements is necessary because staff are proposing to move these sections in their entirety to section 2477.20(j) to be with the other reporting requirements in section 2477.20.

Purpose of sections 2477.5(p)(1)(F), (G), (H), and (I)

These amendments update the lettering of section 2477.5(p)(1)(G) to 2477.5(p)(1)(F), 2477.5(p)(1)(H) to 2477.5(p)(1)(G), 2477.5(p)(1)(I) to 2477.5(p)(1)(H), and 2477.5(p)(1)(J) to 2477.5(p)(1)(I).

Rationale of section 2477.5(p)(1)(F), (G), (H), and (I)

These amendments are necessary because items were deleted from section 2477.5(p)(1) and the lettering of these subsections has been updated.

F. Section 2477.6 – Requirements for Vehicle Owners

Purpose of section 2477.6

This amendment deletes terminal operator requirements from section 2477.6 in its entirety and adds language to establish requirements for vehicle owners.

Rationale of section 2477.6

Please see the earlier rationale of section 2477.2(b) as the changes are necessary for the same reasons.

G. Section 2477.7 – Requirements for Drivers

Purpose of section 2477.7

This amendment adds references to section 2477.5 (b), (c), and (d) and adds language requiring drivers to allow CARB enforcement staff to conduct a visual inspection of TRUs.

Rationale of section 2477.7

The addition to the references to section 2477.5 (b), (c), and (d) is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b), and in-use performance standard requirements were moved from section 2477.5(a) to 2477.5(c) and (d) as part of changes to section 2477.5. Truck drivers would be required to only operate TRU-equipped trucks or tractor-trailers equipped with a TRU or TRU gen set that are compliant with all the above requirements.

The addition of language requiring drivers to allow CARB enforcement staff to conduct a visual inspection of TRUs is necessary to enable staff to inspect TRUs to determine whether emission control components have been tampered with, inadequately maintained, or are defective. Robust compliance monitoring and enforcement is needed to ensure emission reductions are achieved as expected.

H. Section 2477.8 – Requirements for Freight Brokers and Freight Forwarders

Purpose of section 2477.8

This amendment adds references to section 2477.5 (b), (c), and (d).

Rationale of section 2477.8

The addition to the references to section 2477.5 (b), (c), and (d) is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b), and in-use performance standard requirements were moved from section 2477.5(a) to 2477.5(c) and (d) as part of changes to section 2477.5. Freight brokers and freight forwarders would be required to only arrange, hire, contract for, or dispatch TRU-equipped trucks, trailers, shipping containers, and railcars or TRU gen sets that are compliant with all the above requirements.

I. Section 2477.9 – Requirements for Motor Carriers

Purpose of section 2477.9(b)

This amendment deletes subsection 2477.9(b).

Rationale of section 2477.9(b)

This amendment is necessary because staff are proposing to delete the terminal operator requirements. Please see the rationale of section 2477.2(b) on the deletion of applicability to terminal operators.

J. Section 2477.10 – Requirements for Shippers

Purpose of section 2477.10

This amendment deletes the words "California-based," adds references to section 2477.5 "(b), (c), and (d)," and makes other non-substantive changes for grammar.

Rationale of section 2477.10

The deletion of the words "California-based" is necessary to specify that the shipper requirements apply to any shipper that arranges, tenders contracts for, or dispatches the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in the State of California, regardless of whether the shipper is based in California. Please see the earlier rationale of section 2477.2(f) and (g).

The addition of the references to section 2477.5 "(b), (c), and (d)" is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b), and in-use performance standard requirements were moved from section 2477.5(a) to 2477.5(c) and (d) as part of changes to section 2477.5. Shippers would be required to only arrange, tender contracts for, or dispatch the transport of perishable goods in TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars compliant with all the above requirements.

K. Section 2477.11 – Requirements for Receivers

Purpose of section 2477.11

This amendment deletes the words "California-based," adds references to section 2477.5 "(b), (c), and (d)," and makes other non-substantive changes for grammar.

Rationale of section 2477.11

The deletion of the words "California-based" is necessary to specify that the receiver requirements apply to any receiver that arranges, tenders contracts for, or dispatches the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in the State of California, regardless of whether the receiver is based in California. Please see the earlier rationale of section 2477.2(f) and (g).

The addition of the references to section 2477.5 "(b), (c), and (d)" is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b), and in-use performance standard requirements were moved from section 2477.5(a) to 2477.5(c) and (d) as part of changes to section 2477.5. Receivers would be required to only arrange, tender contracts for, or dispatch the transport of perishable goods in TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars compliant with all the above requirements.

L. Section 2477.12 – Requirements for Lessors and Lessees

Purpose of section 2477.12(a)(1)(A)

This amendment deletes references to ARBER registration, updates the reference to section 2477.5 "(e)" to "(g), (h), and (i)," and adds language to allow lessors to delegate TRU reporting, TRU operating fee, and TRU compliance label requirements to the lessee.

Rationale of section 2477.12(a)(1)(A)

Please see the earlier rationale of section 2477.5(c)(3)(A)7. on the deletion of references to ARBER registration.

The remaining changes are necessary because staff are proposing to replace the ARB IDN requirements in section 2477.5(e) with TRU reporting requirements in section 2477.5(g), add TRU operating fee requirements in section 2477.5(h), and add TRU compliance label requirements in section 2477.5(i). The proposed changes specify that lessors may delegate the above administrative requirements to the lessee if certain requirements are met.

Purpose of section 2477.12(a)(1)(A)2.

This amendment specifies that the lessor shall submit third party agreement information as required under section 2477.20(k); replaces "applying for an IDN" with "reporting the TRU or TRU gen set to CARB;" and deletes the subsections containing the required third-party agreement confirmation information.

Rationale of section 2477.12(a)(1)(A)2.

The addition of the reference to section 2477.20(k) is necessary because staff are proposing to move all reporting requirements to section 2477.20. The subsection that contains the requirements for third-party agreement confirmation information has been moved to section 2477.20(k).

The replacement of "applying for an IDN" with "reporting the TRU or TRU gen set to CARB" is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

The deletion of the subsections containing required third-party agreement confirmation information is necessary because staff are proposing to move these sections in their entirety to section 2477.20(k) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.12(a)(1)(B)

This amendment deletes reference to in-use standards; updates the reference to section 2477.5 "(a)" to "(a), (b), (c), and (d);" deletes the reference to section 2477.4; and makes other non-substantive changes for grammar.

Rationale of section 2477.12(a)(1)(B)

This amendment is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b) and the in-use performance standard requirements were moved to section 2477.5(c) and 2477.5(d). The new requirements do not fall in the category of "performance standards." The changes are needed to specify that an owner may not delegate responsibility of all the above requirements to the lessee.

This amendment is also necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.12(a)(2)

This amendment deletes section 2477.12(a)(2).

Rationale of section 2477.12(a)(2)

This amendment is necessary because staff are proposing to delete the terminal operator requirements. Please see the rationale of section 2477.2(b) on the deletion of applicability to terminal operators.

Purpose of section 2477.12(b)(1)

This amendment deletes section 2477.12(b)(1), updates the numbering of section 2477.12(b)(2) to 2477.12(b)(1), deletes references to ARBER registration, updates the reference to section 2477.5 "(e)" to "(g), (h), and (i)," and updates the reference to subparagraph 2477.5 "(e)(1)(F)" to "(g)(6)."

Rationale of section 2477.12(b)(1)

This amendment is necessary because staff are proposing to delete the terminal operator requirements. Please see the rationale of section 2477.2(b) on the deletion of applicability to terminal operators.

The update to the numbering of section 2477.12(b)(2) to 2477.12(b)(1) is necessary because section 2477.12(a)(1) was deleted and the numbering of this subsection has been updated.

Please see the earlier rationale of section 2477.5(c)(3)(A)(7) on the deletion of references to ARBER registration.

Please see the earlier rationale of section 2477.12 on the update of the reference to section 2477.5 "(e)" to "(g), (h), and (i)."

The update to the updates the reference to subparagraph 2477.5 "(e)(1)(F)" to "(g)(6)" is necessary because staff are proposing to replace the ARB IDN requirements in section 2477.5(e) with TRU reporting requirements in section 2477.5(g) and the subsection that contains the CARB IDN labeling requirements has been updated.

M. Section 2477.13 – Requirements for TRU, TRU Gen Set, and ZE Truck TRU Original Equipment Manufacturers

Purpose of section 2477.13

This amendment adds "ZE truck TRU" to the title of the section.

Rationale of section 2477.13

This amendment is necessary to specify that the TRU OEM requirements in section 2477.13 also apply to OEMs that direct ZE truck TRUs sales to the California market. As defined, a TRU is a refrigeration system powered by an integral internal combustion

engine. Thus, the OEM requirements would not apply to ZE truck TRU OEMs because ZE truck TRUs do not have a diesel-powered engine. Staff are proposing to require ZE Truck TRU OEMs to report the same information to CARB that is currently required for TRU and TRU gen set OEMs. This will enable staff to verify information reported by TRU owners on the ZE truck TRUs used to comply with section 2477.5(b).

Purpose of section 2477.13(a)

This amendment deletes section 2477.13(a) in its entirety and establishes refrigerant requirements for OEMs. Beginning December 31, 2022, OEMs would be required to only manufacture truck TRUs, trailer TRUs, and DSC TRUs for sale or use in California that use refrigerant with a GWP value less than or equal to 2,200 or use no refrigerant at all. This amendment also establishes refrigerant label requirements for OEMs.

Rationale of section 2477.13(a)

The deletion of section 2477.13(a) is necessary because staff are proposing to delete provisions related to flexibility engines. A flexibility engine is an engine installed in new equipment by an OEM under the Transitional Program for Equipment Manufacturers in accordance with title 40, Code of Federal Regulations, sections 89.102 and 1039.625, and title 13, CCR, section 2423(d). The flexibility rules allow pre-approved OEMs to use previous-tier engines in lieu of Tier 4i or Tier 4 final engines for up to a seven-year phase-in period. The Tier 4i and Tier 4 final engine standards went into effect in 2008 and 2013, respectively. Therefore, the phase-in period ended, and these provisions no longer apply.

The OEM refrigerant requirements are necessary to ensure that only compliant truck TRUs, trailer TRUs, and DSC TRUs are manufactured for sale or use in California. Please see the earlier rationale of section 2477.5(a) on the addition of refrigerant requirements. The refrigerant labeling requirements are necessary to ensure units are labeled properly to enable TRU owners and CARB enforcement staff to easily identify whether a given unit is compliant for use in California. Proper labeling is also needed to ensure TRU owners recharge their unit with the correct refrigerant type when doing routine maintenance.

Purpose of section 2477.13(b)

This amendment establishes ZE truck TRU requirements for OEMs. Beginning December 31, 2023, OEMs would be required to only manufacture truck TRUs for sale or use in California that meet the definition of a ZE truck TRU.

Rationale of section 2477.13(b)

This amendment is necessary to ensure that only compliant truck TRUs are manufactured for sale or use in California and that there are sufficient ZE truck TRUs available in the market to enable owners to operate compliant fleets. Please see the earlier rationale of section 2477.5(b) on the addition of ZE truck TRU requirements.

Purpose of section 2477.13(c)

This amendment establishes performance standard requirements for OEMs. Beginning May 31, 2023, OEMs would be required to only manufacture trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets for sale or use in California that are equipped with an engine that meets the PM emission standard set forth in section 2477.5(d).

Rationale of section 2477.13(c)

This amendment is necessary to ensure that only compliant trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets are manufactured for sale or use in California. Please see the earlier rationale of section 2477.5(d) on the PM emission standard requirements. The May 31, 2023 date provides OEMs sufficient time to use leftover stock of MY 2022 TRU engines that are not required to meet the PM emission standard.

Purpose of section 2477.13(d)

This amendment updates the lettering of section 2477.13(b) to 2422.13(d), and deletes provisions related to current and prior production reports.

Rationale of section 2477.13(d)

This amendment is necessary because items were added to section 2477.13 and the lettering of this subsection has been updated.

The deletion of provisions related to current and prior production reports is necessary to lessen the burden on OEMs to comply with reporting requirements. As currently written, OEMs are required to report unit and engine data for the coming production year and prior production years, as well as provide monthly production reports. Staff are proposing to delete the requirements for current and prior production reports, so that OEMs would only be required to submit monthly production reports.

Purpose of section 2477.13(d)(1)

This amendment updates the numbering and lettering of section 2477.13(b)(2)(B) to 2477.13(d)(1); changes the monthly production report due date from the 15th of each calendar month to the end of the second business day of each month, updates the

reference to section "2477.13 (b)(2)(C)" to "2477.20(l)," and deletes the subsections containing the required monthly production report information.

Rationale of section 2477.13(d)(1)

The update to the numbering and lettering of section 2477.13(b)(2)(B)(1) to 2477.13(d)(1)(A) is necessary because items were added to section 2477.13 and the numbering and lettering of this subsection has been updated.

The change to the monthly production report due date was made in response to a request from an OEM since the 15th of each calendar month does not always fall on a business day.

The update of the reference to section "2477.13 (b)(2)(C)" to "2477.20(l)" is necessary because necessary because staff are proposing to move all reporting requirements to section 2477.20. The subsection that contains the monthly production report requirements has been updated.

The deletion of the subsections containing the required monthly production report information is necessary because staff are proposing to move these sections in their entirety to section 2477.20(l) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.13(d)(2)

This amendment updates the numbering and lettering of section 2477.13(b)(3) to 2477.13(d)(2), deletes the words "current and prior," adds the word "specific," and makes other non-substantive changes for grammar.

Rationale of section 2477.13(d)(2)

The update to the numbering and lettering of section 2477.13(b)(3) to 2477.13(d)(2) is necessary because items were added to section 2477.13 and the numbering and lettering of this subsection has been updated.

The addition of the word "specific" is needed to allow OEMs to designate specific information submitted in the production report as confidential or trade secret. As currently written, OEMs could only designate the entire production report as confidential or trade secret.

Purpose of section 2477.13(e) and (e)(1)

This amendment updates the lettering of section 2477.13(c) to 2477.13(e); adds "ZE truck TRUs;" deletes references to "ARBER;" updates the references to section 2477.5 "(e)" to "(g)," and deletes the references to section 2477.4.

Rationale of section 2477.13(e) and (e)(1)

The update to the lettering of section 2477.13(c) to 2477.13(e) is necessary because items were added to section 2477.13 and the numbering and lettering of this subsection has been updated.

The addition of "ZE truck TRU" is necessary to specify that OEMs would be required to provide a registration document for each new ZE truck TRU, which is already required for new TRUs and TRU gen sets. The registration document provides the owner or owner/operator the necessary unit information to report the ZE truck TRU to CARB as required in section 2477.5(g).

The deletion of references to "ARBER" and the update of the references to section 2477.5 "(e)" to "(g)" are necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

The deletion of the reference to section 2477.4 is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.13(e)(2)

This amendment adds "ZE truck TRU;" deletes references to "ARBER;" updates the reference to section 2477.5 "(e)" to "(g)," and deletes the reference to section 2477.4.

Rationale of section 2477.13(e)(2)

The addition of "ZE truck TRU" is necessary to specify that OEMs would be required to provide a registration document for each new ZE truck TRU, which is already required for new TRUs and TRU gen sets. The registration document provides the owner or owner/operator the necessary unit information to report the ZE truck TRU to CARB as required in section 2477.5(g).

The update of the reference to section 2477.5 "(e)" to "(g)" is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

The deletion of the reference to section 2477.4 is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.13(e)(2)(D)

This amendment updates the references of section 2477.13 "(c)(2)(A), (B), and (C)" to "(e)(2)(A), (B), and (C)."

Rationale of section 2477.13(e)(2)(D)

This amendment is necessary because items were added to section 2477.13 and the lettering of the subsection that contains requirements for the OEM registration information document required for new TRU, TRU gen set, or ZE truck TRUs has been updated.

Purpose of section 2477.13(e)(3)

This amendment replaces "register in ARBER" with "report to CARB;" updates the reference to section 2477.5 "(e)" to "(g);" updates the reference to section "2477.5(e)(1)(A)4." to "2477.20(f)(4);" and updates the references of section 2477.13 "(c)(3)(A), (B), and (C)" to "(e)(3)(A), (B), and (C)."

Rationale of section 2477.13(e)(3)

The replacement of "register in ARBER" with "report to CARB" and the update of the reference to section 2477.5 "(e)" to "(g)" are necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g).

The update of the reference to section "2477.5(e)(1)(A)4." to "2477.20(f)(4)" is necessary because staff are proposing to move TRU reporting information to new section 2477.20(f) to be with the other reporting requirements in section 2477.20. The subsection that contains the TRU reporting requirements related to unit information has been updated.

The update of the reference to section 2477.13 "(c)(3)(A), (B), and (C)" to "(e)(3)(A), (B), and (C)" is necessary because items were added to section 2477.13 and the lettering of the subsection that contains requirements for the OEM registration information

Purpose of section 2477.13(f)

This amendment updates the lettering of section 2477.13(d) to 2477.13(f).

Rationale of section 2477.13(f)

The update to the lettering of section 2477.13(d) to 2477.13(f) is necessary because items were added to section 2477.13 and the lettering of this subsection has been updated.

N. Section 2477.14 – Requirements for TRU, TRU Gen Set, and TRU-Equipped Truck and Trailer Dealers

Purpose of section 2477.14(a)

This amendment adds "ZE truck TRU."

Rationale of section 2477.14(a)

The addition of "ZE truck TRU" is necessary to specify that dealers would be required to provide the registration document provided by the TRU OEM to the ultimate purchaser of a new ZE truck TRU, which is already required for new TRUs and TRU gen sets. The registration document provides the owner or owner/operator the necessary unit information to report the ZE truck TRU to CARB as required in section 2477.5(g).

Purpose of section 2477.14(a)(1) and (2)

This amendment updates the reference to section "2477.13(c)(2)(D) or 2477.13(c)(3)(D)" to section "2477.13(e)(2)(D) or (e)(3)(D);" adds "ZE truck TRU;" and updates the reference to section 2477.5 "(e)" to "(g)."

Rationale of section 2477.14(a)(1) and (2)

The update of the reference to section "2477.13(c)(2)(D) or 2477.13(c)(3)(D)" to section "2477.13(d)(2)(D) or (d)(3)(D)" is necessary because items were added to section 2477.13 and the lettering of the subsection that contains the OEM reporting requirements has been updated.

The addition of "ZE truck TRU" is necessary to specify that dealers would be required to provide the registration document provided by the TRU OEM to the ultimate purchaser of a new ZE truck TRU, which is already required for new TRUs and TRU gen sets. The registration document provides the owner or owner/operator the necessary unit information to report the ZE truck TRU to CARB as required in section 2477.5(g).

The update of the reference to section 2477.5 "(e)" to "(g)" is necessary because the TRU reporting requirements were moved from section 2477.5(e) to 2477.5(g) as part of changes to section 2477.5.

Purpose of section 2477.14(a)(3)

This amendment replaces "register in ARBER" with "report to CARB," and updates the reference to section "2477.5(e)(1)(A)7" to "2477.20(f)(7)."

Rationale of section 2477.14(a)(3)

This amendment is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). The update of the reference to section "2477.5(e)(1)(A)7" to "2477.20(f)(7)" is necessary because staff are proposing to move TRU reporting information to new section 2477.20(f) to be with the other reporting requirements in section 2477.20. The subsection that contains the TRU reporting requirements related to TRU engine information has been updated.

Purpose of section 2477.14(a)(4)

This amendment deletes section 2477.14(a)(4) which requires dealers to notify ultimate purchasers of TRUs or TRU gen sets equipped with a flexibility engine of the written disclosures provided by the OEM and provide the disclosures to the ultimate purchaser prior to sale.

Rationale of section 2477.14(a)(4)

Please see the earlier rationale of section 2477.13(a) as this amendment is necessary for the same reasons.

Purpose of section 2477.14(b)

This amendment replaces "in-use performance standard" with "requirements," and adds section 2477.5 "(b), (c), (d), and (g)."

Rationale of section 2477.14(b)

This amendment is necessary because staff are proposing new ZE truck TRU requirements in section 2477.5(b) and in-use performance standard requirements were moved from section 2477.5(a) to 2477.5(c) and (d) as part of changes to section 2477.5. In addition, the ARB IDN requirements in section 2477.5(e) were moved to section 2477.5(g) as part of changes to section 2477.5.

O. Section 2477.15 – Requirements for Repair Shops Located in California that Work on TRUs or TRU Gen Sets

Purpose of section 2477.15(a)(1) and (2)

This amendment replaces "register in ARBER" with "report to CARB," and updates the reference to section "2477.5(e)(1)(A)7" to "2477.20(f)(7)."

Rationale of section 2477.15(a)(1) and (2)

Please see the earlier rationale of section 2477.14(a)(3) as the changes are the same and thus necessary for the same reasons.

Purpose of section 2477.15(a)(3)

This amendment replaces "register in ARBER" with "report to CARB," and updates the reference to section "2477.5(e)(1)(A)4" to "2477.20(f)(4)."

Rationale of section 2477.15(a)(3)

This amendment is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). The update of the reference to section "2477.5(e)(1)(A)4" to "2477.20(f)(4)" is necessary because items were added and the numbering and lettering of the subsection that contains the TRU reporting requirements related to unit information has been updated.

P. Section 2477.16 – Requirements for Engine Rebuilders

Purpose of section 2477.16(a)

This amendment updates the reference to section 2477.5 "(a)" to "(c)."

Rationale of section 2477.16(a)

This amendment is necessary because items were added to section 2477.5. The subsection that contains the requirements for in-use performance standards has been updated.

Purpose of section 2477.16(b)(4)(A)

This amendment deletes the reference to section 2477.4.

Rationale of section 2477.16(b)(4)(A)

This amendment is necessary to delete unneeded wording and limit redundancy. It is inherent that the definitions are in section 2477.4 and not necessary to reference as such every time a defined word is used in the regulatory text.

Purpose of section 2477.16(e)(1) and (2)

This amendment replaces "register in ARBER" with "report to CARB;" updates the reference to section "2477.5(e)(1)(A)7." to "2477.20(f)(7);" and updates the reference to section "2477.5(e)(1)(A)4 and 5" to "2477.20(f)(4) and (5)."

Rationale of section 2477.16(e)(1) and (2)

The replacement of "register in ARBER" with "report to CARB" is necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g). Please see the rationale of section 2477.5(g) on the addition of TRU reporting requirements.

The update of the reference to section "2477.5(e)(1)(A)7" to "2477.20(f)(7)" and the update to the reference to section "2477.5(e)(1)(A)4 and 5" to "2477.20(f)(4) and (5)" are necessary because staff are proposing to move TRU reporting information to new section 2477.20(f) to be with the other reporting requirements in section 2477.20. The subsections that contain the TRU reporting requirements related to unit, other TRU identifying numbers, and TRU engine information have been updated.

Q. Section 2477.17 – Requirements for Applicable Facility Owners or Applicable Facility Owner/Operators

Purpose of section 2477.17

This amendment updates the title of section 2477.17.

Rationale of section 2477.17

This amendment is necessary to specify that the requirements in section 2477.17 apply to owners or owner/operators of an applicable facility. Staff are proposing to delete the facility reporting requirements and add requirements for owners or owner/operators of applicable facilities.

Purpose of section 2477.17(a)

This amendment changes the compliance date for initial registration to December 31, 2023, deletes reporting fields that no longer apply, and adds reporting fields on applicable facility type, building size, rental or lease status, and ZE fuel provided.

Rationale of section 2477.17(a)

This amendment is necessary to inform applicable facility owners or owner/operators of the registration requirements in the Proposed Amendments and give the due date for facilities to register with CARB. The compliance date was changed because the reporting date in the current regulation has passed. Staff anticipate the Proposed Amendments to become effective at the end of 2022. The December 31, 2023 date provides staff sufficient time to conduct outreach prior to implementation. The additional reporting fields are necessary to collect data relevant to applicable facilities.

The facility information will be used by staff to monitor compliance and the ZE fuel information will help CARB to monitor the installation of infrastructure to support ZE TRUs and support the development of the Part 2 regulation to transition trailer TRUs and the remaining TRU categories to ZE technology.

Purpose of section 2477.17(a)(8) and (9)

This amendment updates the numbering of section 2477.17(a)(10) and (11) to 2477.17(a)(8) and (9), changes the reporting year from 2005 to 2022, and deletes the reference to subparagraph "(f)(2)(B)2."

Rationale of section 2477.17(a)(8) and (9)

The update to the numbering of section 2477.17(a)(10) and (11) to 2477.17(a)(8) and (9) is necessary because items were deleted from section 2477.17 and the lettering of these sections has been updated.

The changes to the reporting year from 2005 to 2022 is necessary because the current date has already passed and staff need data that is recent and relevant. The data collected will help to inform the development of the Part 2 regulation to transition trailer TRUs and the remaining TRU categories to ZE technology.

The deletion of the reference to subparagraph "(f)(2)(B)2." is necessary to correct an error because section 2477.17(f)(2)(B)2. does not exist in the current regulation.

Purpose of section 2477.17(b) and (c)

This amendment adds language to require applicable facilities to report any changes to the submitted facility information within 30 days of the changes, and any applicable facility that begins operations after December 31, 2023 to report facility information to CARB within 30 days.

Rationale of section 2477.17(b) and (c)

This amendment is necessary to ensure applicable facility information is accurate and that CARB is informed of any new applicable facilities subject to the Proposed Amendments.

Purpose of section 2477.17(d)

This amendment adds language to establish applicable facility registration fee requirements.

Rationale of section 2477.17(d)

Please see the earlier rationale of section 2477.5(h) as the changes are the same and thus necessary for the same reasons.

Purpose of section 2477.17(e)

This amendment establishes two facility reporting options for an applicable facility. An applicable facility may change their selected option by notifying CARB by September 30 of the preceding calendar year.

Rationale of section 2477.17(e)

This amendment is necessary to inform applicable facilities of the two reporting options and how to change their selected reporting option. The Proposed Amendments provide two reporting options to provide flexibility to applicable facilities and allow them to choose the option that works best for their business operations. TRU emissions are generated at applicable facilities and impact communities surrounding them. Therefore, applicable facility owners and operators should bear some responsibility for ensuring TRUs operating on their properties are compliant with emissions requirements. This amendment would also allow an applicable facility to change their designated reporting option.

Purpose of section 2477.17(e)(1)

This amendment establishes reporting option 1, in which an applicable facility may choose to report all TRUs that operate on applicable facility property to CARB.

Rationale of section 2477.17(e)(1)

This amendment is necessary to specify that applicable facilities that choose reporting option 1 would be required to collect information required under section 2477.20(m) for any TRU that operates inside the facility fence line or property boundary. The collected information will enable staff to identify non-compliant TRUs operating in California and bring them into compliance.

Purpose of section 2477.17(e)(1)(B)

This amendment establishes the date applicable facility owners or applicable facility owner/operators would be required to begin reporting information collected in section 2477.17(e)(1)(A) to CARB and the schedule of when this information is to be reported.

Rationale of section 2477.17(e)(1)(B)

This amendment is necessary for applicable facility owners or applicable facility owner/operators to know when the information collected in section 2477.17(e)(1)(A) needs to be submitted to CARB.

Purpose of section 2477.17(e)(1)(C)

This amendment establishes that applicable facility owners or applicable facility owner/operators are responsible for reporting all TRUs operating inside their fence line or property boundary and any non-reported TRUs found operating by CARB may result in penalties.

Rationale of section 2477.17(e)(1)(C)

This amendment is necessary to ensure applicable facility owners or applicable facility owner/operators know that they are liable for TRU compliance on their property and to inform them of the consequences if non-reported TRUs are found to be operating on their property.

Purpose of section 2477.17(e)(1)(D)

This amendment adds language to specify that an applicable facility owner or applicable facility owner/operator may designate specific report information as confidential or trade secret.

Rationale of section 2477.17(e)(1)(D)

This amendment is necessary to protect reported TRU activity at an applicable facility that is considered confidential or trade secret but necessary for CARB staff to determine facility compliance, identify non-compliant TRUs operating in California, and bring them into compliance.

Purpose of section 2477.17(e)(2)

This amendment establishes reporting option 2, in which an applicable facility may choose to provide a declaration to CARB, under penalty of perjury, that non-compliant TRUs subject to this regulation will not be permitted to operate on their property. This amendment also establishes the penalties and liabilities an applicable facility owner or applicable facility owner/operator is subject to if CARB finds non-compliant TRUs operating within the applicable facility fence line or property boundary.

Rationale of section 2477.17(e)(2)

This amendment is necessary to inform readers of what is required if an applicable facility chooses option 2. Not allowing non-compliant TRUs to operate at an applicable

facility incentivizes TRU owners to comply and achieves immediate emission reductions in impacted communities. This amendment is also necessary to ensure applicable facility owners and applicable facility owner/operators know that they are liable for TRU compliance on their property.

Purpose of section 2477.17(f)

This amendment updates the lettering of section 2477.17(b) to 2477.17(f).

Rationale of section 2477.17(f)

This amendment is necessary because items were added to section 2477.17 and the lettering of this subsection has been updated.

Purpose of section 2477.17(f)(1)

This amendment deletes section 2477.17(f)(1), updates the numbering of section 2477.17(b)(2) to 2477.17(f)(1), and deletes the subsections that contain the recordkeeping and facility report submittal requirements.

Rationale of section 2477.17(f)(1)

The update to the numbering of section 2477.17(b)(2) to 2477.17(f)(1) is necessary because items were added to section 2477.17 and the lettering of this subsection has been updated.

The remaining changes are necessary because staff are proposing to move facility reporting and recordkeeping requirements to new sections 2477.20(a) and 2477.20(b), respectively, to be with the other reporting requirements in section 2477.20. Establishing one section that contains all the reporting requirements will make the regulatory text consistent and ensure that all information reported to CARB to comply with the regulation is subject to the same requirements for submittal and recordkeeping and include a statement of accuracy.

R. Section 2477.18 – Prohibitions

Purpose of section 2477.18(a) and (b)

This amendment deletes the word "performance" and adds references to the requirements in section 2477.5 "(b), (c), and (d)," and replaces "registered in ARBER" with "reported to CARB."

Rationale of section 2477.18(a) and (b)

This amendment is necessary because staff are proposing new refrigerant requirements in section 2477.5(a), new ZE truck TRU requirements in section 2477.5(b)

and the in-use performance standard requirements were moved to section 2477.5(c) and 2477.5(d). The new requirements do not fall in the category of "performance standards." The changes are needed to prohibit the selling, renting, or leasing of TRUs that do not meet all the above requirements. As currently written, the prohibition would only apply to TRUs that do not meet the in-use standards.

This amendment is also necessary because staff are proposing to delete the ARB IDN requirements in section 2477.5(e) that require ARBER registration and add TRU reporting requirements in section 2477.5(g).

Purpose of section 2477.18(b)(2)

This amendment updates the reference to section 2477.5 "(a)(3)" to "(c)(3)."

Rationale of section 2477.18(b)(2)

This amendment is necessary because items were added to section 2477.5 and the section that contains the alternative technology provisions has been updated.

Purpose of section 2477.18(c)

This amendment deletes the word "performance" and adds references to the requirements in section 2477.5 "(b), (c), and (d)."

Rationale of section 2477.18(c)

Please see the earlier rationale of section 2477.18(a) and (b) as the changes are the same and thus necessary for the same reasons.

S. Section 2477.19 – Non-compliance and Penalties

Purpose of section 2477.19

This amendment adds "Non-compliance" to the title of the section.

Rationale of section 2477.19

This amendment is necessary because staff are proposing to add section 2477.19(a)(1), which establishes liability for non-compliance.

Purpose of section 2477.19(a)(1)

This amendment adds language to establish liability for non-compliance.

Rationale of section 2477.19(a)(1)

This section is necessary to establish liability for non-compliance to the owner of a TRU or applicable facility when neither the owner nor the operator can produce evidence of the party responsible for compliance with State laws.

T. Section 2477.20 – Reporting

Purpose of section 2477.20

This amendment establishes one section that contains all the reporting requirements.

Rationale of section 2477.20

This is necessary to make the regulatory text consistent by establishing one section that contains all reporting requirements and ensuring that all information reported to CARB to comply with the regulation is subject to the same requirements for submittal and recordkeeping and include a statement of accuracy.

Purpose of section 2477.20(a)

This amendment specifies that submission of information to CARB shall be done by one of three methods: mail, electronically submit by email, or electronically submit through CARB's online system.

Rationale of section 2477.20(a)

This amendment is necessary to ensure that regulated parties are aware of the approved methods of submittal.

Purpose of section 2477.20(b)

This amendment specifies that all records are required to be kept for a minimum of three years and compiled and made available to CARB upon request.

Rationale of section 2477.20(b)

This amendment is necessary to ensure that regulated parties maintain records for a sufficient amount of time for CARB to enforce the regulation. The three-year retention time is consistent with recordkeeping requirements in other CARB regulations.

This amendment is also necessary as it specifies that records shall be made available to CARB upon request to verify reported information and for the purpose of demonstrating compliance with requirements of the regulation.

Purpose of section 2477.20(c)

This amendment specifies that information submitted to CARB shall be accompanied by a statement of accuracy.

Rationale of section 2477.20(c)

This amendment is necessary to help ensure that information submitted to CARB is true, accurate, and complete.

Purpose of section 2477.20(d)

This amendment specifies the requirements for electronic tracking systems for owners that elect to comply with the in-use performance standards by using a hybrid electric TRU or electric standby-equipped TRU. The electronic tracking system is required to collect time, TRU engine hour meter reading, location data at a rate of at least one reading per minute with no more than 10 minutes data gap, and capable of determining if the TRU or TRU gen set location is within California and determining the TRU engine run time in California for each day.

Rationale of section 2477.20(d)

This amendment is necessary to establish the requirements for electronic tracking systems to monitor compliance with the Alternative Technology option. The required information to be collected by the electronic tracking system is needed to ensure the hybrid electric or electric standby-equipped TRU is operated in accordance with the regulation. The electronic tracking system requirements were retained from the current regulation (in section 2477.5(e)(1)(F), but have been moved to section 2477.20(d) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.20(e)

This amendment specifies the requirements for placement of the CARB IDN on the TRU chassis.

Rationale of section 2477.20(e)

This amendment is necessary to ensure uniform placement of the CARB IDN on the TRU chassis. This will allow CARB enforcement staff to quickly identify the CARB IDN. The requirements for placement of the CARB IDN were retained from the current regulation (in section 2477.5(d)(3)(B) and section 2477.5(d)(4)), but have been moved to section 2477.20(e) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.20(f)

This amendment specifies what information TRU owners or owner/operators are required to report to CARB.

Rationale of section 2477.20(f)

This amendment is necessary to identify the information TRU owners or owner/operators are required to report to CARB for each TRU operated in California. The TRU reporting requirements were retained from the current regulation ("ARB Identification Numbering Requirements" in section 2477.5(e)), except TRU reporting requirements apply to all TRUs that operate in California, not just those that are based in California and include additional information on the date the TRU was purchased, rented, or leased and certification that TRU owners have appraised the TRU operator of their obligations under the regulation.

Reporting of California-based and non-California-based TRUs that operate in California and the additional reporting fields are needed to ensure robust compliance monitoring and enforcement of all TRUs operating in California. The reported data would be used by staff to better target fleets that are not in compliance. This would help ensure better overall enforcement. Staff expect this to lead to further emission reductions from TRUs, thus leading to more health benefits to individuals living in California. This amendment is also necessary to level the playing field between TRUs based in-state and out-of-state.

Purpose of section 2477.20(g)

This amendment specifies what information is required to apply for a mobile catering service exemption.

Rationale of section 2477.20(g)

This amendment is necessary to identify the information required in an application for a mobile catering service exemption. The mobile catering exemption application requirements were retained from the current regulation (in section 2477.5(j), but have been moved to section 2477.20(g) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.20(h)

This amendment specifies what information is required to apply for a compliance extension based on unavailability of compliance technology.

Rationale of section 2477.20(h)

This amendment is necessary to identify the information required in an application for a compliance extension based on unavailability of compliance technology. The requirements for a compliance extension based on unavailability of compliance technology were retained from the current regulation (in section 2477.5(k), but have been moved to section 2477.20(h) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.20(i)

This amendment specifies what information is required to apply for a compliance extension based on delays.

Rationale of section 2477.20(i)

This amendment is necessary to identify the information required in an application for a compliance extension based on delays. The requirements for a compliance extension based on delays were retained from the current regulation (in section 2477.5(l), but have been moved to section 2477.20(i) to be with the other reporting requirements in section 2477.20 and include a new compliance extension for delays related to the installation of ZE fueling infrastructure. Please see the earlier rationale of section 2477.5(o) as the changes are necessary for the same reasons.

Purpose of section 2477.20(j)

This amendment specifies what information is required to apply for a safe passage permit.

Rationale of section 2477.20(j)

This amendment is necessary to identify the information required in an application for a safe passage permit. The requirements for a safe passage permit were retained from the current regulation (in section 2477.5(n), but have been moved to section 2477.20(j) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.20(k)

This amendment specifies what information is required to be submitted for third-party agreement confirmation.

Rationale of section 2477.20(k)

This amendment is necessary to identify the information required for third-party agreement confirmation. The requirements for third-party agreement confirmation

were retained from the current regulation (in section 2477.12(b), but have been moved to section 2477.20(k) to be with the other reporting requirements in section 2477.20.

Purpose of section 2477.20(l)

This amendment specifies what information is required in OEM monthly production reports, including the following new reporting fields: OEM VDECS manufacturer and family name, VDECS serial number, whether the unit is ZE, if the unit is electric-standby equipped or is a hybrid-electric, and the refrigerant type.

Rationale of section 2477.20(l)

This amendment is necessary to identify the information required in OEM monthly production reports. The OEM monthly production report requirements were retained from the current regulation (in section 2477.13(b)(2)(C), but have been moved to section 2477.20(l) to be with the other reporting requirements in section 2477.20.

The additional reporting fields are needed to ensure robust compliance monitoring and enforcement of the refrigerant, ZE truck TRU, in-use performance standard, and PM emission standard requirements, as well as to enable staff to verify information reported by TRU owners.

Purpose of section 2477.20(m)

This amendment specifies what information applicable facility owners or owner/operators are required to submit to CARB if they choose to report all TRU activity under section 2444.17(e)(1).

Rationale of section 2477.20(l)

This amendment is necessary to identify the information applicable facility owners or owner/operators are required to submit to CARB if they choose to report all TRU activity. The required information is needed for CARB enforcement purposes and to bring reported non-compliant TRUs into compliance.

U. Section 2477.21 – Fees

Purpose of section 2477.21

This amendment adds language to establish TRU operating and applicable facility registration fee requirements.

Rationale of section 2477.21

Please see the earlier rationale of section 2477.5(h) as the changes are the same and thus necessary for the same reasons.

V. Section 2477.22 – Relationship to Other Law

Purpose of section 2477.22

This amendment adds language to establish a relationship to other law clause and sets forth that nothing in this regulation allows TRUs to operate in violation of other applicable laws.

Rationale of section 2477.22

This amendment is necessary to establish that the Proposed Amendments shall not conflict with or supersede any other sections of the California Vehicle Code, Health & Saf. Code, or any applicable ordinance, rule, or requirement that is as stringent as, or more stringent than the requirements of this regulation. The addition of this section is necessary for rule harmonization and to ensure current emission reduction levels continue.

W. Section 2477.23 – Authority to Request Additional Information

Purpose of section 2477.23

This amendment updates the numbering of section 2477.20 to 2477.23.

Rationale of section 2477.23

This amendment is necessary because staff are proposing new section 2477.23 and the numbering of this section has been updated.

X. Section 2477.24 – Severability

Purpose of section 2477.24

This amendment updates the numbering of section 2477.21 to 2477.24.

Rationale of section 2477.24

This amendment is necessary because staff are proposing new section 2477.24 and the numbering of this section has been updated.

V. Benefits Anticipated from the Regulatory Action, Including the Benefits or Goals Provided in the Authorizing Statute

A. Health Benefits

Exposure to pollution from the diesel engines that power TRUs has both potential cancer and non-cancer health impacts. For this Staff Report, staff conducted a health risk assessment (HRA) to evaluate the potential cancer risk resulting from direct exposure to diesel PM from TRUs, as well as the non-cancer health impacts associated with exposure to ambient levels of directly emitted PM2.5 and secondary PM2.5 formed in the atmosphere from TRU NOx emissions. The HRA compared the current and future impacts of the TRU ATCM (Baseline) to the current and future impacts of the Proposed Amendments. Chapter VI provides a detailed summary of the health benefits of the Proposed Amendments.

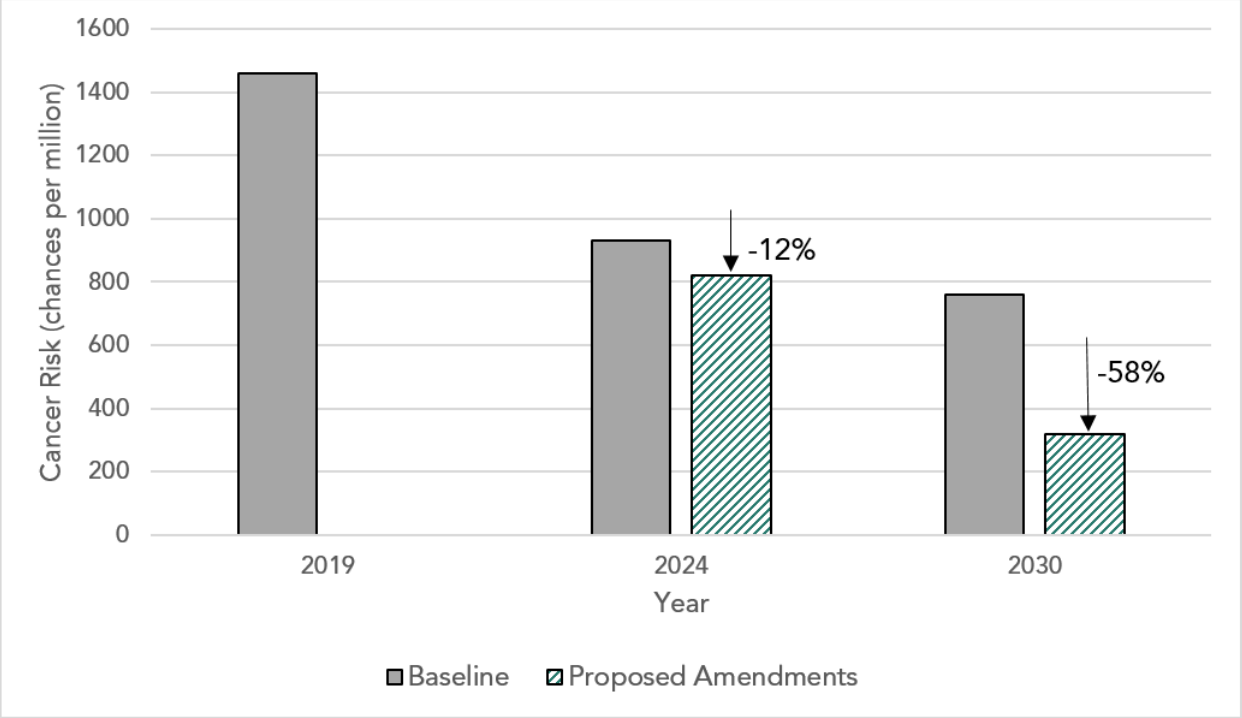
1. Reduction in Potential Cancer Risk

Based on staff's analysis, the facility types with the highest estimated contribution of statewide diesel PM emissions from TRUs are refrigerated WHDCs (which include CSWs) and grocery stores. Therefore, staff conducted an HRA to evaluate the cancer risk associated with emissions from TRUs operating at a CSW and grocery store. Potential cancer risk is expressed as the chance an individual has of developing cancer if a million people were exposed to a toxic air contaminant continuously for a specified duration of exposure. Staff calculated potential cancer risk values for two exposure scenarios: individual residential exposure and off-site worker exposure.

a. Individual Residential Cancer Risk

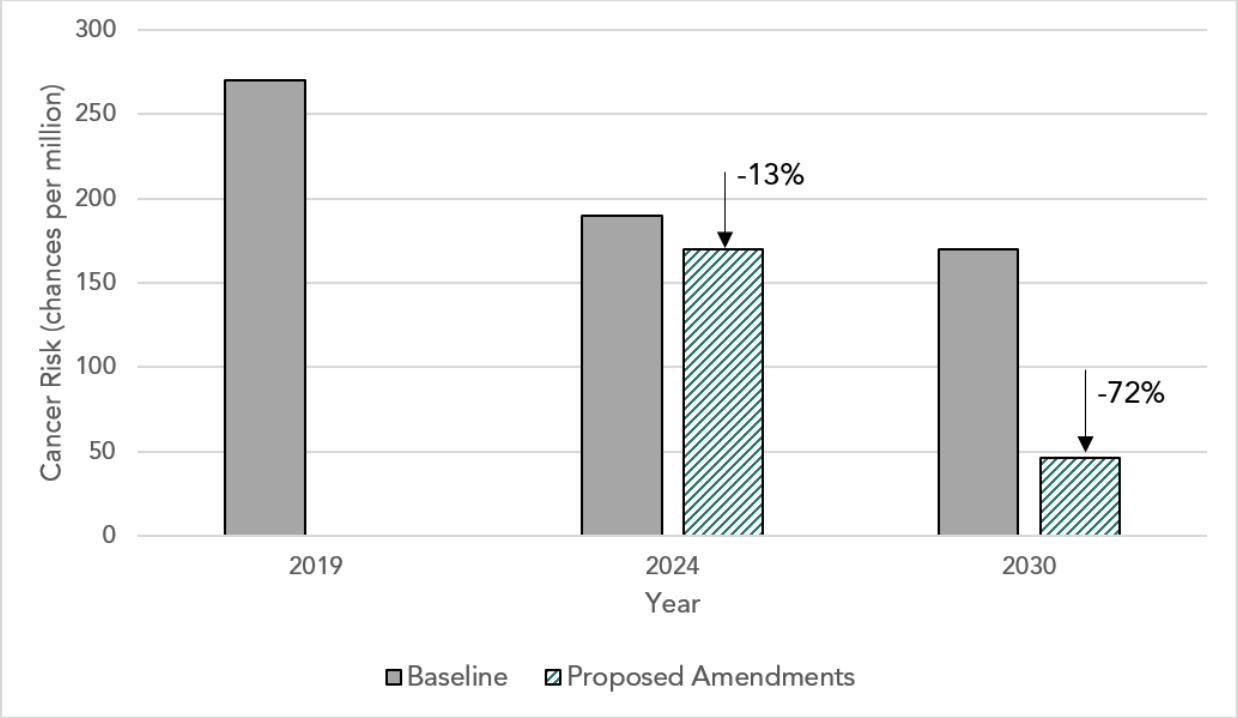
The cancer risk to an individual resident is based on an assumed 30-year exposure duration. Staff evaluated the potential cancer risk to individual residents under the Proposed Amendments and the Baseline. After full implementation, the Proposed Amendments are expected to reduce potential individual residential cancer risk from TRU operations at a CSW by approximately 58 percent compared to the Baseline. Similarly, after full implementation, the Proposed Amendments are expected to reduce potential individual residential cancer risk from TRU operations at a grocery store by up to 72 percent compared to the Baseline, depending on the operational scenario. Figure V-1 and Figure V-2 show the potential individual residential cancer risk from TRU operations at a CSW and grocery store under the Baseline and Proposed Amendments.

Figure V-1. Potential Individual Resident Cancer Risk and Risk Reduction for Cold Storage Warehouses[60]



[60] Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy method (95th percentile/80th percentile daily breathing rates. Fraction of time at home equals 1 for age bins <16 years and 0.73 for age bin 16-70 years.

Figure V-2. Potential Individual Resident Cancer Risk and Risk Reduction for Grocery Stores (7 Trucks, 2 Trailers, 1 Seasonal Trailer Scenario)[61]



b. Off-site Worker Cancer Risk

For the evaluation of off-site worker cancer risk, staff assumed that a worker outside a CSW or grocery store is exposed to the emission sources for 25 years, 8 hours per day, and 250 days per year. After full implementation, the Proposed Amendments are expected to reduce potential off-site worker cancer risk from TRU operations at a CSW by approximately 58 percent compared to the Baseline. Similarly, after full implementation, the Proposed Amendments are expected to reduce potential off-site worker cancer risk from TRU operations at a grocery store by up to 71 percent compared to the Baseline, depending on the operational scenario. Although the HRA only evaluated exposure to individual residents and off-site workers, the Proposed Amendments are also expected to reduce occupational exposure of on-site workers, including, but not limited to TRU operators, truck drivers, and other individuals who work at facilities where TRUs operate.

[61] Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy method (95th percentile/80th percentile daily breathing rates. Fraction of time at home equals 1 for age bins <16 years and 0.73 for age bin 16-70 years.

2. Non-Cancer Health Impacts and Valuations

Staff evaluated a limited number of statewide non-cancer health benefits associated with reductions in exposure to PM2.5 and NOx emissions resulting from the Proposed Amendments. NOx includes nitrogen dioxide, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled. However, the most serious quantifiable impacts of NOx emissions occur through the conversion of NOx to fine particles of ammonium nitrate aerosol through chemical processes in the atmosphere. PM2.5 formed in this manner is termed secondary PM2.5. Both directly emitted (primary) PM2.5 and secondary PM2.5 is associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for cardiovascular and respiratory illnesses, and emergency room visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these adverse health outcomes. Staff estimates that the total reduction in the number of cases statewide due to the implementation of the Proposed Amendments from 2022 to 2034 would be as follows:

- 177 fewer premature deaths (138 to 217, 95 percent confidence interval (CI))
- 57 fewer hospital admissions for cardiovascular and respiratory illnesses (7 to 106, 95 percent CI)
- 87 fewer emergency room visits for asthma (55 to 119, 95 percent CI)

3. Monetization of Health Impacts

In accordance with U.S. EPA practice, staff monetized health outcomes by multiplying the projected number of cases by a standard value derived from economic studies.[62] The total statewide valuation due to avoided health outcomes as a result of the Proposed Amendments from 2022 to 2034 are summarized in Table V-1. The spatial distribution of these benefits follows the distribution of emission reductions and avoided adverse health outcomes. Therefore, most benefits to individuals would occur in the South Coast, San Joaquin Valley, and San Francisco air basins, with fewer benefits in the Sacramento Valley and San Diego County air basins. The total statewide health benefits for the Proposed Amendments are estimated to be $1.75 billion (compared to approximately $1.04 billion in total net costs).

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[62] National Center for Environmental Economics et al., Appendix B: Mortality Risk Valuation Estimates, Guidelines for Preparing Economic Analyses (EPA 240-R-10-001, December 2010). (web link: https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-22.pdf)

Table V-1. Statewide Valuation from Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2022-2034 (2019$)

Outcome	Valuation
Avoided Premature Deaths	$1,749,747,000
Avoided Hospitalizations	$3,092,000
Avoided Emergency Room Visits	$73,000
Total	$1,752,912,000

Note: Values have been rounded to the nearest thousand.

While CARB's PM2.5 mortality and illness analysis has been, and continues to be, a useful method for valuing the health benefits of regulations, it only represents a portion of those benefits. The full health benefits of the Proposed Amendments are underestimated because not all the adverse health outcomes associated with PM2.5 and additional pollutants such as air toxics are evaluated and monetized. Also, CARB's current evaluation methodology does not take into account all PM2.5 precursor emissions. Expansion of the emissions inputs and health outcomes, including, but not limited to, additional cardiovascular and respiratory illnesses, nonfatal/fatal cancers, nervous system diseases, and work loss days would provide a more comprehensive picture of the benefits from reduced exposure to air pollution.

B. Air Quality and Climate Benefits

1. PM2.5 and NOx

The Proposed Amendments require the use of ZE technology and implement a PM standard for newly-manufactured units, which will achieve PM2.5 and NOx emission reductions. This will help to reduce ambient levels of PM2.5 and ozone, contribute toward meeting commitments outlined in the 2016 State SIP Strategy, and support attainment of federal ambient air quality standards, which are established to protect even the most sensitive individuals. Cumulatively, from 2022 to 2034, the Proposed Amendments are expected to reduce statewide TRU emissions by approximately 1,258 tons of PM2.5 and 3,515 tons of NOx, relative to the Baseline. Chapter VI provides a detailed summary of the air quality benefits of the Proposed Amendments.

2. Greenhouse Gases

The benefit of GHG reductions achieved by the Proposed Amendments can be estimated using the social cost of carbon (SC-CO2), which provides a dollar valuation of the damages caused by one ton of carbon pollution and represents the monetary benefit today of reducing carbon emissions in the future.

The Council of Economic Advisors and the Office of Management and Budget convened an Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) to develop a methodology for estimating the SC-CO2. The methodology relies

on a standardized range of assumptions and can be used consistently when estimating the benefits of regulations across agencies and around the world.[63] Staff utilized the current IWG supported SC-CO2 values to consider the social costs of actions taken to reduce GHG emissions. This is consistent with the approach presented in the Revised 2017 Climate Change Scoping Plan, in line with the Office of Management and Budget Circular A-4 of September 17, 2003, and reflects the best available science in the estimation of the socio-economic impacts of carbon.[64,65]

The IWG describes the social cost of carbon as follows:

> "The social cost of carbon (SC-CO2) for a given year is an estimate, in dollars, of the present discounted value of the future damage caused by a 1-metric ton increase in carbon dioxide (CO2) emissions into the atmosphere in that year, or equivalently, the benefits of reducing CO2 emissions by the same amount in that year. The SC-CO2 is intended to provide a comprehensive measure of the net damages – that is, the monetized value of the net impacts – from global climate change that result from an additional ton of CO2.
>
> These damages include, but are not limited to, changes in net agricultural productivity, energy use, human health, property damage from increased flood risk, as well as nonmarket damages, such as the services that natural ecosystems provide to society. Many of these damages from CO2 emissions today will affect economic outcomes throughout the next several centuries."[66]

The SC-CO2 is year-specific and is highly sensitive to the discount rate used to discount the value of the damages in the future due to CO2. The SC-CO2 increases over time as systems become more stressed from the aggregate impacts of climate change and future emissions cause incrementally larger damages. A higher discount rate decreases the value today of future environmental damages. This analysis uses the IWG standardized range of discount rates from 2.5 to 5 percent to represent varying

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[63] Interagency Working Group on the Social Cost of Carbon, Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866, August 2016. (web link: https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf)
[64] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf)
[65] Office of Management and Budgets, Circular A-4, September 17, 2003. (web link: https://www.transportation.gov/sites/dot.gov/files/docs/OMB%20Circular%20No.%20A-4.pdf)
[66] National Academies of Sciences, Engineering, Medicine, Valuing Climate Damages: Updating Estimation of Carbon Dioxide, 2017. (web link: http://www.nap.edu/24651)

valuation of future damages. Table V-2 shows the range of IWG SC-CO2 values used in California's regulatory assessments.[67,68]

Table V-2. Social Cost of Carbon (2019$/Metric Ton)

Year	5 Percent Discount Rate	3 Percent Discount Rate	2.5 Percent Discount Rate
2020	$15	$54	$80
2025	$18	$59	$88
2030	$21	$65	$94
2035	$23	$71	$101
2040	$27	$77	$108
2045	$30	$83	$115
2050	$34	$89	$123

If all of the expected emission reductions projected under the Proposed Amendments are achieved and assumed to be equivalent to CO2 reductions, the avoided SC-CO2 in a given year is the total emission reductions (in MTCO2e multiplied by the SC-CO2 (in $/MTCO2e) for that year. The annual emission reductions from the Proposed Amendments and the estimated benefits are shown in Table V-3. The total benefits range between $29 million to $134 million from 2022 to 2034, depending on the discount rate.

[67] Interagency Working Group on the Social Cost of Carbon, Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866, August 2016. (web link: https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf)
[68] The IWG SC-CO2 values are provided in 2007 dollars. Staff adjusted from 2007 to 2019 dollars by using the California Department of Finance Consumer Price Index (CPI-U), adjusting from 2007 dollars to 2019 dollars. (web link: https://www.dof.ca.gov/Forecasting/Economics/Indicators/Inflation/documents/CPI_All_Item_CY.xlsx)

Table V-3. Avoided Social Cost of CO2 from 2022 to 2034 (Million 2019$)

Year	GHG Emission Reductions (MMTCO2e)	5 Percent Discount Rate	3 Percent Discount Rate	2.5 Percent Discount Rate
2022	0.00	$0	$0	$0
2023	0.01	$0	$1	$1
2024	0.03	$1	$2	$3
2025	0.05	$1	$3	$4
2026	0.07	$1	$4	$6
2027	0.09	$2	$6	$8
2028	0.12	$2	$7	$11
2029	0.14	$3	$9	$13
2030	0.16	$3	$10	$15
2031	0.17	$4	$11	$16
2032	0.18	$4	$12	$18
2033	0.19	$4	$13	$19
2034	0.20	$5	$14	$20
Total	1.42	$29	$92	$134

SC-CO2, while intended to be a comprehensive estimate of the damages caused by carbon globally, does not represent the cumulative cost of climate change and air pollution to society. There are additional costs to society outside of the SC-CO2, including costs associated with changes in co-pollutants, the social cost of other GHGs including methane and nitrous oxide, and costs that cannot be included due to modeling and data limitations. The Intergovernmental Panel on Climate Change has stated that the IWG SC-CO2 estimates likely are underestimated due to the omission of impacts that cannot be accurately monetized, including important physical, ecological, and economic impacts.[69]

C. Other Benefits

1. Establishing ZE Technology in the Off-Road Sector

Transitioning diesel-powered truck TRUs to ZE under the Proposed Amendments will provide an opportunity to increase ZE technology in the off-road sector. As more truck TRU fleets use ZE technologies as a result of the Proposed Amendments, industry acceptance of advanced technologies will improve. The state of ZE TRU technology

[69] Intergovernmental Panel on Climate Change, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. (web link: https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg3_full_report-1.pdf)

will progress and expand into extended range applications, as well as other off-road sectors.

2. Infrastructure

The Proposed Amendments will increase the installation of electric charging and fueling infrastructure needed to support the use of ZE truck TRUs. Advanced TRU technologies are underutilized due in part to limited access to supporting infrastructure at the facilities where TRUs operate. Additional installations of electric charging and fueling infrastructure will support the use of these technologies, as well as other advanced technology equipment and vehicles onsite.

The increased use of electric charging infrastructure will also increase the amount of electricity supplied by utility providers and help the State's investor-owned utilities meet the goals of SB 350.[70] SB 350 requires the State's investor-owned utilities to develop programs to accelerate widespread transportation electrification with goals to reduce dependence on petroleum, increase the uptake of ZE vehicles, help meet air quality standards, and reduce GHGs. The three large investor-owned utilities in the State, Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison, all have programs to install make-ready charging infrastructure for TRUs. In addition, all three large investor-owned utilities have either proposed or have been approved to establish new commercial electricity rate options that make charging more affordable during certain times of the day. Although not required by SB 350, several publicly-owned utilities have taken similar action. For example, Los Angeles Department of Water and Power and Sacramento Municipal Utility District have make-ready charging infrastructure programs and new commercial rates for charging. The Proposed Amendments support the utilities' programs and the goals of SB 350 by increasing the number of ZE TRUs in the State to make use of these utility investments and rates.

3. Benefits in Disadvantaged Communities

The Proposed Amendments reduce PM2.5 and NOx emissions, resulting in health benefits for Californians, including those in disadvantaged communities. Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions from the diesel engines that power TRUs. There are several occurrences across the State where communities contain "groups" or "clusters" of facilities where TRUs operate. In many cases, these facilities are located in or near communities that are classified as disadvantaged by CalEPA. CalEPA uses CalEnviroScreen to score California communities based on environmental

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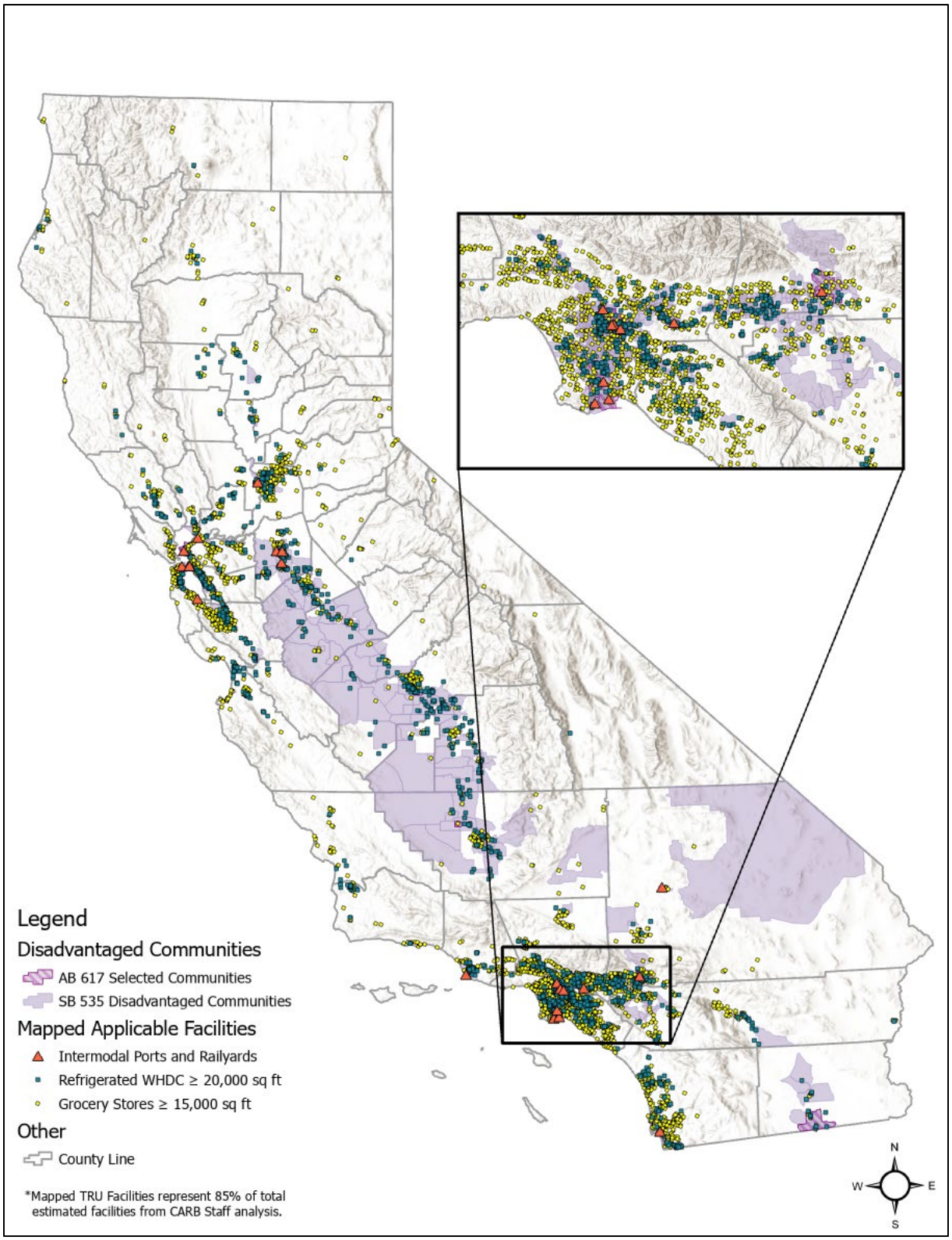
[70] California Legislature, Senate Bill No. 350, signed October 7, 2015. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB350)

pollution burden and socio-economic indicators.[71] Based on staff's analysis, approximately 40 percent of the proposed applicable facilities identified are located in disadvantaged communities as designated by CalEnviroScreen.

The Proposed Amendments require applicable facilities to ensure that only compliant TRUs operate on their properties. To meet this requirement, the Proposed Amendments require applicable facilities to gather information on all TRUs that operate at their facilities and report that information to CARB quarterly. Alternatively, facilities may provide a declaration, under penalty of perjury, that they do not allow non-compliant TRUs to operate on their properties. Applicable facility reporting will help staff better identify non-compliant TRUs operating in California and bring them into compliance. Alternatively, not allowing non-compliant TRUs to operate at an applicable facility incentivizes TRU owners to comply and achieves immediate emission reductions in impacted communities. Figure V-3 shows the statewide distribution of the proposed applicable facilities, including those in disadvantaged communities.

[71] Office of Environmental Health Hazard Assessment. CalEnviroScreen 3.0, June 25, 2018. (web link: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)

Figure V-3. Applicable Facilities (as of January 2021)



4. Job Opportunities

The Proposed Amendments provide opportunities for design, engineering, construction, and project management firms to design new and expanded infrastructure at an estimated 1,000 truck TRU home base facilities statewide. The increase in electric charging and fueling infrastructure will also benefit suppliers, equipment installers, and electricians. All of the installations will be in California and some of the infrastructure equipment may be manufactured in California. One manufacturer, ESL Power Systems, has primary operations based in California.[72]

Increased purchases of ZE TRUs under the Proposed Amendments will also benefit ZE TRU manufacturers, as well as various businesses in the ZE TRU supply chain, including those involved in battery, fuel cell, cold plate, and solar photovoltaic technology throughout the State.

5. Noise Reduction

An additional benefit of the Proposed Amendments is reduced noise from diesel-powered TRUs. Diesel-powered TRUs can produce a substantial amount of noise, which also results in adverse health impacts. This is of concern when TRUs operate in and near places where people live, work, and play. Staff have received several noise complaints regarding TRU activity near schools, hospitals, elder care facilities, and residential neighborhoods. The Proposed Amendments will transition diesel-powered truck TRUs to ZE technology, which produces little to no noise. This will eventually eliminate the use of diesel-powered truck TRUs and reduce noise levels.

[72] ESL Power Systems, Inc. (web link: https://eslpwr.com/, last accessed May 11, 2021)

VI. Air Quality and Health Impacts

This chapter describes the air quality and health impacts that will result from the Proposed Amendments. Section A of this chapter includes an overview of the emission inventory methods, Section B describes the baseline used to estimate emission benefits of the Proposed Amendments, Section C provides the resulting PM2.5, NOx, and GHG emission reductions, and Section D summarizes the expected health benefits.

A. Emission Inventory Methods

This section outlines the 2021 update to the statewide emission inventory for TRUs. The data sources and methodology used in the 2021 update are described in Appendix H. Staff last updated the inventory in 2011.[73] The updated inventory reflects improvements to a number of parameters, including, but not limited to:

- Population and age distribution.
- Annual TRU engine activity and the portion of activity that occurs within the State.
- Turnover (replacement of old units) and purchasing trends (addition of new units).

A significant update to the inventory reflects the emergence of trailer TRUs with less than 25 horsepower engines. The emergence of trailer TRUs with engines less than 25 horsepower is notable because the U.S. EPA Tier 4 final PM emission standard for these smaller horsepower engines is 15 times higher (i.e., less stringent) than those for engines greater than 25 horsepower. Similar trends are expected for DSC TRUs, railcar TRUs, and TRU gen sets. The number of TRUs equipped with engines less than 25 horsepower will become responsible for the majority of PM emissions from TRUs in the near future, if current trends continue.

The emission inventory for any given year is calculated by combining the TRU population, hours of TRU engine activity, TRU engine horsepower, load factors, emission factors, and fuel correction factors, in the following equation:

Emissions = Population × Activity × Hp × LF × EF × FCF

Where:

Population = Count of equipment population (unit-less)

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[73] California Air Resources Board, Public Hearing to Consider Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled TRUs and TRU Generator Sets, and Facilities where TRUs Operate. Staff Report: Initial Statement of Reasons, August 31, 2011. (web link: https://ww3.arb.ca.gov/regact/2011/tru2011/truisor.pdf)

Activity = Time the engine is running (hours)

Hp = Horsepower of the engine (maximum brake horsepower)

LF = Load factor (unit-less)

EF = Emission factor (grams per kilowatt-hour) specific to horsepower and MY and pollutant, and includes deterioration

FCF = Fuel correction factor based on calendar year (unit-less)

B. Baseline Information

Per Department of Finance (DOF) regulations (title 1, CCR, sections 2000 through 2004), the Proposed Amendments are a major regulation requiring a (SRIA) because the economic impact of the regulation is projected to exceed $50 million in a 12-month period. The SRIA requires an analysis of the economic and emission impacts of the regulatory proposal relative to a baseline that reflects full compliance with existing regulations. All impacts of the Proposed Amendments that are discussed in this Staff Report are based on the SRIA baseline.

The analysis relative to the emission inventory baseline, which reflects actual conditions and expected compliance with the TRU ATCM based on observed compliance choices in the California Air Resources Board Equipment Registration (ARBER) program and data from CARB's enforcement program can be found in Appendix H.

C. Emissions Results

1. PM2.5

Figure VI-1 shows the PM2.5 emissions from TRUs in the baseline scenario and under the Proposed Amendments, excluding truck TRUs. Under the Proposed Amendments, emissions are expected to decrease beginning in 2023, when the PM standard goes into effect for MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines. Figure VI-2 shows the PM2.5 emissions from truck TRUs in the baseline scenario and under the Proposed Amendments.

Figure VI-1. Statewide PM2.5 Emissions from TRUs (excluding Truck TRUs) in the Baseline and under the Proposed Amendments from 2022 to 2034

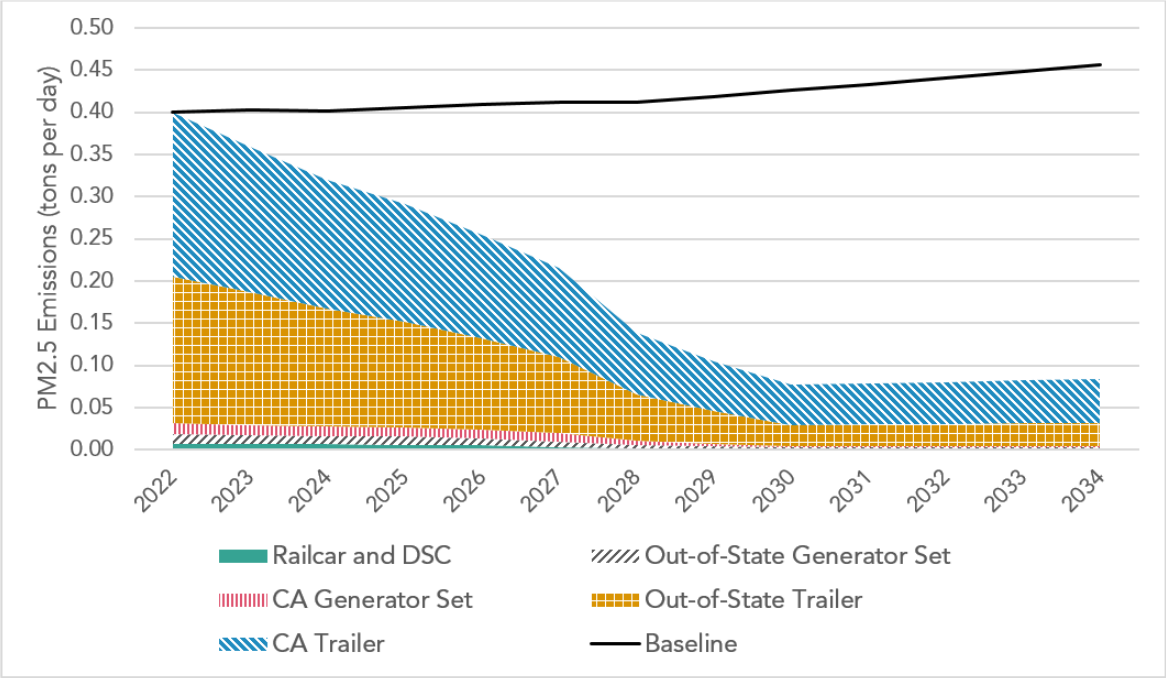
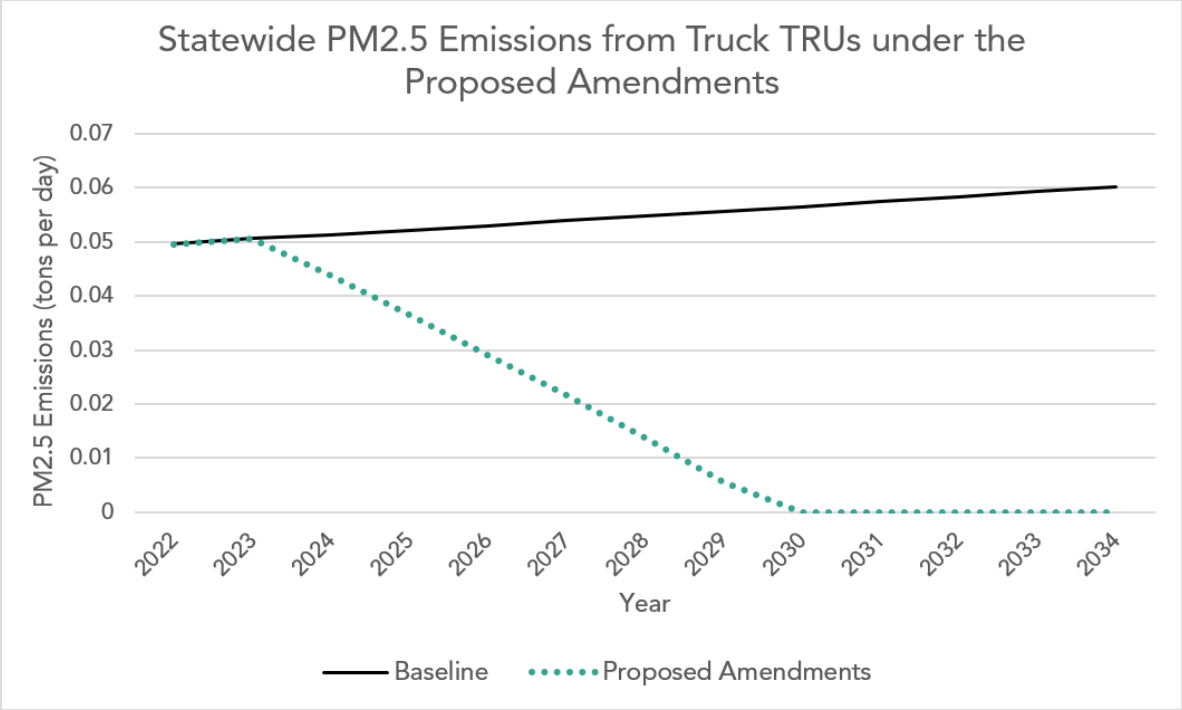


Figure VI-2. Statewide PM2.5 Emissions from Truck TRUs in the Baseline and under the Proposed Amendments from 2022 to 2034



2. NOx

Figure VI-3 shows the NOx emissions from TRUs in the baseline scenario, excluding truck TRUs. Under the Proposed Amendments, NOx emissions are only reduced by the requirement for truck TRUs to transition to ZE technology, with no change in emissions from the remaining TRU categories. Figure VI-4 shows the NOx emissions from truck TRUs in the baseline scenario and under the Proposed Amendments.

Figure VI-3. Statewide NOx Emissions from TRUs (excluding Truck TRUs) in the Baseline from 2022 to 2034

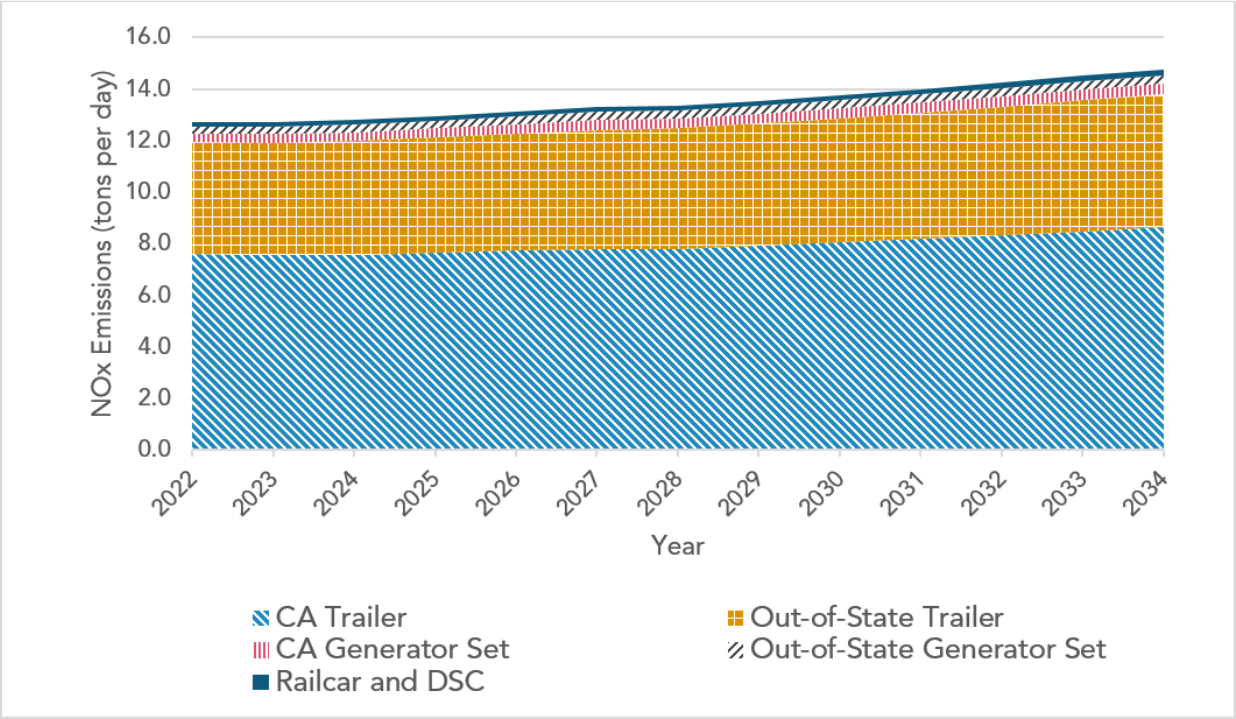
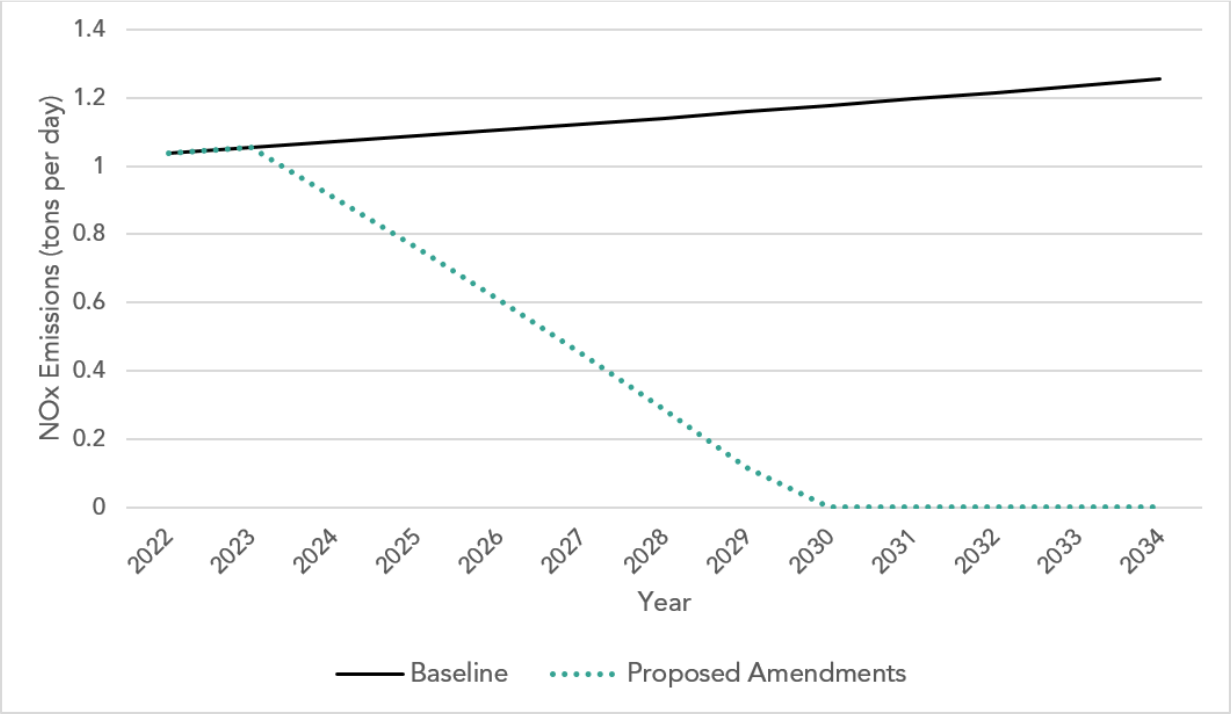


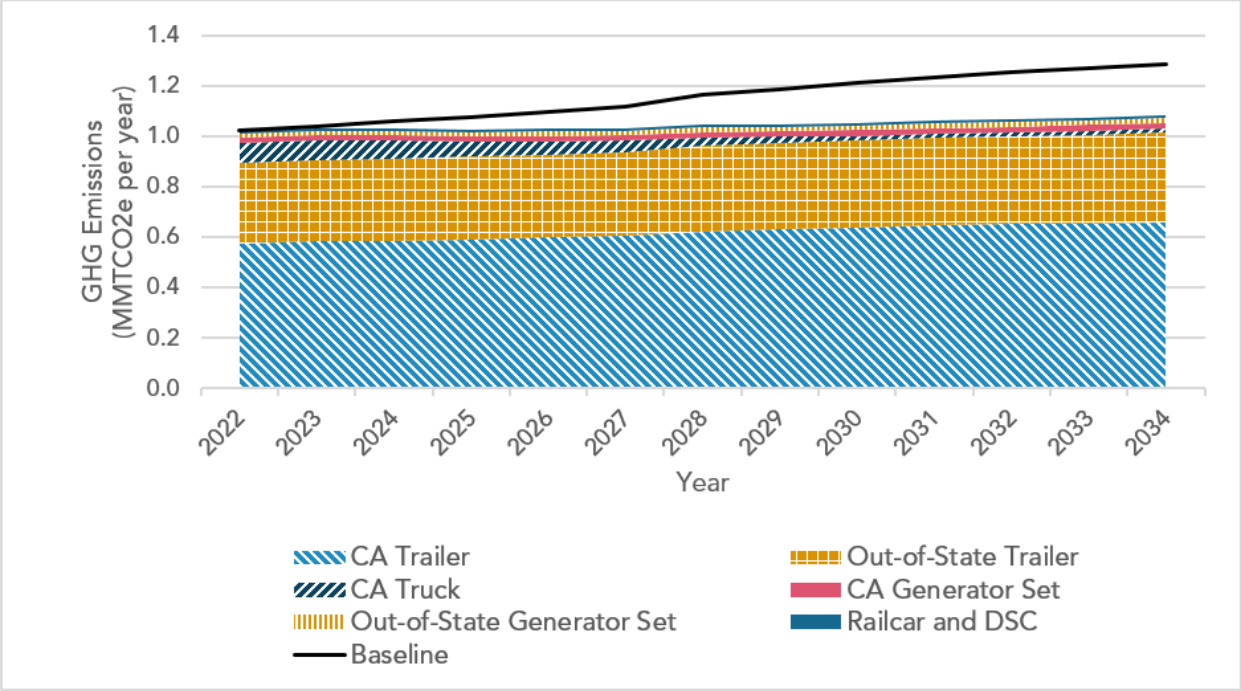
Figure VI-4. Statewide NOx Emissions from Truck TRUs in the Baseline and under the Proposed Amendments from 2022 to 2034



3. GHG

Figure VI-4 shows the GHG emissions from TRUs in the baseline scenario and under the Proposed Amendments from 2022 to 2034. GHG emission reductions will start in 2023 when the lower-GWP refrigerant requirement begins. Additional GHG emission reductions will begin in 2024 when truck TRUs are required to transition to ZE technology.

Figure VI-5. Statewide GHG Emissions from TRUs in the Baseline and under the Proposed Amendments from 2022 to 2034



D. Health Impacts

This section summarizes the results of an evaluation of the health impacts from TRU emissions using two different methods: an HRA and a mortality and illness analysis. The HRA considers the localized health impacts to communities around facilities where TRUs operate, in which air dispersion modeling is used to estimate the air concentration of diesel PM, estimates diesel PM exposure to residents in those communities, and quantifies the health effects (potential cancer risk, and acute and chronic non-cancer impact) that would be expected to result from that exposure. The HRA further projects how those impacts change with implementation of the Proposed Amendments.

The mortality and illness analysis uses emissions inventory data and county-specific statistics on health outcomes (premature death due to cardiac or respiratory effects, hospitalizations and emergency room visits attributed to those causes). The analysis focuses on the impacts of regional PM2.5 pollution, either directly emitted from TRUs or formed in the atmosphere from NOx emissions from these sources. The following is a summary of the results from these analyses. The complete health analyses can be found in Appendix I.

1. Potential Exposures and Health Risks from TRU Engine Diesel PM Emissions

Staff conducted an HRA to estimate the potential cancer risk from diesel PM emitted from diesel-powered TRUs operating at refrigerated facilities. TRUs typically operate at refrigerated WHDCs, grocery stores, seaport facilities, intermodal railyards, and other locations that are often near sensitive receptors, such as schools, hospitals, elder care facilities, and residential neighborhoods. Staff estimated the number and types of facilities where TRUs operate as well as their contribution to statewide diesel PM emissions with the purpose of determining the applicability of the Proposed Amendments. More information on the applicable facilities included in the Proposed Amendments is provided in Appendix F.

Based on staff's analysis, the facility types with the highest estimated contribution of statewide diesel PM emissions from the diesel engines that power TRUs are refrigerated WHDCs (which include CSWs) and grocery stores. Therefore, staff modeled a generic CSW and a generic grocery store to characterize existing health risk and the effectiveness of the Proposed Amendments.

Staff used air dispersion modeling to estimate the diesel PM concentrations for communities nearby a generic CSW and generic grocery store and estimated the potential health impacts from the modeled exposures. The HRA compared the current and future impacts of the TRU ATCM (Baseline) to the current and future impacts of the Proposed Amendments. The Proposed Amendments provide reductions in

potential cancer risk to individual residents and off-site workers when compared to the Baseline.

a. CSW Modeling Results

CSWs range in size depending on the location and type of operation. The primary emission sources of diesel PM at these facilities are the diesel engines powering TRUs mounted either on straight trucks or on semi-trailers. Because of the variability in size and operation, staff modeled a generic CSW that could accommodate TRU engine activity, ranging from 500 hours per week, representing a small warehouse, to 8,000 hours per week, representing a large warehouse.

Figure VI-6 compares the potential cancer risk for individual residents under the Baseline and the Proposed Amendments in 2030. The scenarios show reductions in risk across all activity levels. After full implementation of the Proposed Amendments, residential and off-site worker cancer risk is anticipated to be reduced by approximately 58 percent compared to the Baseline.

Figure VI-6. Cold Storage Warehouse Individual Resident Cancer Risk – Year 2030 (chances per million)

Baseline

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	760	650	560	490	310	220	168	130	110	94	81	72	65	59	54	50	47	43
5,000	260,000	470	410	350	300	190	140	105	84	69	58	51	45	40	37	34	31	29	27
3,000	156,000	280	250	210	180	120	83	63	50	41	35	30	27	24	22	20	19	17	16
2,000	104,000	190	160	140	120	77	55	42	33	28	23	20	18	16	15	13	13	12	11
1,000	52,000	95	82	70	61	39	28	21	17	14	12	10	9	8	7	7	6	6	5
500	26,000	47	41	35	30	19	14	10	8	7	6	5	4	4	4	3	3	3	3

Proposed Am.

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	320	270	230	200	130	92	70	56	46	39	34	30	27	25	22	21	19	18
5,000	260,000	200	170	150	130	81	58	44	35	29	24	21	19	17	15	14	13	12	11
3,000	156,000	120	100	87	76	48	35	26	21	17	15	13	11	10	9	8	8	7	7
2,000	104,000	79	68	58	51	32	23	18	14	12	10	8	8	7	6	6	5	5	4
1,000	52,000	40	34	29	25	16	12	9	7	6	5	4	4	3	3	3	3	2	2
500	26,000	20	17	15	13	8	6	4	3	3	2	2	2	2	2	1	1	1	1

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy method (95th/80th percentile daily breathing rates. Fraction of time at home equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

b. Grocery Store Modeling Results

Grocery stores range in size from small local markets to supercenter grocery stores. The primary emission sources of diesel PM at these facilities are TRUs mounted on straight trucks or semi-trailers. Additionally, during the holiday seasons, some grocery stores have one or more semi-trailers parked for an extended period of time behind the store to provide additional storage for refrigerated or frozen products. These are referred to as seasonal trailers. Because of the variability of size and operation, staff modeled a generic grocery store using three operational scenarios, which are described as follows:

- One daily truck TRU, one daily trailer TRU, one seasonal trailer TRU.
- Seven daily truck TRUs, two daily trailer TRUs, one seasonal trailer TRU.
- Ten daily truck TRUs, six daily trailer TRUs, one seasonal trailer TRU.

TRU activity at a grocery store is dependent on the number of truck and trailer trips generated by the facility. Staff developed these operating scenarios using data from environmental planning documents and CARB surveys regarding the total number of deliveries grocery stores receive each day.

Figure VI-7 shows the potential cancer risk for individual residents under the Baseline and the Proposed Amendments in 2030. The three grocery store scenarios under the Baseline show potential cancer risk ranging from approximately 79 to 300 chances per million at the facility fence line. After implementation of the Proposed Amendments, the potential cancer risk is reduced to a range of approximately 34 to 94 chances per million in 2030. After full implementation of the Proposed Amendments, residential cancer risk is anticipated to be reduced by approximately 57 to 72 percent compared to the Baseline, depending on the operational scenario. Off-site worker cancer risk is anticipated to be reduced by approximately 58 to 71 percent compared to the Baseline, depending on the operational scenario.

Figure VI-7. Grocery Store Individual Resident Cancer Risk – Year 2030 (chances per million)

Control Measure	Downwind Distance (m) from Grocery Store Fence Line															
	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck, 1 Daily Trailer, 1 Seasonal Trailer (Baseline TRU Engine Hours: 202 per week; 3,940 per year)																
Baseline	79	56	38	23	16	12	7	5	4	3	2	2	2	1	<1	<1
Prop. Am.	34	24	16	10	7	5	3	2	2	1	<1	<1	<1	<1	<1	<1
7 Daily Trucks, 2 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 274 per week; 7,717 per year)																
Baseline	170	120	82	51	35	26	16	11	9	7	6	5	4	3	3	2
Prop. Am.	46	33	22	14	9	7	4	3	2	2	1	1	<1	<1	<1	<1
10 Daily Trucks, 6 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 402 per week; 14,334 per year)																
Baseline	300	210	150	90	61	45	28	20	15	12	10	8	6	5	4	4
Prop. Am.	94	68	46	28	19	14	9	6	4	3	3	2	2	1	1	<1

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy method (95th percentile/80th percentile daily breathing rates. Fraction of time at home equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

2. Regional PM2.5 Mortality and Illness Analysis for California Air Basins

Staff conducted a PM2.5 mortality and illness analysis based on the statewide emission reductions of PM2.5 and NOx that will be achieved by the Proposed Amendments (see Appendix I). This section provides a summary of the mortality and illness impacts, which include premature death from cardiopulmonary disease, hospitalizations for cardiovascular and respiratory illnesses, and emergency room visits for asthma.

a. PM2.5 Mortality and Illness

CARB staff evaluated a limited number of statewide non-cancer health benefits associated with reductions in exposure to PM2.5 and NOx emissions resulting from the Proposed Amendments. NOx includes nitrogen dioxide, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled. However, the most serious quantifiable impacts of NOx emissions occur through the conversion of NOx to fine particles of ammonium nitrate aerosol through chemical processes in the atmosphere. PM2.5 formed in this manner is termed secondary PM2.5. Both directly emitted (primary) PM2.5 and secondary PM2.5 is associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for cardiovascular and respiratory illnesses, and emergency room visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these adverse health outcomes.

b. Reduction in Health Outcomes

CARB uses the incidence-per-ton (IPT) methodology to quantify the health benefits of emission reductions in cases where air quality modeling results are not available. A description of this method is included on CARB's Methodology for Estimating the Health Effects of Air Pollution webpage.[74] CARB's IPT methodology is based on the methodology developed by U.S. EPA.[75,76,77]

The IPT methodology assumes that changes in emissions are approximately proportional to changes in health outcomes. IPT factors are derived by calculating the

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[74] California Air Resources Board, CARB's Methodology for Estimating the Health Effects of Air Pollution. (web link: https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution, last accessed May 11, 2021)
[75] Fann N, Fulcher CM, Hubbell BJ., The influence of location, source, and emission type in estimates of the human health benefits of reducing a ton of air pollution, Air Quality, Atmosphere & Health, 2:169-176, 2009. (web link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770129/)
[76] Fann N, Baker KR, Fulcher CM., Characterizing the PM2.5-related health benefits of emission reductions for 17 industrial, area and mobile emission sectors across the U.S. Environ Int.; 49:141-51, 2012. (web link: https://www.sciencedirect.com/science/article/pii/S0160412012001985)
[77] Fann N, Baker K, Chan E, Eyth A, Macpherson A, Miller E, Snyder J., Assessing Human Health PM2.5 and Ozone Impacts from U.S. Oil and Natural Gas Sector Emissions in 2025, Environ. Sci. Technol. 52 (15), pp 8095–8103, 2018. (web link: https://pubs.acs.org/doi/abs/10.1021/acs.est.8b02050)

number of health outcomes associated with exposure to PM2.5 concentrations for a baseline scenario and dividing by the emissions of PM2.5 or a precursor. The calculation is performed separately for each air basin using the following equation:

IPT = (number of health outcomes in air basin)/(annual emissions in air basin)

Multiplying the emission reductions from the Proposed Amendments in an air basin by the IPT factor then yields an estimate of the reduction in health outcomes achieved by the Proposed Amendments. For future years, the number of outcomes is adjusted to account for population growth. CARB's current IPT factors are based on a 2014-2016 baseline scenario, which represents the most recent data available at the time the current IPT factors were computed. IPT factors are computed for the two types of PM2.5: primary PM2.5 and secondary PM2.5 of ammonium nitrate aerosol formed from precursors.

Staff estimated the reduction in adverse health outcomes associated with reduced emissions of PM2.5 and NOx due to the Proposed Amendments. These health outcomes include cardiopulmonary mortality, hospital admissions for cardiovascular and respiratory illnesses, and emergency room visits for asthma. Staff estimates that the total reduction in the number of cases statewide due to the implementation of the Proposed Amendments from 2022 to 2034 would be as follows:

- 177 fewer premature deaths (138 to 217, 95 percent confidence interval (CI))
- 57 fewer hospital admissions for cardiovascular and respiratory illnesses (7 to 106, 95 percent CI)
- 87 fewer emergency room visits for asthma (55 to 119, 95 percent CI)

Table VI-1 shows the estimated reductions in health outcomes as a result of the Proposed Amendments by air basin from 2022 to 2034.

Table VI-1. Total Reductions in Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034

Air Basin	Cardiopulmonary Mortality	Cardiovascular and Respiratory Hospital Admissions	Asthma Emergency Room Visits
Great Basin Valleys	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake County	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake Tahoe	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Mojave Desert	2 (2 -3)	1 (0 - 1)	1 (1 - 1)
Mountain Counties	1 (1 - 1)	0 (0 - 0)	0 (0 - 0)
North Central Coast	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Northeast Plateau	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	7 (5 - 8)	2 (0 - 3)	2 (2 - 3)
Salton Sea	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
San Diego County	6 (5 - 7)	2 (0 - 3)	2 (2 - 3)
San Francisco Bay Area	20 (16 - 25)	7 (1 - 12)	11 (7 - 15)
San Joaquin Valley	22 (17 - 27)	5 (1 - 9)	8 (5 - 11)
South Central Coast	2 (1 - 2)	0 (0 - 1)	1 (0 - 1)
South Coast	115 (89 - 140)	40 (5 - 74)	59 (37 - 81)
Total	177 (138 - 217)	57 (7 -106)	87 (55 - 119)

Note: The values in parentheses represent the 95 percent confidence intervals of the central estimate. Totals may not add due to rounding.

c. Statewide Valuation

In accordance with U.S. EPA practice, staff monetized health outcomes by multiplying the projected number of cases by a standard value derived from economic studies.[78] Table VI-2 shows the valuations assigned to different health outcomes in 2019 U.S. Dollars (2019$).

[78] National Center for Environmental Economics et al., Appendix B: Mortality Risk Valuation Estimates, Guidelines for Preparing Economic Analyses (EPA 240-R-10-001), December 2010. (web link: https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-22.pdf)

Table VI-2. Valuation per Incident Avoided Health Outcomes (2019$)

Outcome	Valuation per Incident
Avoided Premature Deaths	$9,864,695
Avoided Acute Respiratory Hospitalizations	$58,288
Avoided Cardiovascular Hospitalizations	$50,842
Avoided Emergency Room Visits	$834

The valuation for avoided premature mortality is based on willingness to pay.[79] This value is a statistical construct based on the aggregated dollar amount that a large group of people would be willing to pay to avoid a single annual death in the population. This value is not an estimate of how much someone would be willing to pay to prevent the death of any particular person,[80] nor does it consider specific mortality-related costs such as hospital expenses.

Unlike premature mortality valuation, the valuation for avoided hospitalizations and emergency room visits is based on a combination of typical costs and the willingness of surveyed individuals to pay to avoid adverse outcomes that occur when hospitalized. These include hospital charges, post-hospitalization medical care, out-of-pocket expenses, and lost earnings for both individuals and family members. It also includes lost recreation value and lost household protection (e.g., valuation of time-losses from inability to maintain a household or provide childcare). These costs are most closely associated with specific cost savings to individuals and costs to the health care system.

Table VI-3 shows the total statewide valuation of avoided adverse health outcomes as a result of the Proposed Amendments from 2022 to 2034. The spatial distribution of these benefits follows the distribution of emission reductions and avoided adverse health outcomes. Therefore, most benefits to individuals would occur in the South Coast, San Joaquin Valley, and San Francisco air basins, with fewer benefits in the Sacramento Valley and San Diego County air basins.

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[79] United States Environmental Protection Agency Science Advisory Board (U.S. EPA-SAB), An SAB Report on EPA's White Paper Valuing the Benefits of Fatal Cancer Risk Reduction (EPA-SAB-EEAC-00-013), July 2000. (web link: http://yosemite.epa.gov/sab%5CSABPRODUCT.NSF/41334524148BCCD6852571A700516498/$File/eeacf013.pdf)

[80] United States Environmental Protection Agency, Mortality Risk Valuation – What does it mean the place a value on a life? (web link: https://www.epa.gov/environmental-economics/mortality-risk-valuation#means, last accessed March 2, 2021)

Table VI-3. Statewide Valuation from Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034 (2019$)

Outcome	Valuation
Avoided Premature Deaths	$1,749,747,000
Avoided Hospitalizations	$3,092,000
Avoided Emergency Room Visits	$73,000
Total	$1,752,912,000

Note: Values have been rounded to the nearest thousand.

In addition to the health impacts for which valuations were provided, the Proposed Amendments would provide other health benefits that are not currently quantified. These include decreases in vulnerability and impacts in disadvantaged communities, work loss days, school loss days, nervous system and lung impacts, and cancer risk.

VII. Environmental Analysis

CARB is the lead agency for the Proposed Amendments and has prepared an environmental analysis pursuant to its certified regulatory program (title 17, CCR, sections 60000 through 60008) to comply with the requirements of CEQA. CARB's regulatory program, which involves the adoption, approval, amendment, or repeal of standards, rules, regulations, or plans for the protection and enhancement of the State's ambient air quality has been certified by the California Secretary for Natural Resources under Public Resources Code section 21080.5 of CEQA (title 14, CCR, section 15251(d)). Public Resources Code section 21080.5 allows public agencies with certified regulatory programs to prepare a "functionally equivalent" or substitute document in lieu of an environmental impact report or negative declaration, once the program has been certified by the Secretary for the Resources Agency as meeting the requirements of CEQA. CARB, as a lead agency, prepares a substitute environmental document (referred to as an "Environmental Analysis" or "EA") as part of the Staff Report to comply with CEQA (title 17, CCR, section 60005).

The Draft Supplemental Environmental Analysis (Draft Supplemental EA) for the Proposed Amendments is included in Appendix D. The Draft Supplemental EA provides a programmatic environmental analysis of an illustrative, reasonably foreseeable compliance scenario that could result from implementation of the Proposed Amendments. The Draft Supplemental EA states that implementation of the Proposed Amendments could result in beneficial impacts to PM, NOx, and GHGs through reductions in emissions from diesel-powered TRUs in California, long-term beneficial impacts to air quality through reductions in criteria pollutants, and beneficial impacts to energy demand.

For the purpose of determining whether the Proposed Amendments will have a potential adverse effect on the environment, CARB evaluated the potential physical changes to the environment resulting from a reasonable, foreseeable compliance scenario.

Implementation of the Proposed Amendments could result in the construction and operation of new or expanded manufacturing facilities for ZE TRU technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

In some cases, potentially significant effects to environmental resources may occur due to implementation of compliance responses associated with the Proposed Amendments. It is expected that many of these potentially significant impacts can be

feasibly avoided or mitigated to a less-than-significant level, due to project-specific environmental review processes associated with compliance responses and compliance with local and State laws and regulations. However, the Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient to mitigate an impact to less than significant or may not be implemented by other parties) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable. Table VII-1 summarizes the potential environmental impacts of the Proposed Amendments.

Table VII-1. Summary of Potential Environmental Impacts

	Resource Area Impact	Significance
1-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Aesthetics	Potentially Significant and Unavoidable
2-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Agriculture and Forest Resources	Potentially Significant and Unavoidable
3-1	Short-Term Construction-Related Effects to Air Quality	Potentially Significant and Unavoidable
3-2	Long-Term Operation-Related Effects to Air Quality	Beneficial
4-1	Short-Term Construction-Related Effects to Biological Resources	Potentially Significant and Unavoidable
4-2	Long-Term Operation-Related Effects to Biological Resources	Potentially Significant and Unavoidable
5-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Cultural Resources	Potentially Significant and Unavoidable
6-1	Short-Term Construction-Related Effects on Energy Demand	Less than Significant
6-2	Long-Term Operation-Related Effects on Energy Demand	Beneficial
7-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Geology, Seismicity, and Soils	Potentially Significant and Unavoidable
8-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Greenhouse Gas Emissions and Climate Change	Beneficial
9-1	Short-Term Construction-Related Effects to Hazards and Hazardous Materials	Potentially Significant and Unavoidable
9-2	Long-Term Operation-Related Effects to Hazards and Hazardous Materials	Less than Significant
10-1	Short-Term Construction-Related Effects on Hydrology and Water Quality	Potentially Significant and Unavoidable

	Resource Area Impact	Significance
10-2	Long-Term Operation-Related Effects to Hydrology and Water Quality	Potentially Significant and Unavoidable
11-1	Short-Term Construction-Related and Long-Term Operation-Related Impacts on Land Use and Planning	Less than Significant
12-1	Short-Term Construction-Related Effects to Mineral Resources	Less than Significant
12-2	Long-Term Operation-Related Effects to Mineral Resources	Potentially Significant and Unavoidable
13-1	Short-Term Construction-Related Noise Effects	Potentially Significant and Unavoidable
13-2	Long-Term Operation-Related Noise Effects	Potentially Significant and Unavoidable
14-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Population and Housing	Less than Significant
15-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Public Services	Less than Significant
16-1	Short-Term Construction-Related and Long-Term Operation-Related Effects to Recreation	Less than Significant
17-1	Short-Term Construction-Related Effects to Transportation	Potentially Significant and Unavoidable
17-2	Long-Term Operation-Related Effects to Transportation	Potentially Significant and Unavoidable
18-1	Short-Term Construction-Related and Long-Term Operational Impacts on Utilities and Service Systems	Potentially Significant and Unavoidable
19-1	Short-Term Construction-Related and Long-Term Operation-Related Effects on Wildfire	Less than Significant

Staff prepared a Notice of Preparation and made it available for review and comment for 30 days, per the CEQA Guidelines (title 14, CCR, section 15082(b)). The comment period for the Notice of Preparation began on July 30, 2019 and ended on August 29, 2019. CARB held public workshops that also served as CEQA scoping meetings to solicit input on the scope and content of the Draft EA on August 28, 2019, September 3, 2019, and September 11, 2019. Written comments on the Draft EA will be accepted starting July 30, 2021, through 5:00 p.m. on September 13, 2021. The Board will consider the Final EA and responses to comments received on the Draft EA before taking action to adopt the Proposed Amendments.

VIII. Environmental Justice

State law defines environmental justice as the fair treatment and meaningful involvement of people of all races, cultures, incomes, and national origins, with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies (Government Code section 65040.12, subd. (e)(1)). Environmental justice includes, but is not limited to, all of the following: (A) The availability of a healthy environment for all people. (B) The deterrence, reduction, and elimination of pollution burdens for populations and communities experiencing the adverse effects of that pollution, so that the effects of the pollution are not disproportionately borne by those populations and communities. (C) Governmental entities engaging and providing technical assistance to populations and communities most impacted by pollution to promote their meaningful participation in all phases of the environmental and land use decision making process. (D) At a minimum, the meaningful consideration of recommendations from populations and communities most impacted by pollution into environmental and land use decisions (Government Code section 65040.12, subd. (e)(2)). The Board approved its Environmental Justice Policies and Actions (Policies) on December 13, 2001, to establish a framework for incorporating environmental justice into CARB's programs consistent with the directives of State law (CARB 2001). These policies apply to all communities in California, but are intended to address the disproportionate environmental exposure burden borne by low-income communities and communities of color. Environmental justice is one of CARB's core values and fundamental to achieving its mission.

Diesel-powered TRUs emit harmful pollutants while in transit and during stationary operation at refrigerated WHDCs, grocery stores, seaports, intermodal railyards, and other locations that are often in close proximity to sensitive receptors, such as schools, hospitals, elder care facilities, and residential neighborhoods. In addition, some facilities, such as refrigerated WHDCs and grocery stores, use TRUs for extended cold storage when facilities run out of space inside their buildings. These facilities store overflow products in TRU-equipped trucks and trailers outside, contributing to higher localized health risk in nearby communities.

Although CARB's existing regulations and incentive programs have reduced freight related emissions, additional reductions are needed to better protect the communities around California freight facilities still exposed to higher risk from diesel-powered sources such as TRUs. These communities bear a disproportionate health burden due to their close proximity to diesel emissions. The impacts of the elevated air pollution burden in these communities can be measured. For example, while exposure to cancer-causing diesel particles has decreased statewide, exposure to diesel particles in disadvantaged communities is on average twice that experienced in

non-disadvantaged communities.[81] In recognition that air pollution heavily impacts disadvantaged communities in California, AB 617 places additional emphasis on protecting such communities by requiring new community-focused and community-driven action to reduce air pollution and improve public health in communities that experience disproportionate burdens from exposure to air pollutants.[82]

The Proposed Amendments are consistent with CARB's environmental justice goal of reducing exposure to air pollutants and reducing adverse health impacts from toxic air contaminants in all communities, including low-income communities and communities of color. As discussed in Chapter III of this Staff Report, the Proposed Amendments will achieve additional emission reductions from TRUs by transitioning diesel-powered truck TRUs to ZE technology, as well as requiring a PM emission standard for newly-manufactured TRUs in the remaining categories and the use of lower-GWP refrigerant. The Proposed Amendments also require applicable facilities to either report all TRU activity to CARB or ensure that only compliant TRUs to operate on their properties. Applicable facility reporting will help CARB staff better identify non-compliant TRUs operating in California and bring them into compliance. Alternatively, only allowing compliant TRUs to operate at an applicable facility incentivizes TRU owners to comply and achieves immediate emission reductions in nearby communities. Based on staff's analysis, approximately 40 percent of the proposed applicable facilities identified are located in disadvantaged communities as designated by CalEnviroScreen (see Figure V-3 in Chapter V for the statewide distribution of the proposed applicable facilities, including those in disadvantaged communities).

The Proposed Amendments are designed to reduce criteria pollutants, toxic air contaminants, GHG emissions, and risk from regional air pollution that can be associated with adverse health impacts. The additional reductions and associated improvements to air quality are designed to help protect all Californians and will be of particular benefit in disadvantaged communities.

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[81] California Air Resources Board, Community Air Protection Blueprint, August 2018. (web link: https://ww2.arb.ca.gov/sites/default/files/2018-08/final_draft_community_air_protection_blueprint_august_2018_1.pdf)

[82] California Health and Safety Code § 40920.6, 42400, 42402, 39607.1, 40920.8, 42411, 42705.5, and 44391.2, Division 26, Assembly Bill No. 617, Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants, July 26, 2017. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617)

IX. Technical Feasibility of the Proposed Amendments

The purpose of this chapter is to describe the various TRU technologies, including their performance considerations, availability, deployment, and cost, that may be used to meet the requirements of the Proposed Amendments. The Proposed Amendments do not prescribe a single set of technologies, but instead allow any technology to be used to meet the requirements. The Proposed Amendments can be met through the application of existing technologies and solutions that are available today. In addition, staff anticipate that certain technologies, described herein, will become available within the timeframe of the Proposed Amendments. This chapter evaluates the current and projected technologies that may be used to comply with the following requirements of the Proposed Amendments:

- Truck TRU fleets shall transition to full ZE technology by replacing 15 percent of the diesel-fueled fleet per year. The current regulation does not have a ZE requirement for truck TRUs.
- MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines shall meet a PM emission standard of 0.02 g/hp-hr or lower. The current regulation requires that these engines meet ULETRU by December 31 of the seventh year after the engine MY.
- Newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs shall use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all. The current regulation does not have a refrigerant requirement.

Expanded descriptions and technical details of the technologies discussed in this chapter can be found in the CARB's 2015 Draft Technology Assessment: Transport Refrigerators.[83]

A. Proposed Requirement: ZE Truck TRUs

The Proposed Amendments require truck TRU fleets to transition to ZE technology by replacing 15 percent of the diesel-fueled truck TRU fleet per year. Truck TRUs are used to refrigerate cargo in straight trucks where the trailer is permanently attached to the truck cab. Truck TRUs often travel shorter distances, return to a home base each night, and can be charged at the depot or the location where they are dispatched. These operational characteristics make truck TRUs ideal candidates for the currently available ZE TRU technologies discussed below.

[83] California Air Resources Board, Technology Assessment: Transport Refrigerators, August 2015. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-06/TRU%20Tech%20Assessment%20Report%20ada.pdf)

1. Description of Available ZE Truck TRU Technology

a. Battery-Electric Truck TRU

In battery-electric truck TRUs, the diesel engine powering the compressor and fans is removed and replaced with electric motors to drive those components. Battery packs provide electrical power to the TRU while on the road and away from grid-connected electric power plugs. Straight truck box lengths vary between 12 and 28 feet. The required size of the battery pack is dependent on the size of the truck, as well as other factors specific to each operation, including the length of the route, product being transported, temperature of the load, number of door openings on the route, and outdoor temperature.

Currently available battery-electric truck TRUs utilize lead-acid or lithium-ion battery technology. Deep cycle lead-acid absorbed glass mat batteries are designed to discharge between 45 percent and 75 percent of their capacity, but they are heavy. Depending on the number needed, lead-acid batteries can create a payload impact and cause additional wear and tear on the truck. However, they are less expensive than advanced batteries, such as lithium-ion. Lithium-ion batteries are lighter, take up less space, and are lower maintenance. They are capable of high charge/discharge rates and have no memory effect if they are repeatedly only partially discharged before being recharged. Lithium-ion batteries also have a long life if managed properly. Lithium-ion batteries currently cost more than other battery chemistries, but can vary widely, depending on cell capacity, performance needed, and the number being produced.

Existing deployments of battery-electric truck TRUs use solar panels to extend the operating range of the TRU, in which the energy collected by the solar assist system is used to directly run the refrigeration system or refuel the batteries. In existing battery-electric truck TRU deployments, high-efficiency monocrystalline silicone solar photovoltaic (PV) cells are mounted on a flexible support foundation in modules so they can withstand road vibration and shock. These PV modules are mounted on top of the refrigerated truck van's roof to capture solar irradiation and collect the energy as direct current (DC) electricity using the photovoltaic effect. A solar charge controller is used to optimize the power coming from the PV cells and manage the electric power delivery to the on-board battery pack. A DC-to-alternate current (AC) inverter is part of the battery management system to convert DC power from the solar array and batteries to AC power for the refrigeration compressor, electronic controls, and condenser and evaporator fans. High-efficiency scroll compressors can be driven by DC inverter systems that vary the frequency to control compressor speed, which provides a more energy efficient, precise temperature control. Existing battery-electric truck TRUs need about 7kW of electric power input, which is the amount of power that the inverter needs to deliver from the battery (and solar panels if installed) with no optimization of the refrigeration system or insulated truck van. Figure IX-1 shows battery-electric truck TRUs with solar assist.

Figure IX-1. Battery-Electric Truck TRUs with Solar Assist

Most of the cooling capacity and power demand of a TRU is needed for a quick chill-down of the truck van prior to loading. Loads on the refrigeration system can also be heavier after each door opening on a multi-stop delivery route. The load on the refrigeration system to maintain the temperature set point after chill-down is much less and depends on the temperature set point, the amount and condition of the truck van insulation, ambient temperature, product being hauled, and other factors.

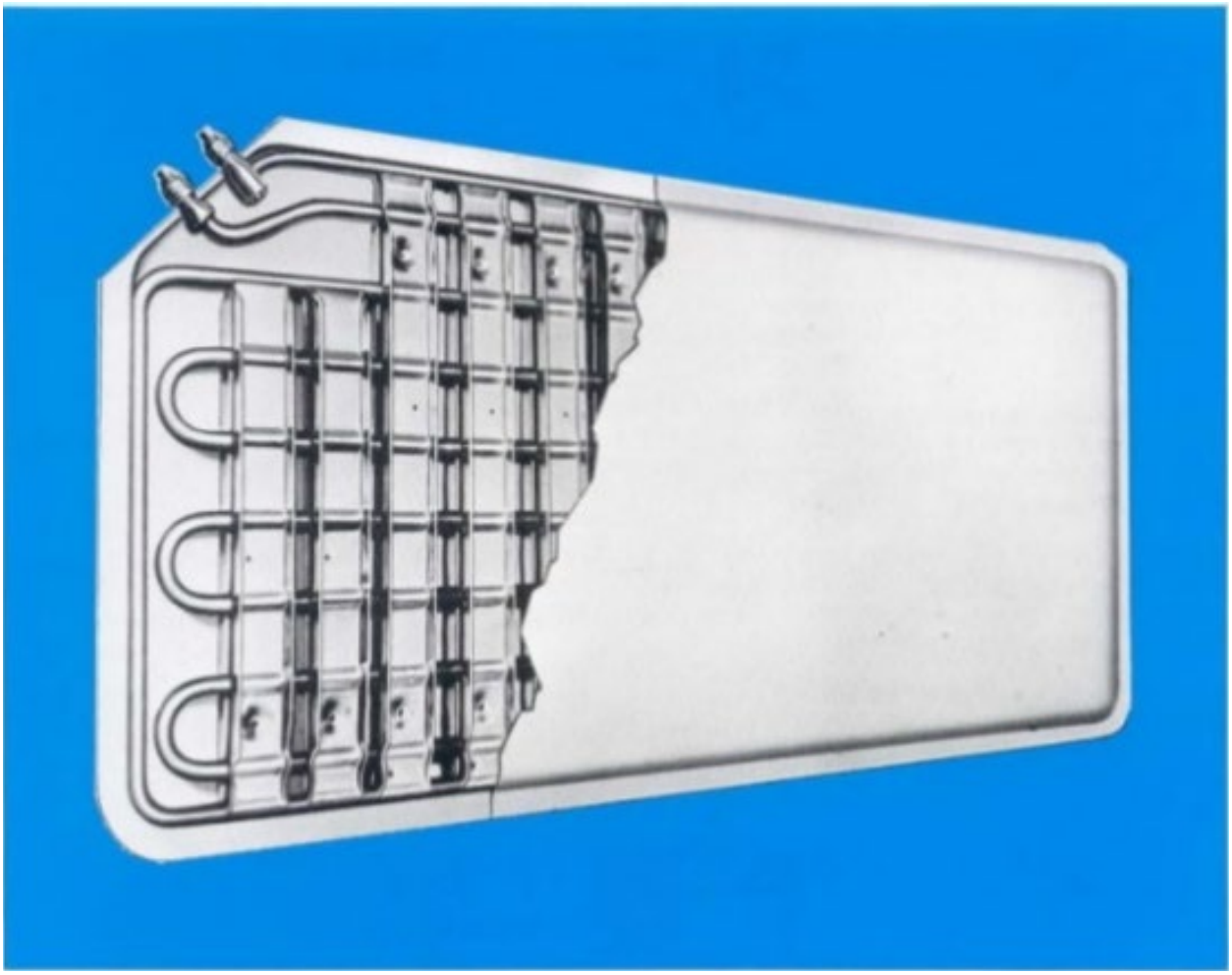
Battery-electric truck TRUs require supporting electrical infrastructure to recharge the batteries and run the TRU while stationary (e.g., to facilitate the initial pre-chill of the

truck van prior to loading and after loading, and to power the refrigerator while parked and waiting for dispatch). The most common infrastructure for a battery-electric truck TRU is a Level 2 electrical vehicle supply equipment (EVSE) that requires a 208- or 240-volt wall outlet and a J1772 connector.

b. Cold Plate Truck TRU

Cold plate truck TRU systems consist of a sheet metal shell, with cooling coils built inside to hold the eutectic fluid. The fluid used in cold plates is a mixture of water and salts (e.g., sodium and potassium salts) that form a eutectic solution that has the lowest possible melting/freezing point. Cold plates are similar to the gel packs used in lunch boxes and ice chests, but larger. Figure IX-2 shows a eutectic cold plate, in which the refrigeration unit's evaporator coils are built into a sheet metal shell. The refrigeration unit is plugged into electric power until the eutectic plates are frozen.

Figure IX-2. Cold Plate



Cold plate truck TRU systems provide refrigeration in the cargo area of the truck by absorbing the heat load coming through the walls, ceiling, floor, and doors and any heat generated by the load itself (e.g., from produce respiration). All of the eutectic salt mixture's constituents go through a phase change, from solid state to liquid state, simultaneously within the plates as they absorb the heat load. The plates are mounted on the ceiling and/or interior walls or as partitions of the cargo area. Some systems include fans and evaporator-blowers. The cold plate TRU system can offer single- or multi-temp applications. Once the cold plates are frozen and the product is loaded, the TRU is unplugged, and the truck begins the refrigerated deliveries. Figure IX-3 shows a cold plate system with blowers.

Figure IX-3. Cold Plates and Blowers

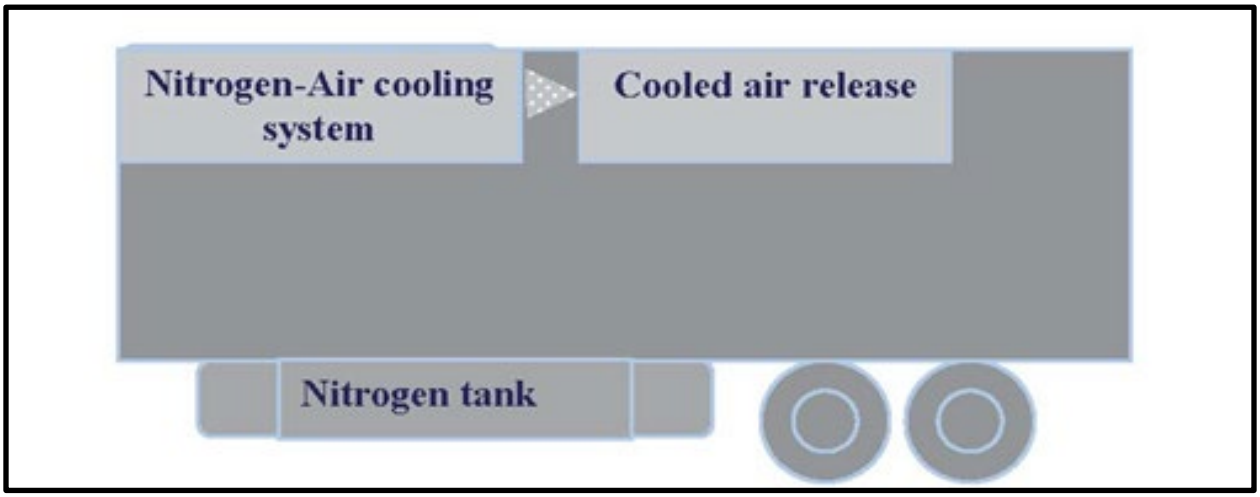
Once the cold plates are used, they must be refrozen by plugging into a single-phase or 3-phase electric power source. Cold plates are refrozen in-place in the cargo area, which requires 6 to 8 hours of stationary plug-in time. Similar to what was described in the previous section for battery-electric TRUs, Level 2 EVSE are the most common charging infrastructure for cold plate TRU systems. In addition to recharging (refreezing) the cold plates, the batteries can also be recharged while plugged into shore power.

c. Cryogenic Truck TRU

In cryogenic truck TRUs, a cryogenic fluid (liquid CO2 or liquid nitrogen) is the cooling agent, which replaces the diesel engine-driven refrigeration system utilized in a conventional TRU. Stored at temperatures below -150°F (-100°C), the cryogenic fluid is contained in a refillable storage tank on the truck near the cargo space. When cooling is needed by the microprocessor controller, valves open to allow the liquid to flow from the tank into the evaporator coils, also called a heat exchanger, inside the cargo space. Electric fans circulate air through the coils. As the liquid evaporates, it cools the coil and the air passing over it. As a result, cool air is circulated through the cargo

maintaining the temperature set-point. Having cooled the coil and the air, the gas is directed outside the vehicle body into the atmosphere. This is considered indirect cooling. Currently available cryogenic truck TRU applications utilize indirect cooling. In indirect cooling, the gas never enters the cargo space, and the load temperature and humidity are controlled by airflow. Figure IX-4 shows a depiction of indirect cryogenic cooling.

Figure IX-4. Indirect Cryogenic Cooling



The primary components of currently available cryogenic truck TRUs include the cryogenic storage tank, a heat exchanger to dispense the cryogenic fuel and transfer cooling, and fans to circulate air. In addition, controllers and flow regulators are needed to meter the dispensing of the cryogenic fluid to properly control the desired temperature. Often, electronic sensors and controllers are used to ensure desired temperatures are maintained and safety systems are robust. The cryogenic truck TRU has fewer moving parts than a conventional diesel-powered truck TRU, as it does not require an engine or compressor. Some of the equipment is exposed to cryogenic liquids, so the materials must be compatible with very cold temperatures.

Existing cryogenic truck TRUs use either liquid CO2 or liquid nitrogen. Liquid CO2 is collected as a byproduct from petroleum refining. The refueling infrastructure consists of a bulk storage tank and a dispenser with a liquid nitrogen fill pipe. Dispensers can be gravity or pump fill. The gravity dispensers can be very slow to fill dependent on the temperature and pressure differentials between the dispensing tank and the receiving tank. Dispensers can be configured to fill a single tank or multiple tanks, as needed.

2. ZE Truck TRU Technology Performance

Staff determined that each of the currently available ZE truck TRU technologies are capable of meeting the following performance parameters.

Ability to Perform the Duty Cycle

TRUs must be capable of maintaining the optimum "set point" temperature to ensure product integrity and providing fast "pull-down" (pre-cool) to prepare the cargo space for loading (typically in under 30 minutes), and to recover quickly from door openings that occur during deliveries. Straight truck TRUs are rated at 5,000 to 33,000 British Thermal Units per hour cooling capacity depending on the thermostat set point. Most transport refrigeration applications demand high-performance cooling capacity and airflow. Delivery routes using truck TRUs often require doors to be opened frequently. Rapid cool-down after each delivery stop is required and the additional fan load and evaporator load for multiple cooling zones in a truck also adds to the power demand on the engine.

Operating Range

For TRUs, operating range is the number of hours of operation between refueling. Truck TRUs are generally used for local and regional delivery in grocery and foodservice distribution. Typically, drivers of TRU-equipped trucks deliver to a number of customers along a route, such as to convenience stores, restaurants, and cafeterias. Truck TRUs generally require a minimum of 8 to 10 hours of daily operation between refueling, depending on factors specific to each operation, including the length of the route, product being transported, temperature of the load, number of door openings on the route, and outdoor temperature.

Payload Impacts

Maximizing the payload carrying capacity for a refrigerated truck generally improves the economics of transport operations. Space and weight payload capacity can be reduced by heavy temperature control technologies. Reducing payload capacity has a negative impact on potential revenue and the rate of return for the equipment. In addition, reducing cargo space may result in more loads/trips and increased environmental impacts.

Infrastructure Availability

According to the statewide TRU emission inventory, truck TRUs operating in the State are almost entirely California-based. Truck TRUs are generally used for local and regional delivery, and return to a home base each night. Based on their daily operational characteristics and operating range of current technologies, TRUs installed on trucks are well suited for ZE, because they would not require additional refueling or recharging infrastructure outside their home terminals or distribution centers before dispatch.

a. Battery-Electric Truck TRU

Battery-electric truck TRUs achieve the key performance parameters required for transport refrigeration with the ability to perform their duty cycles by maintaining optimum set point temperature and providing fast pre-cool of the cargo area.

Current battery-electric truck TRUs achieve the necessary operating range of 8 to 10 hours per day with batteries ranging in size from 10 to 60 kilowatt hours (kWh). A 40 kWh battery can handle a medium to frozen temperature load for an 8-to-12-hour route, depending on depending on factors specific to each operation. With solar assist, operating range is increased by 1 to 2 hours per day.

These systems have minimal impact on the payload capacity because the addition of batteries and solar panels is offset by the removal of the diesel engine.

It is expected that truck TRU owners would install infrastructure at their home terminals or distribution centers, enabling battery-electric truck TRUs to recharge their batteries at night or before dispatch. In addition, battery-electric truck TRUs may utilize Level 2 EVSE already installed and operational throughout California to support light-duty and medium-duty vehicles. As of May 2021, approximately 27,000 Level 2 charging outlets are located at over 13,000 stations statewide.[84]

b. Cold Plate Truck TRU

Cold plate truck TRU systems achieve the key performance parameters required for transport refrigeration and have the ability to perform their duty cycles by maintaining optimum set point temperature and providing fast pre-cool of the cargo area.

Current cold plate truck TRU systems are capable of providing cooling for daily runs of 10 to 12 hours.

Cold plate truck TRU systems have minimal impact on the payload capacity because the weight of the cold plates and batteries is offset by the removal of the diesel engine.

Similar to battery-electric truck TRU owners, it is expected that cold plate truck TRU owners would install infrastructure at their home terminals or distribution centers to recharge at night or prior to dispatch. Cold plate TRUs may also utilize the Level 2 EVSE operational at charging stations across the State.

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[84] U.S. Department of Energy, Energy Efficiency and Renewable Energy Alternative Fuels Data Center, Alternative Fueling Station Counts by State. (web link: https://afdc.energy.gov/stations/states, last accessed May 12, 2021).

c. Cryogenic Truck TRU

Cryogenic truck TRU systems achieve the key performance parameters required for transport refrigeration by maintaining optimum set point temperature, providing fast pre-cool of the cargo area, and faster set point temperature recovery after door openings. Ventilation fans can be used to begin the pre-cool process without the need of any fuel usage.

Current cryogenic truck TRU systems for truck applications achieve the necessary operating range of 8 to 10 hours per day required for foodservice and grocery distribution. With solar assist, operating range can be increased 1 to 2 hours a day.

Cryogenic truck TRU systems have minimal impact on the payload capacity of the TRU because the weight of the cooling system and nitrogen tanks is offset by the removal of the diesel engine.

The infrastructure required for cryogenic truck TRU systems includes the installation of a liquid CO2 or liquid nitrogen fueling station. Public access to liquid CO2 and liquid nitrogen fueling is limited. Liquid nitrogen is produced in air separation units and there are approximately 40 air separation units in California concentrated around densely populated regions such as Southern and Northern California.[85] It is expected that cryogenic truck TRU owners would install infrastructure at their home terminals or distribution centers to refuel at night or prior to dispatch. For larger fleets, complete detailed construction site plans for installation of fueling stations are available from cryogenic suppliers. Liquid nitrogen tank leasing options are available for smaller fleets.

3. ZE Truck TRU Technology Availability

a. Battery-Electric Truck TRU

As of January 2021, both of the two major TRU manufacturers do not have a commercially available ZE truck TRU. However, both manufacturers have indicated to staff that they are currently developing and intend to have a battery-electric truck TRU available in time to meet the ZE truck TRU implementation dates in the Proposed Amendments. Demonstration products are anticipated for 2021 with limited sales beginning in 2022.[86] In addition, there are two small-scale manufacturers with battery-electric truck TRUs available in the United States: Volta Air and eNOW.

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[85] Presentation by Cold Clean Power to CARB, "Overview for CARB," March 2021.
[86] Claimed confidential data obtained from an industry source that requested non-attribution.

b. Cold Plate Truck TRU

Cold plate truck TRUs are fully commercialized, having been in use for over 50 years, and their designs have improved over the years along with the refrigeration system. Both Dole Refrigerating Company and Great Dane Johnson (formerly Johnson Truck Bodies) offer cold plate systems in the United States. The current market share for truck refrigeration is about 20 percent cold plates and 80 percent mechanical or diesel-powered.[87]

c. Cryogenic Truck TRU

Cryogenic truck TRU technologies are commercially available in Europe. Thermo King produces the CryoTech indirect liquid CO2 (using R-744 refrigerant) system as the CT-10 Spectrum multi-temp truck unit and the CT-10 single temp truck unit.[88] In the United States, Cold Clean Power (formerly Dearman Engine Company) plans to begin marketing their cryogenic truck TRU in late 2021.

4. ZE Truck TRU Technology Deployment

a. Battery-Electric Truck TRU

As of January 2021, there are two small-scale manufacturers with battery-electric truck TRUs in operation in California. D&D Wholesale operates three ZE Volta Air truck TRUs. Volta Air has a total of 20 fully battery-electric truck TRUs in operation in the United States and another 30–35 in operation in Canada. eNOW also has one ZE truck TRU in operation in California.

b. Cold Plate Truck TRU

In the United States, the majority of cold plates are produced by Dole Refrigerating Company. They have over 100 standard cold plate sizes plus numerous made-to-order custom-sized cold plates. About 500 new refrigerated trucks per year are produced with cold plate refrigeration systems.[89]

c. Cryogenic Truck TRU

As of January 2021, there are no cryogenic truck TRUs operating in the United States. However, there is one Cold Clean Power cryogenic truck TRU and over 500 Thermo King CryoTech truck units in operation in Europe.[90] Cold Clean Power anticipates

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[87] Phone conversation between Great Dane Johnson staff and Renee Coad (CARB) dated January 2020.
[88] Thermo King, CryoTech Brochure, 2020. (web link: https://europe.thermoking.com/wp-content/uploads/2019/07/TK80.22_CryoTech-08-2020-EN_V1.0.pdf)
[89] Phone conversation between Great Dane Johnson staff and Renee Coad (CARB) dated January 2020.
[90] Phone conversation between Thermo King staff and Lea Yamashita (CARB) dated May 14, 2021.

being able to produce approximately 1,500 cryogenic truck TRUs in the United States beginning in 2022 and ramp up each year to meet market demands.[91]

5. ZE Truck TRU Technology Cost

Staff determined the total cost of ownership for a ZE truck TRU compared to a conventional diesel-powered truck TRU. ZE truck TRUs have higher upfront costs than diesel-powered truck TRUs, but their maintenance costs provide cost savings over the useful lifetime. In addition to the operational savings attributable to ZE TRUs, owners may generate Low Carbon Fuel Standard (LCFS) credit revenue. Credits are generated by the purchase and/or usage of electricity, hydrogen, or other low carbon fuels to displace internal combustion fuel, such as diesel fuel. The credits have a monetary value when sold to regulated parties who must offset deficits created by their supply of fuels with carbon intensities that exceed the LCFS standards. Table IX-1 shows the cost of ownership for a ZE truck TRU compared to a diesel-powered truck TRU.

Table IX-1. Cost of Ownership for ZE and Diesel-Powered Truck TRUs

	Diesel-Powered Truck TRU	Battery-Electric Truck TRU	Cold Plate Truck TRU	Indirect Cryogenic Truck TRU
Capital Equipment Cost	$19,300	$44,600	$23,000	$45,000
Capital Infrastructure Cost (includes installation)	n/a	$4,887	$4,887	$0[92]
Annual Fuel Cost	$1,780[93]	$2,550[94]	$2,550	$6,120
Annual Equipment Maintenance Cost	$1,290	$680	$680	$900
Annual Infrastructure Maintenance Cost	n/a	$93	$93	$200
Annual LCFS Credit	n/a	(-$2,000)[95]	(-$2,000)	n/a
Total Cost of Ownership[96]	$52,550	$69,260	$44,800	$123,150

[91] Email from Brett Gipe (Cold Clean Power) to Lea Yamashita (CARB) dated January 15, 2021.
[92] Assumes liquid nitrogen fuel available onsite. Capital cost of $120,000 - $180,000 for tank with 20 unit capacity. Lease options available for approximately $3,000 per month.
[93] Assumes 1,360 annual operating hours, fuel consumption rate of $0.55 gallons per hour, and 2023 diesel price of $2.38 per gallon. See Appendix B for more information.
[94] Assumes 40 kWh battery size, 312 operating days, and 2023 electricity price of $0.19 per kWh. See Appendix B for more information.
[95] Assumes 2023 LCFS credit price of $0.16 per kWh. See Appendix B for more information.
[96] Assumes 10 year useful life. Capital costs amortized over a five year period at 5 percent interest.

6. ZE Truck TRU Technology in Development

a. Fuel Cell Truck TRU

Hydrogen (H2) proton-exchange membrane (PEM) fuel cells are devices that convert H2 and oxygen to water, creating electricity and some heat in the process. Compressed H2 molecules enter the cell on the anode side of the fuel cell, get distributed across the membrane surface and catalytically dissociated, releasing the electrons, which are conducted out through the anode to the load, shown here as a light bulb. The hydrogen ions (protons) diffuse through the proton exchange membrane to the cathode side of the fuel cell. Air enters the cathode side of the fuel cell as oxygen molecules are dispersed across the membrane surface.

The electrons return from load through the cathode to a catalytic surface, where they recombine with hydrogen ions and oxygen to form water. The water serves as the electrolyte hydrating the membrane to keep it functional and stable. Some heat is created in the process, but all of this typically occurs at 60 to 80 °C (140 to 180 °F).

A number of fuel cells are stacked together to form the fuel cell stack, which is the primary energy system. As more fuel cells are stacked together, the power capacity of the stack increases. The power needed for the initial chill-down of the truck van typically determines the peak power capacity for the TRU.

Fuel cell components include energy storage (batteries may be used to provide power in excess of nominal power during peak loads), filters, flow meters, an air compressor, air humidifier, a DC-to-AC inverter, a DC-to-DC converter, cooling system for the stack, batteries, and DC-to-DC converter (e.g., coolant pump, intercooler, radiators, and fans), protective devices, sensors, an electronic control unit, system controller, cables, and connectors. An on-board H2 storage tank rated for high pressure and sized to provide adequate range is also necessary,

Fuel cell TRU systems achieve the key performance parameters required for transport refrigeration with the ability to perform their duty cycles by maintaining optimum set point temperature and providing fast pre-cool of the cargo area. These systems have lowered payload impacts without the use of a diesel engine, but this technology has payload impacts due to on-board fuel storage. The addition of batteries and solar panels to increase range may also have payload impacts.

The H2 infrastructure required for this technology has limited public availability. There are approximately 30 H2 fueling stations located throughout California with concentrations in Southern California, the Bay Area, and some stations in the Sacramento region.

Fuel cell TRUs have been demonstrated. However, the high cost of the technology and limited availability of H2 infrastructure need to be addressed prior to market acceptance.

B. Proposed Requirement: PM Emission Standard

The Proposed Amendments require newly-manufactured (MY 2023 and newer) trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines to meet a PM emission standard of 0.02 g/hp-hr or lower. In-use (MY 2022 and older) engines would continue to operate under the current regulatory requirements, in which they are required to meet ULETRU by December 31 of the seventh year after the engine MY.

1. Description of PM Emission Standard Technology

MY 2013 and newer TRU engines in the 25 to less than 50 horsepower category are certified to the U.S. EPA Tier 4 final off-road engine standards and meet the 0.02 g/hp-hr standard.

2. PM Emission Standard Technology Availability

Both Carrier and Thermo King have commercially-available TRUs with engines certified to meet the PM standard.

3. PM Emission Standard Technology Deployment

As of November 2020, over 44,000 trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets are registered in ARBER that are equipped with a certified engine that meets the PM standard. Table IX-2 shows the number of TRUs equipped with a certified engine that meets the PM standard by manufacturer.

Table IX-2. Number of TRUs Equipped with a Certified Engine that Meets PM Standard (as of November 2020)

TRU OEM	Number of Registered TRUs Equipped with a Certified Engine that Meets PM Standard
Carrier	270
Thermo King	43,880
Other	10
Total	44,160

4. PM Emission Standard Technology Cost

The estimated cost of a TRU equipped with an engine certified to meet the PM standard is based on the average cost of commercially available single-temperature and multi-temperature units with greater than 25 horsepower engines, as shown in Table IX-3.

Table IX-3. Capital Cost of TRU Equipped with a Certified Engine that Meets PM Standard

Equipment Type	Cost (per Unit)
Diesel Trailer TRU/DSC TRU/Railcar TRU	$28,390
TRU Generator Set	$19,900

C. Proposed Requirement: Lower-GWP Refrigerant

The Proposed Amendments require newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California to use a refrigerant with a GWP value less than or equal to 2,200, or use no refrigerant at all.

1. Description of Available Refrigerant Technology

In the United States, the predominant refrigerant used in TRUs is R-404A. Despite being non-ozone-depleting, R-404A has a high-GWP value of 3,922, which is above the proposed threshold of 2,200. R-452A is a hydrofluoroolefin-based replacement for R-404A. Like R-404A, R-452A is non-ozone depleting, but has a lower-GWP of 2,140 and meets the proposed threshold. It can be used in new transport refrigeration equipment and for the retrofit of existing systems. R-452A is a "design-compatible" replacement for R-404A because it offers similar levels of refrigeration performance, fuel efficiency, reliability, and refrigerant charge.[97] U.S. EPA approved R-452A for use in transport refrigeration applications in 2017.[98]

2. Refrigerant Technology Availability

TRUs in Europe have been using R-452A since 2015, as a result of the European Union F Gas Regulation requiring the phase down in the use of HFCs.[99] In the United States, both of the two major TRU manufacturers offer R-452A as an option for truck TRUs, trailer TRUs, and DSC TRUs.

3. Refrigerant Technology Deployment

TRUs using R-452A refrigerant are commercially available from both of the two major TRU manufacturers. However, very few units in the United States use R-452A, because it is higher in cost compared to R-404A and its use is unregulated. As of

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[97] Refrigerated Transporter, "Carrier Transicold will offer R-452A for reefer transport," July 28, 2017. (web link: https://www.refrigeratedtransporter.com/going-green/article/21721031/carrier-transicold-will-offer-r452a-for-reefer-transport)
[98] United States Environmental Protection Agency, Federal Register, Vol. 82, No. 139, Page 33823, July 21, 2017. (web link: https://www.govinfo.gov/content/pkg/FR-2017-07-21/pdf/2017-15379.pdf)
[99] European Commission, "EU legislation to control F-gases." (web link: https://ec.europa.eu/clima/policies/f-gas/legislation_en, last accessed March 1, 2021)

November 2020, there are approximately 100 units in the United States that use R-452A. In Europe, nearly all of the TRUs use R-452A and all of the units coming from Europe that operate in the United States (approximately 3,000 units) use R-452A.[100]

4. Refrigerant Technology Cost

R-452A is a "design-compatible" replacement for R-404A and offers similar levels of refrigeration performance, fuel efficiency, and refrigerant charge. Therefore, the only cost consideration is the higher cost of R-452A refrigerant compared to R-404A refrigerant. The refrigerant capital cost is the amount of refrigerant used (charge size) multiplied by the per-pound cost of the refrigerant. Based on manufacturer specifications for commercially-available truck TRUs, trailer TRUs, and DSC TRUs from the two major TRU manufacturers, staff used a refrigerant capacity of 6.5 pounds[101,102] for truck TRUs and 16 pounds[103,104] for trailer TRUs and DSC TRUs. Staff estimated the average initial charge with R-452A would cost $38 more for a truck TRU and $100 more for a trailer TRU or DSC TRU, as compared with an initial charge with R-404A. Table IX-4 shows the capital cost comparison between R-45A and R-404A.

Table IX-4. Refrigerant Capital Costs (2019$)

Equipment Type	Baseline Cost (R-404A)	Proposed Cost (R-452A)	Incremental Cost (Proposed Cost – Baseline Cost)
Truck TRU	$25	$64	$38
Trailer TRU and DSC TRU	$66	$166	$100

A TRU may need recharging to restore its nominal charge amount throughout its useful life. Table IX-5 shows the maintenance cost comparison between R-452A and R-404A refrigerant. Staff calculated refrigerant maintenance costs based on an assumed leak rate of 15 percent per year[105] (for all refrigerants) and the refrigerant capacity for truck TRUs, trailer TRUs, and DSC TRUs discussed previously. Based on

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[100] Claimed confidential data obtained from an industry source that requested non-attribution.
[101] Carrier Transicold, Supra S8 Performance Specifications, December 2020. (web link: https://www.shareddocs.com/hvac/docs/2000/Public/05/62-12105.pdf)
[102] Thermo King, T-690 and T-690 Max Specifications, February 2020. (web link: https://2v0usj4e6l6t2qrqk1maqr81-wpengine.netdna-ssl.com/wp-content/uploads/2019/12/T-690-Spec-Sheet.pdf)
[103] Carrier Transicold, X4 7300 Performance Specifications, February 6, 2020. (web link: https://www.shareddocs.com/hvac/docs/2000/Public/0C/62-11663.pdf)
[104] Thermo King, Precedent S-610DE Specification Sheet, April 2017. (web link: https://2v0usj4e6l6t2qrqk1maqr81-wpengine.netdna-ssl.com/wp-content/uploads/2015/04/2020-Precedent-S-610DE-Spec-Sheet.pdf)
[105] California Air Resources Board, California's High Global Warming Potential Gases Emission Inventory Methodology and Technical Support Document, April 2016. (web link: https://ww3.arb.ca.gov/cc/inventory/slcp/doc/hfc_inventory_tsd_20160411.pdf)

conversations with industry stakeholders, staff expect that as R-404A is phased out and R-452A becomes the predominant refrigerant in response to the Proposed Amendments, the cost of R-452A will decrease.

Table IX-5. Refrigerant Maintenance Costs (2019$)

Equipment Type	Baseline Cost (R-404A)	Proposed Cost (R-452A)	Incremental Cost (Proposed Cost – Baseline Cost)
Truck TRU	$6	$14	$8
Trailer TRU and DSC TRU	$14	$35	$19

5. Refrigerant Technology under Development

U.S. EPA approved R-744 for use in transport refrigeration applications in 2014.[106] R-744 is refrigerant-grade CO2, used as a replacement for R-404A in ultra-low, low, and medium temperature refrigeration applications. CO2 refrigerant has a GWP of 1, roughly 2,000 times lower than R-452A and 4,000 times lower than R-404A. It is also non-flammable, non-ozone-depleting, globally available, and cost-effective.

A challenge with the application of CO2 as a refrigerant is the higher operating pressures compared to other commercial refrigerants. As a result, system components, tools, and equipment must be rated to safely operate at these higher pressures.

Carrier has successfully applied CO2 refrigerant in stationary commercial refrigeration systems widely used throughout Europe, including NaturaLINE container refrigeration systems used by container shipping lines and prototype trailer refrigeration trials with two European supermarket chains.[107] In Europe, Thermo King offers the CryoTech indirect liquid CO2 (using R-744 refrigerant) system as the CT-15 Spectrum multi-temp trailer unit, CT-15 single-temp trailer unit, CT-10 Spectrum multi-temp truck unit, and the CT-10 single temp truck unit.[108] The application of CO2 as a refrigerant in the United States is still under development.

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[106] United States Environmental Protection Agency, Federal Register, Vol. 79, No. 203, October 21, 2014. (web link: https://www.govinfo.gov/content/pkg/FR-2014-10-21/pdf/2014-24989.pdf)
[107] Freight Waves, "Carrier Transicold reefer unit uses CO2 as refrigerant," October 9, 2013. (web link: https://www.freightwaves.com/news/carrier-transicold-reefer-unit-uses-co2-as-refrigerant)
[108] Thermo King, CryoTech Brochure, 2020. (web link: https://europe.thermoking.com/wp-content/uploads/2019/07/TK80.22_CryoTech-08-2020-EN_V1.0.pdf)

X. Standardized Regulatory Impact Analysis

Government Code sections 11346.2(b)(2) and 11346.3(c) require the preparation of a SRIA for a major regulation as defined by DOF regulations. The Proposed Amendments are a major regulation requiring a SRIA because the economic impact of the regulation is projected to exceed $50 million in a 12-month period. This chapter summarizes the economic impact of the Proposed Amendments as presented in the SRIA, which can be found in Appendix B, as well as on the DOF website. CARB responses to comments received from DOF can be found in Appendix C.

A. Direct Costs

The total net cost of the Proposed Amendments from 2022 to 2034 is estimated to be $1.04 billion. Direct costs include capital costs for ZE truck TRUs and supporting infrastructure, new TRUs equipped with engines certified to meet the PM standard, lower-GWP refrigerant, TRU refrigerant maintenance costs, truck TRU infrastructure maintenance costs, electricity usage, CARB fees, and administrative costs for registration and reporting. Cost savings include truck TRU capital costs, truck TRU maintenance cost savings, truck TRU diesel fuel savings, and LCFS credit revenue. Aside from LCFS credit revenue, the cost analysis does not include incentive funding. The actual cost of the Proposed Amendments may be lower if TRU owners take advantage of existing funding programs.

1. Changes Made since the SRIA

The Proposed Amendments have been updated since the release of the SRIA on May 12, 2021. These changes include increasing the number of CARB staff needed to implement and enforce the Proposed Amendments and updating the salary amount used for the Staff Services Manager I position. These changes resulted in an increase of proposed TRU operating and applicable facility operating fees. In the SRIA, the TRU operating fee for a diesel TRU was $43, the TRU operating fee for a ZE TRU was $22, and the applicable facility registration fee was $43. In the updated proposal, the TRU operating fee for a diesel TRU is $54, the TRU operating fee for a ZE TRU s $27, and the applicable facility registration fee is $54.

Staff also updated the economic analysis to account for sales taxes on the capital cost of truck TRU charging infrastructure and additional costs to CARB, including the indirect labor cost for new CARB staff and operational costs (e.g., compliance labels, envelopes, and postage). As a result of these changes, the net cost of the Proposed Amendments from 2022 to 2034 is estimated to be $1.04 billion (previously $1.03 billion).

2. Cost Inputs

a. TRU Populations, New Sales, and TRU Activity

The Proposed Amendments include different requirements and associated costs for each TRU type. Staff divided the affected TRU population into five categories for the economic analysis, including truck TRUs, trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets. All estimates for annual TRU populations, new sales, and TRU activity are from the statewide TRU emission inventory. The data sources and methodology used in the statewide TRU emission inventory are described in Appendix H.

b. Applicable Facility Populations

The Proposed Amendments include refrigerated WHDCs with a building size of 20,000 square feet or greater, grocery stores with a building size of 15,000 square feet or greater, seaport facilities, and intermodal railyards. To determine the number of applicable facilities subject to the facility registration, registration fee, and reporting requirements in the Proposed Amendments, staff developed a refrigerated facility inventory based on datasets from various sources, including CARB, other State departments, contracted businesses, and online refrigerated business sites. More information on the applicable facilities included in the Proposed Amendments is provided in Appendix F.

Staff estimated the statewide number of applicable facilities subject to the Proposed Amendments by determining the number of facilities above the proposed size threshold for each facility type in the refrigerated facility inventory. Table X-1 provides the estimated statewide applicable facility population by type in 2020. Staff applied a 1.6 percent annual growth rate in future years, which is equal to the TRU growth rate used in the statewide TRU emission inventory.

Table X-1. Estimated Statewide Applicable Facility Population in 2020

Facility Type	Population
Refrigerated WHDC - (Building size greater than or equal to 20,000)	2,167
Grocery Store - (Building size greater than or equal to 15,000 square feet)	3,918
Seaport Facility (No size threshold)	25
Intermodal Railyard (No size threshold)	9
Total	6,119

c. Equipment Capital Costs to TRU Owners

i. ZE Truck TRU Purchases

The Proposed Amendments require TRU owners to transition a percentage of their truck TRU fleet to ZE technology each year starting in 2023. Truck TRU owners can comply with the Proposed Amendments using a combination of battery-electric, cold plate, solar, and cryogenic ZE technologies. It is difficult to predict TRU owners' future plans for complying with the Proposed Amendments, especially as battery technologies improve and costs continue to decline. Although cold plate units are less expensive, staff assumed TRU owners would comply with the ZE truck TRU requirement by purchasing battery-electric truck TRUs. This is based on stakeholder input,[109] and that many products require TRUs to both heat and cool in order to maintain a stable temperature while controlling humidity and promoting adequate airflow, which other technologies are not capable of.

Staff estimated the cost of a battery-electric truck TRU by adding electric component, energy storage, and additional labor costs to a conventional diesel-powered TRU. The battery cost is the largest contributing factor associated with the price of a battery-electric TRU. Straight truck box lengths vary between 12 and 28 feet. The required size of the battery is dependent on the size of the truck, as well as other factors specific to each operation, including the length of the route, product being transported, temperature of the load, number of door openings on the route, and outdoor temperature.

The current average battery capacity for light-duty electric vehicles is 45 kWh,[110] which is comparable in size to current offerings of battery-electric truck TRUs ranging in size from 10 to 60 kWh. Therefore, staff used current price projections for light-duty batteries.[111] Staff derived costs for the remaining components, such as the battery management system, power system, controllers, and labor from cost estimates from a small-scale manufacturer of battery-electric TRUs.

The total cost of a battery-electric truck TRU (based on battery costs in 2023) ranges from $35,600 to $50,600 depending on the battery size, compared to the average cost of a diesel-powered truck TRU, which ranges from $17,700 to $21,000.[112] For this analysis, staff used the cost of a battery-electric truck TRU with a median battery size of 40 kWh. Estimated battery size is based on the current offerings of battery-electric

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[109] Stakeholder comments during TRU Infrastructure Work Group Meeting on December 17, 2019.
[110] Statista, "Estimated average battery capacity in electric vehicles worldwide from 2017 to 2025, by type of vehicle," February 25, 2021. (web link: https://www.statista.com/statistics/309584/battery-capacity-estimates-for-electric-vehicles-worldwide/)
[111] Bloomberg, "QuickTake Better Batteries," October 2019. (web link: https://www.bloomberg.com/quicktake/batteries)
[112] Claimed confidential data obtained from industry sources that requested non-attribution.

truck TRUs, which use batteries ranging in size from 10 to 60 kWh capable of handling an 8-to-12-hour route, depending on operational needs.[113] Staff determined that this operating range was sufficient for truck TRUs because they are generally used only for local and regional operations.

Staff amortized the capital cost of new ZE truck TRU purchases over a period of 5 years at an interest rate of 5 percent. The amortized costs result in a level cost incurred for every year until the capital cost of the TRU is fully paid and also reflect normal purchasing patterns in which businesses generally do not pay the total capital cost up front. The 5 percent interest rate reflects the rate of return on an inflation-adjusted 10-year treasury security (about 2 percent in the past five years), plus the CalEPA recommended 3 percent risk premium.[114] Additionally, 5 percent is the average of what the United States Office of Management and Budget recommends (7 percent) and what U.S. EPA has used historically for regulatory analyses.[115] Staff used a 5-year timeframe to reflect approximately half the expected lifetime for a TRU.

ii. ZE Truck TRU Infrastructure

The Proposed Amendments do not include a specific infrastructure requirement. However, staff accounted for the capital cost of infrastructure needed to support operation of battery-electric truck TRUs purchased to comply with the ZE truck TRU requirement. Staff assumed truck TRU home base facility owners would install infrastructure on the same schedule as the truck TRUs transition to ZE technology, adding enough chargers to support the battery-electric truck TRU population each year beginning in 2023 to accommodate changing fleet sizes and minimize capital and maintenance costs for unused chargers.

The most common infrastructure for a battery-electric truck TRU is a vehicle charger or an EVSE at the Level 2 power level that requires a 208- or 240-volt wall outlet using a J1772 connector. Level 2 EVSE are already installed and operational throughout the State, primarily powering light- and medium-duty vehicles. As of May 2021, approximately 27,000 Level 2 charging outlets are located at over 13,000 stations statewide.[116] Additional stations are in the planning, design, and construction phase

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[113] Claimed confidential data obtained from an industry source that requested non-attribution.
[114] California Air Resources Board, Economic Evaluation Supplement, Climate Change Draft Scoping Plan Pursuant to AB 32 The California Global Warming Solutions Act of 2006, Appendix I: Modeling Assumptions for Economic Analysis of the Draft Scoping Plan, September 2008. (web link: https://ww3.arb.ca.gov/cc/scopingplan/document/economic_appendix1.pdf)
[115] United States Environmental Protection Agency, Guidelines for Preparing Economic Analyses, Chapter 6, December 2010. (web link: https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-06.pdf)
[116] U.S. Department of Energy, Energy Efficiency and Renewable Energy Alternative Fuels Data Center, Alternative Fueling Station Counts by State. (web link: https://afdc.energy.gov/stations/states, last accessed May 12 2021)

and will soon be operational as part of California's ZE Vehicle Action Plan.[117] However, as a conservative cost assumption and to ensure truck TRUs are sufficiently charged after their daily operations, staff assumed truck TRU owners would not rely on publicly accessible charging infrastructure. Staff assumed that truck TRU owners would install one single-port Level 2 charger per truck TRU at their home base facility. This would allow truck TRUs to complete their daily operations and return home to their home base facility to charge overnight. Nighttime charging at the home base facility during off-peak times would also avoid time-of-use electricity charges. Therefore, the number of chargers needed to support operation of the approximately 8,800 battery-electric truck TRUs that would be purchased to meet the ZE truck TRU requirements from 2022 to 2034 is 8,800.

Level 2 chargers have a variety of power outputs from 16 to 48 amps at 208- or 240-volts. The higher power output results in faster charging and meets the specifications of existing ZE truck TRUs. Level 2 chargers available on the market today have a variety of different features and power ratings resulting in cost variability. Given a lack of data on individual needs relative to power and wall or pedestal mounted chargers, all types of charging units are assumed available to truck TRU home base facility owners based on individual purchase decisions. The cost of a commercial Level 2 charger with a single port ranges from $608[118] to $2,004.[119] This includes the Level 2 charger, the necessary outlet, and power cord. For this analysis, staff used an average cost of $1,154 per charger, which represents the average of units with power output ranging from 7.2 to 11.5 kWh, as well as wall mount and pedestal installations.

Installation costs also vary due to site-specific factors, such as the existing electric panel capacity, installation location, and regional labor costs. Based on a report by the International Council on Clean Transportation (ICCT), per-charger costs decline as more chargers are installed. Level 2 charger installation costs range from $2,840 for more than six chargers to $4,150 for a single charger.[120] These costs are based on installations in Southern California and include labor, materials, permits, taxes, and utility upgrades, which may or may not include costs associated with the need to bring

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[117] California Governor's Office of Business and Economic Development, 2018 ZEV Action Plan Priorities Update, September 2018. (web link: https://static.business.ca.gov/wp-content/uploads/2019/12/2018-ZEV-Action-Plan-Priorities-Update.pdf)
[118] Clipper Creek, HCS-50, 40A, L2 EVSE, 240V, w/25 ft cable. (web link: https://store.clippercreek.com/hcs-50-hcs-50P-40-amp-ev-charging-station, last accessed January 29, 2021)
[119] EV Charge Solutions, PowerCharge P20SP Commercial EV Charger. (web link: https://www.evchargesolutions.com/PowerCharge-P20SP-Commercial-EV-Charger-p/p20sp.htm, last accessed January 29, 2021)
[120] The International Council on Clean Transportation, Estimating Electric Vehicle Charging Infrastructure Costs Across Major U.S. Metropolitan Areas, August 2019. (web link: https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf)

additional power to the site. As previously discussed, CARB staff assumed truck TRU infrastructure would be installed on the same schedule that truck TRUs are required to transition to ZE technology, adding enough chargers to accommodate the battery-electric truck TRU population each year. Based on the ZE truck TRU fleet percentages in the Proposed Amendments, only fleets with 10 or more truck TRUs require the purchase of more than one ZE truck TRU and multiple charger installations in a given year. According to ARBER, less than 8 percent of truck TRU fleets have more than 10 truck TRUs. Therefore, staff used the installation cost for a single charger. The ICCT report also recommends a 10 percent reduction for workplace charging, which is the most similar to the truck TRU application. Therefore, for this analysis, staff assumed an average installation cost of $3,733 per charger.

Staff annualized the purchase and installation costs for charging infrastructure at truck TRU home base facilities using the same methodology used for ZE truck TRU capital costs. Staff amortized infrastructure costs over a period of 5 years at an interest rate of 5 percent, to reflect approximately half the expected lifetime for charging equipment.[121]

iii. PM Emission Standard

The Proposed Amendments require MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines to meet a PM emission standard of 0.02 g/hp-hr or lower. MY 2013 and newer TRU engines in the greater than 25 horsepower category certified to the U.S. EPA Tier 4 final off-road engine standards meet the 0.02 g/hp-hr PM emission standard. The incremental capital cost for new TRUs equipped with an engine that meets the PM emission standard for each TRU category is shown in Table X-2.[122]

Table X-2. Trailer TRU, DSC TRU, Railcar TRU, and TRU Gen Set Capital Costs (2019$)

Equipment Type	Baseline Cost	Proposed Cost	Incremental Cost
Diesel Trailer TRU/DSC TRU/Railcar TRU	$25,530	$28,390	$2,860
TRU Gen Set	$17,300	$19,900	$2,600

Staff amortized the capital costs for new TRUs equipped with an engine that meets the PM emission standard over a period of 5 years at an interest rate of 5 percent using the same methodology used for truck TRU capital costs.

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[121] United States Department of Energy, Costs Associated with Non-Residential Electric Vehicle Supply Equipment, November 2015. (web link: https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf)
[122] Please see Appendix B for cost references.

iv. Lower-GWP Refrigerant

The Proposed Amendments require TRU OEMs and TRU dealers to manufacture and sell new truck TRUs, trailer TRUs, and DSC TRUs with lower-GWP refrigerant. Although staff assumed refrigerant costs would be passed on to TRU owners and reflected in a higher capital cost for compliant TRUs compared to what would have been purchased in the Baseline, refrigerant capital costs were analyzed separately.

The incremental cost to switch to lower-GWP refrigerants is due to the higher cost for alternative refrigerants to comply with the Proposed Amendments. Staff estimated that approximately 10 percent of new units currently use HFC-134a (GWP = 1,430). HFC-134a is generally used for medium low temperature applications and is not suitable for very low temperatures. HFC-134a would continue to be allowed under the Proposed Amendments because its GWP value is less than the proposed threshold of 2,200. Therefore, staff assumed that 10 percent of new units would continue to use HFC-134a.

The remaining 90 percent of new units currently use R-404A. For the purpose of this analysis, staff assumed this portion of the new units would switch to R-452A (GWP = 2,141) to comply with the Proposed Amendments, because it is a "design-compatible" replacement for R-404A, suitable for both very low and medium low temperatures, commercialized in the European markets and is already being offered as an optional alternative by manufacturers in the North American markets.[123,124] Staff estimated the average initial charge with R-452A would cost $38 more for a truck TRU and $100 more for a trailer TRU or DSC TRU as compared with an initial charge with R-404A. Table X-3 shows the refrigerant capital costs.[125]

Table X-3. Refrigerant Capital Costs (2019$)

Equipment Type	Baseline Cost	Proposed Cost	Incremental Cost
Truck TRU	$25	$64	$38
Trailer TRU and DSC TRU	$66	$166	$100

[123] Carrier Press Release, Carrier Transicold Strengthens Sustainability Initiatives with Lower GWP Refrigerant for North America Truck and Trailer Systems, December 15, 2020. (web link: https://www.carrier.com/truck-trailer/en/north-america/news/news-article/carrier_transicold_strengthens_sustainability_initiatives_with_lower_gwp_refrigerant_for_north_america_truck_and_trailer_systems.html)

[124] Fleet Owner, Thermo King offers products to help reduce emissions, July 28, 2017. (web link: https://www.fleetowner.com/running-green/emissions/article/21696418/thermo-king-offers-products-to-help-reduce-emissions)

[125] Please see Appendix B for cost references.

Staff amortized the refrigerant capital costs over a period of 5 years at an interest rate of 5 percent using the same methodology used for truck TRU capital costs.

v. Sales Tax

Sales tax is an additional cost levied on the purchase of TRUs and infrastructure. Sales tax varies across the State from a minimum of 7.25 percent up to 10.5 percent in some municipalities. Staff used a value of 8.6 percent, which is a weighted average based on county-level output.[126, 127] Staff applied the additional sales tax cost to the capital cost for TRUs based in California and truck TRU infrastructure. This results in higher costs for California-based owners and higher revenue for local and State government.

d. Maintenance and Operational Costs

i. TRU Maintenance Costs

TRU maintenance costs reflect the cost of labor and parts for routine maintenance, preventative maintenance, and repairing broken components. Maintenance costs for battery-electric truck TRUs are generally lower than diesel-powered TRUs in part due to fewer moving components. For truck TRUs, staff used an estimated maintenance cost of $0.95 per hour of operation for a diesel-powered TRU and $0.50 per hour of operation for a battery-electric truck TRU.[128] Staff calculated annual TRU maintenance costs by multiplying the TRU maintenance rate by the annual activity within California per TRU and the total TRU population per calendar year.

For trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets, staff assumed the TRU maintenance costs would be the same in the Baseline and the Proposed Amendments because TRUs equipped with an engine that meets the proposed PM emission standard would incur the same maintenance cost as those equipped with engines that do not.

TRU refrigerant maintenance costs reflect the labor and material cost for a service technician to recharge the refrigerant in a TRU. Refrigerant maintenance costs are based on an assumed leak rate of 15 percent per year[129] (for all refrigerants) and the refrigerant capacity for truck TRUs, trailer TRUs, and DSC TRUs discussed previously.

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[126] County-level output derived from Regional Economic Models, Inc. (REMI) Policy Insight Plus Version 2.4.1. Output is defined as the amount of production, including all intermediate goods purchased as well as value added (compensation and profit). Can also be thought of as sales or supply. The components of Output are Self Supply and Exports (Multiregions, Rest of Nation, and Rest of World).
[127] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)
[128] Claimed confidential data obtained from industry sources that requested non-attribution.
[129] California Air Resources Board, California's High Global Warming Potential Gases Emission Inventory Methodology and Technical Support Document, April 2016. (web link: https://ww3.arb.ca.gov/cc/inventory/slcp/doc/hfc_inventory_tsd_20160411.pdf)

The estimated annual maintenance cost for R-404A refrigerant is $6 per truck TRU and $14 per trailer TRU and DSC TRU. Under the Proposed Amendments, newly-manufactured truck TRUs, trailer TRUs, and DSC TRUs would use the lower-GWP R-452A refrigerant, with an estimated annual maintenance cost of $14 per truck TRU and $35 per trailer TRU and DSC TRU.

ii. ZE Truck TRU Infrastructure Maintenance Costs

Level 2 charger maintenance costs include the cost to replace charger heads, connectors, and other components, as well as labor costs for regular inspections.[130] Annual maintenance costs are estimated to be $92.50 per unit.[131] Staff calculated maintenance costs by multiplying the annual maintenance cost by the number of chargers. These costs also incorporate a 1.6 percent annual industry growth rate (see Appendix H).

iii. Diesel Fuel and Electricity Costs

Staff calculated diesel fuel and electricity costs for truck TRUs by using total fuel used per year and the cost of fuel per unit. For diesel units, fuel consumption is rated in gallons per hour (gal/hr). Staff used a fuel consumption rate of 0.55 gal/hr for diesel-powered truck TRUs, which staff derived from the statewide TRU inventory model. Annual electricity usage is based on the truck TRU battery size, number of operating days, and the total ZE truck TRU population per calendar year. Electricity usage also accounts for a 10 percent battery charging loss factor.[132]

Staff used diesel fuel and electricity prices to 2031 from CEC's Transportation Energy Demand Forecast 2020 IEPR Update.[133] Staff took diesel price projections from the mid-case scenario in the 2020 IEPR update and electricity price projections from commercial electricity prices in the mid-case scenario in the 2020 IEPR update. The Energy Information Administration's (EIA) 2020 Annual Energy Outlook for the Pacific

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[130] California Air Resources Board, Standardized Regulatory Impact Assessment for the Advanced Clean Trucks Regulation, August 8, 2019. (web link: http://www.dof.ca.gov/Forecasting/Economics/Major_Regulations/Major_Regulations_Table/documents/SRIA-Advanced_Clean_Truck_080819_DOF.pdf)

[131] Avista Corp, Electric Vehicle Supply Equipment Pilot Final Report, October 18, 2019. (web link: https://smartenergycc.org/wp-content/uploads/2019/10/Avista-EVSE-Pilot-Project-Review.pdf)

[132] Eudy, Leslie, and Matthew Jeffers. Foothill Transit Battery Electric Bus Demonstration Results: Second Report, National Renewable Energy Laboratory, June 2017. (web link: https://www.nrel.gov/docs/fy17osti/67698.pdf)

[133] California Energy Commission, Transportation Energy Demand Forecast 2020 IEPR Update, December 3, 2020. (web link: https://efiling.energy.ca.gov/GetDocument.aspx?tn=235841&DocumentContentId=68785)

region was used to calculate fuel prices past 2031.[134] Staff applied the annual percentage change in EIA diesel fuel and electricity prices past 2031 to the 2031 CEC diesel and electricity prices to estimate price changes past 2031.

Staff adjusted the CEC diesel fuel prices because TRUs are considered to be off-road equipment and are not subject to certain taxes included in the CEC values. Staff subtracted the federal excise tax rate equal to $0.385 per gallon,[135] as well as State diesel tax and local district tax estimated to be 13 percent and 1.36 percent,[136] respectively. When used off-road, diesel is taxed at the combined statewide sales tax rate, plus applicable district taxes. Therefore, staff applied the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[137] going towards State sales tax and 4.67 percent[138] going towards local sales tax. Table X-4 shows the diesel and electricity prices used for the economic analysis.

Table X-4. Diesel and Electricity Price Projections from 2022-2034 (2019$)

Year	Diesel Price per Gallon	Electricity Price per kWh
2022	$2.40	$0.19
2023	$2.38	$0.19
2024	$2.38	$0.19
2025	$2.35	$0.19
2026	$2.34	$0.20
2027	$2.28	$0.20
2028	$2.25	$0.20
2029	$2.19	$0.21
2030	$2.15	$0.21
2031	$2.15	$0.21
2032	$2.16	$0.21
2033	$2.20	$0.21
2034	$2.21	$0.21

[134] United States Energy Information Administration, Annual Energy Outlook 2020. (web link: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2020&region=1-9&cases=ref2020&start=2018&end=2050&f=A&linechart=ref2020-d112119a.3-3-AEO2020.1-9&map=ref2020-d112119a.4-3-AEO2020.1-9&sourcekey=0%00, last accessed May 11, 2021)
[135] California Department of Tax and Fee Administration, Tax Rates for Motor Vehicles and Diesel Fuels, May 2020. (web link: https://cdtfa.ca.gov/formspubs/L739.pdf)
[136] California Department of Tax and Fee Administration, Sales Tax Rates for Fuels. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm, last accessed May 24, 2021)
[137] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)
[138] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

Truck TRU owners would incur electricity costs beginning in 2024, but would incur diesel fuel cost savings from 2024–2032. For trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets, staff assumed diesel fuel costs would be the same in the Baseline and the Proposed Amendments. The total truck TRU electricity costs are estimated to be $189.4 million from 2022–2034.

e. Administrative Costs

i. TRU Reporting Costs

The Proposed Amendments require TRU owners to report TRUs that operate in California to CARB beginning in 2023, regardless of the state they are based in. The current TRU ATCM requires that owners report California-based TRUs to CARB. Although a number of out-of-state fleets already voluntarily report to CARB, staff accounted for the costs associated with the time it would take to report out-of-state based TRUs because it is not currently a requirement in the TRU ATCM. Based on the amount of information TRU owners would be required to report, staff estimated that it would take on average 10 minutes to report each TRU at an estimated rate of $50 per hour for staffing and lost revenue from the employee assigned to pull and submit the information.

ii. Applicable Facility Registration Costs

The Proposed Amendments require applicable facility owners to register their facilities with CARB in 2023. Based on the amount of information facilities would be required to report, staff estimated that it would take on average one hour per facility to do this at a rate of $50 per hour for staffing and lost revenue from the employee assigned to pull and submit the information.

iii. CARB Fees

The Proposed Amendments include TRU operating fees and applicable facility registration fees. The proposed fees will result in revenue to the State to offset costs needed to implement and enforce the Proposed Amendments. More information on the proposed fees can be found in Appendix G.

Staff determined that compliance monitoring and enforcement activities related to ZE TRUs will be less resource intensive and therefore have a lower operating fee. Table X-5 shows the fee amounts under the Proposed Amendments.

Table X-5. Fee Amounts

Fee Type	Fee Amount (per TRU or Facility)
TRU Operating Fee, paid once every three years	$54
Applicable Facility Registration Fee, paid once every three years	$54
ZE TRU Operating Fee, paid once every three years	$27

iv. Applicable Facility Reporting Costs

The Proposed Amendments require applicable facility owners to ensure that TRUs operating on their property are compliant. Owners may choose one of the following options:

- Reporting Option 1: Report all TRUs that operate on applicable facility property to CARB.
- Reporting Option 2: Provide a declaration to CARB, under penalty of perjury, that non-compliant TRUs subject to this regulation will not be permitted to operate on applicable facility property.

The estimated cost to applicable facility owners to comply with the applicable facility reporting requirements can be found in Appendix B, Section C.1.g.iii.

v. Truck TRU Owner Extension Costs

Staff have worked closely with TRU OEMs and electric utilities to ensure the regulatory compliance dates and annual ZE truck TRU percentages required by the Proposed Amendments are feasible. Staff do not anticipate delays to the availability of ZE truck TRUs or the installation infrastructure needed to support ZE truck TRUs. However, to be conservative, staff quantified the costs that truck TRU owners would incur to apply for an extension. Truck TRU owners may apply for an extension if compliance technology is not available due to a TRU OEM delay or if infrastructure cannot be installed on time. Staff used historical data on the number of OEM related extension applications received for the current TRU ATCM to derive the TRU OEM extension estimate. To estimate the number of infrastructure related extensions, staff considered the number and location of truck TRU home base facilities, as well as the estimated number of truck TRUs and subsequent amount of infrastructure staff expect to be installed at each truck TRU home base facility. Based on this analysis, staff estimated that the number of truck TRU owners that may apply for an extension from 2022 to 2034 ranges from 0 to 75, depending on the year. This represents at most, approximately 7.5 percent of the total number of truck TRU owners. Staff estimated it will take on average 2 to 10 hours per truck TRU owner to apply for an extension depending on the type at rate of $100 per hour.

f. Cost Savings

i. ZE Truck TRU Capital Cost Savings

Truck TRU owners would see equipment capital cost savings beginning in 2032 because they would no longer need to take compliance action every seven years. As a result, the number of new truck TRU sales from 2032–2034 would be lower than in the Baseline.

ii. Truck TRU Maintenance Cost Savings

Maintenance costs for battery-electric truck TRUs are generally lower than diesel-powered TRUs due in part to fewer moving components. Staff used an estimated maintenance cost of $0.95 per hour of operation for a diesel-powered TRU and $0.50 per hour of operation for a battery-electric truck TRU.[139]

iii. Diesel Fuel Savings

As truck TRU owners transition their fleets to ZE, they will incur diesel cost savings.

iv. LCFS Credit Revenue

The LCFS Regulation reduces GHG emissions by requiring fuel producers to reduce the carbon intensity in fuel or purchase credits from those who supply low carbon fuel. The regulation incentivizes the use of low carbon fuels, including electricity, hydrogen, natural gas, and biofuels.[140] TRU owners who use electricity as a power source to charge their ZE truck TRUs can generate credits based on the amount of energy they use. Staff expect that all parties eligible to generate LCFS credits will take advantage of the incentive provided by LCFS. Staff calculated credit values for electricity using the LCFS Credit Price Calculator.[141]

g. Total Direct Costs and Cost Savings

Table X-6 shows the total direct costs of the Proposed Amendments from 2022 to 2034. Table X-7 shows the direct costs, cost savings, and total net cost of the Proposed Amendments from 2022 to 2034. Direct costs include capital costs for ZE truck TRUs and supporting infrastructure, new TRUs equipped with engines certified to meet the PM standard, lower-GWP refrigerant, TRU refrigerant maintenance costs,

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[139] Claimed confidential data obtained from industry sources that requested non-attribution.
[140] California Air Resources Board, Unofficial Electronic Version of the Low Carbon Fuel Standard Regulation, July 2020. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf)
[141] California Air Resources Board, LCFS Credit Price Calculator. (web link: https://www.arb.ca.gov/fuels/lcfs/dashboard/creditpricecalculator.xlsx, last accessed May 2021)

truck TRU infrastructure maintenance costs, electricity usage, CARB fees, and administrative costs for registration and reporting. Cost savings include truck TRU capital costs, truck TRU maintenance cost savings, truck TRU diesel fuel savings, and LCFS credit revenue.

Table X-6. Total Direct Costs of the Proposed Amendments from 2022 to 2034 (2019$)

Year	TRU Capital Costs	TRU Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Truck TRU Electricity Costs	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0
2023	$17,700,000	$900,000	$1,100,000	$0	$0	$13,100,000	$32,800,000
2024	$36,500,000	$1,400,000	$2,500,000	$200,000	$2,400,000	$4,600,000	$47,600,000
2025	$54,700,000	$1,700,000	$3,700,000	$400,000	$5,700,000	$4,500,000	$70,700,000
2026	$81,800,000	$2,200,000	$5,500,000	$600,000	$8,600,000	$12,900,000	$111,600,000
2027	$114,700,000	$2,600,000	$7,100,000	$900,000	$13,100,000	$6,500,000	$144,900,000
2028	$118,900,000	$3,400,000	$7,400,000	$1,100,000	$17,000,000	$7,500,000	$155,300,000
2029	$117,000,000	$3,900,000	$6,800,000	$1,400,000	$20,800,000	$9,300,000	$159,200,000
2030	$108,600,000	$3,900,000	$5,800,000	$1,500,000	$23,300,000	$7,900,000	$151,000,000
2031	$91,300,000	$4,000,000	$4,100,000	$1,500,000	$24,200,000	$9,000,000	$134,100,000
2032	$72,300,000	$4,000,000	$2,700,000	$1,600,000	$24,500,000	$8,500,000	$113,600,000
2033	$72,900,000	$4,100,000	$1,500,000	$1,600,000	$24,900,000	$8,200,000	$113,200,000
2034	$75,300,000	$4,200,000	$800,000	$1,600,000	$25,300,000	$9,600,000	$116,800,000
Total	$961,700,000	$36,300,000	$49,000,000	$12,400,000	$189,800,000	$101,600,000	$1,350,800,000

Table X-7. Total Direct Costs, Cost Savings, and Net Cost of the Proposed Amendments from 2022 to 2034 (2019$)

Year	Total Costs	Truck TRU Capital Cost Savings	Truck TRU Diesel Fuel Cost Savings	Truck TRU Maintenance Cost Savings	LCFS Credit Revenue	Total Cost Savings	Total
2022	$0	$0	$0	$0	$0	$0	$0
2023	$32,800,000	$0	$0	$0	$0	$0	$32,800,000
2024	$47,600,000	$0	(-$600,000)	(-$1,700,000)	(-$1,900,000)	(-$4,200,000)	$43,400,000
2025	$70,700,000	$0	(-$1,300,000)	(-$3,800,000)	(-$4,100,000)	(-$9,200,000)	$61,500,000
2026	$111,600,000	$0	(-$1,900,000)	(-$5,600,000)	(-$6,000,000)	(-$13,500,000)	$98,100,000
2027	$144,900,000	$0	(-$2,900,000)	(-$8,200,000)	(-$9,000,000)	(-$20,100,000)	$124,800,000
2028	$155,300,000	$0	(-$3,700,000)	(-$10,300,000)	(-$10,700,000)	(-$24,700,000)	$130,600,000
2029	$159,200,000	$0	(-$4,400,000)	(-$12,100,000)	(-$12,900,000)	(-$29,400,000)	$129,800,000
2030	$151,000,000	$0	(-$4,900,000)	(-$13,100,000)	(-$14,200,000)	(-$32,200,000)	$118,800,000
2031	$134,100,000	$0	(-$5,000,000)	(-$13,200,000)	(-$14,100,000)	(-$32,300,000)	$101,800,000
2032	$113,600,000	(-$5,200,000)	(-$5,100,000)	(-$13,600,000)	(-$14,100,000)	(-$38,000,000)	$75,600,000
2033	$113,200,000	(-$16,900,000)	(-$5,100,000)	(-$14,000,000)	(-$14,000,000)	(-$50,000,000)	$63,200,000
2034	$116,800,000	(-$23,800,000)	(-$5,200,000)	(-$14,300,000)	(-$13,900,000)	(-$57,200,000)	$59,600,000
Total	$1,350,800,000	(-$45,900,000)	(-$40,100,000)	(-$109,900,000)	(-$114,900,000)	(-$310,800,000)	$1,040,000,000

3. Direct Costs on Businesses and Individuals

Staff calculated the cost for typical and small businesses owning truck TRUs and trailer TRUs to comply with the Proposed Amendments as compared to the Baseline. Costs to typical and small businesses owning applicable facilities can be found in Appendix B, Section C.2.b and Section C.3.b, respectively.

a. Direct Costs on Typical Businesses

i. Truck TRU Owner

For the purposes of the Proposed Amendments, typical businesses are defined as all affected establishments in the State that are not small businesses. Based on CARB's ARBER and Dun and Bradstreet[142] databases, the average number of truck TRUs owned by companies with more than 100 employees is 8. Therefore, to illustrate the costs to a typical business, staff considered an average fleet with eight truck TRUs. An owner of a fleet consisting of eight truck TRUs would be required to purchase ZE truck TRUs beginning in 2023, as shown in Table X-8.

Table X-8. Annual Number of Zero-Emission Truck TRU Purchases Required by the Proposed Amendments for a Typical Business Owning Truck TRUs from 2022 to 2034

Year	Number of Zero-Emission Truck TRUs Purchased
2022	0
2023	1
2024	1
2025	2
2026	1
2027	1
2028	1
2029	1
2030	0
2031	0
2032	0
2033	0
2034	0
Total	8

To assess the costs to a typical business that owns truck TRUs, staff also estimated the cost to install supporting infrastructure. As discussed previously, staff assumed truck

[142] Dun and Bradstreet Database, Employee data for companies that own truck TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

TRU owners will install infrastructure on the same schedule as the truck TRUs transition to ZE technology, adding enough chargers to accommodate changing fleet sizes and avoid paying capital costs and maintenance fees on unused chargers.

Table X-9 shows the annual amortized cost for a typical business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from -$6,020 to $65,280. The total amortized cost for a typical business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $361,660. To show the feasibility of compliance for a typical business owning truck TRUs, staff compared the maximum amortized annual cost of $65,280 to the annual revenue of a typical business in the truck transportation industry, which is $36.5 million.[143] The maximum amortized annual cost for a typical business owning truck TRUs to comply with the Proposed Amendments is less than one percent of their annual revenue.

[143] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)

Table X-9. Estimated Annual Cost to a Typical Business Owning Truck TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	TRU Capital Costs	TRU Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Costs	Electricity Costs	LCFS Credits	TRU Operating Fees	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$11,200	$0	$1,200	$0	$0	$0	$0	$410	$12,810
2024	$0	(-$600)	$2,300	$200	(-$1,800)	$2,600	(-$2,000)	$30	$730
2025	$34,600	(-$1,200)	$4,600	$400	(-$3,500)	$5,200	(-$3,700)	$50	$36,450
2026	$45,500	(-$2,400)	$5,800	$700	(-$7,000)	$10,700	(-$7,500)	$220	$46,020
2027	$56,300	(-$3,000)	$6,900	$900	(-$8,500)	$13,600	(-$9,400)	$50	$56,850
2028	$55,800	(-$3,600)	$6,900	$1,100	(-$10,100)	$16,600	(-$10,500)	$80	$56,280
2029	$65,100	(-$4,200)	$6,900	$1,300	(-$11,500)	$19,800	(-$12,200)	$80	$65,280
2030	$43,100	(-$4,800)	$4,600	$1,500	(-$12,900)	$23,000	(-$14,000)	$50	$40,550
2031	$32,200	(-$4,800)	$3,500	$1,500	(-$12,800)	$23,400	(-$13,700)	$80	$29,380
2032	$21,400	(-$4,800)	$2,300	$1,500	(-$12,900)	$23,400	(-$13,400)	$80	$17,580
2033	$10,700	(-$4,800)	$1,200	$1,500	(-$13,100)	$23,400	(-$13,200)	$50	$5,750
2034	$0	(-$4,800)	$0	$1,500	(-$13,300)	$23,400	(-$12,900)	$80	(-$6,020)
Total	$375,900	(-$39,000)	$46,200	$12,100	(-$107,400)	$185,100	(-$112,500)	$1,260	$361,660

ii. Trailer TRU Owner

Based on CARB's ARBER and Dun and Bradstreet[144] databases, the average number of trailer TRUs owned by companies with more than 100 employees is 7. Therefore, to illustrate the costs to a typical business, staff considered an average trailer TRU fleet with seven trailer TRUs. Trailer TRU fleet owners would incur capital costs for new units purchased beginning in 2023 to comply with the PM emission standard. To determine the number of new trailer TRUs that would be purchased by a typical business owning trailer TRUs, staff used the current average age of the trailer TRU fleet. Based on the statewide TRU inventory, the average age of a trailer TRU is five years old. With an average useful life of 10 years and assuming that all of the TRUs were the same age and did not already meet the PM emission standard, a typical business owning trailer TRUs would turnover their fleet and purchase seven new units in 2027.

Table X-10 shows the annual amortized cost for a typical business owning trailer TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from $0 to $5,600. The total amortized cost for a typical business owning trailer TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $28,300. To show the feasibility of compliance for a typical business owning trailer TRUs, staff compared the maximum amortized annual cost of $5,600 to the annual revenue of a typical business in the truck transportation industry, which is $36.5 million.[145] The maximum amortized annual cost for a typical business owning trailer TRUs to comply with the Proposed Amendments is less than 1/10th of one percent of their annual revenue.

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[144] Dun and Bradstreet Database, Employee data for companies that own trailer TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

[145] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)

Table X-10. Estimated Annual Cost to a Typical Business Owning Trailer TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	PM Emission Standard Costs	Refrigerant Costs	Refrigerant Maintenance Costs	TRU Operating Fees	Total
2022	$0	$0	$0	$0	$0
2023	$0	$0	$0	$400	$400
2024	$0	$0	$0	$0	$0
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$400	$400
2027	$4,900	$200	$100	$400	$5,600
2028	$4,900	$200	$100	$0	$5,200
2029	$4,900	$200	$100	$0	$5,200
2030	$4,900	$200	$100	$400	$5,600
2031	$4,900	$200	$100	$0	$5,200
2032	$0	$0	$100	$0	$100
2033	$0	$0	$100	$400	$500
2034	$0	$0	$100	$0	$100
Total	$24,500	$1,000	$800	$2,000	$28,300

b. Direct Costs on Small Businesses

For the purposes of the Proposed Amendments, companies with 100 or fewer employees are considered small businesses.[146] Meeting the small business criteria does not relieve TRU or applicable facility owners of any requirements in the Proposed Amendments. Staff used the small business criteria for analysis purposes only.

i. Truck TRU Owner

Based on CARB's ARBER and Dun and Bradstreet[147] databases, 95 percent of truck TRU fleets are considered small business. The average number of truck TRUs owned by companies with 100 or fewer employees is 5. Therefore, to illustrate the costs to a small business, staff considered an average fleet with five truck TRUs. An owner of a

[146] California Government Code, Title 2, Division 3, Part 5.5, Chapter 6.5, §14837. (web link: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=14837.)

[147] Dun and Bradstreet Database, Employee data for companies that own truck TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

fleet consisting of five truck TRUs would be required to purchase ZE truck TRUs beginning in 2023, as shown in Table X-11.

Table X-11. Annual Number of Zero-Emission Truck TRU Purchases Required by the Proposed Amendments for a Small Business Owning Truck TRUs from 2022 to 2034

Year	Number of Zero-Emission Truck TRUs Purchased
2022	0
2023	1
2024	1
2025	0
2026	1
2027	1
2028	1
2029	0
2030	0
2031	0
2032	0
2033	0
2034	0
Total	5

To assess the costs to a small business that owns truck TRUs, staff also estimated the cost to install supporting infrastructure. As discussed previously, staff assumed truck TRU owners will install infrastructure on the same schedule as the truck TRUs transition to ZE technology, adding enough chargers to accommodate changing fleet sizes and avoid paying capital costs and maintenance fees on unused chargers.

Table X-12 shows the amortized annual cost for a small business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from -$4,050 to $40,550. The total cost for a small business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $223,820. To show the feasibility of compliance for a small business owning truck TRUs, staff compared the maximum amortized annual cost of $40,550 to the annual revenue of a small business in the truck transportation industry, which is $1.5 million.[148] The maximum amortized annual cost for a small business owning truck TRUs to comply with the Proposed Amendments is less than 3 percent of their annual revenue.

[148] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)

Table X-12. Estimated Annual Cost to a Small Business Owning Truck TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	TRU Capital Costs	TRU Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Costs	Electricity Costs	LCFS Credits	TRU Operating Fees	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$11,200	$0	$1,200	$0	$0	$0	$0	$240	$12,640
2024	$1,800	(-$1,900)	$2,300	$200	(-$3,600)	$2,600	$0	$30	$1,430
2025	$17,500	(-$1,200)	$2,300	$400	(-$3,500)	$5,200	(-$2,000)	$0	$18,700
2026	$28,300	(-$1,800)	$3,500	$400	(-$5,200)	$8,000	(-$3,700)	$110	$29,610
2027	$39,200	(-$2,400)	$4,600	$600	(-$6,800)	$10,900	(-$5,600)	$50	$40,550
2028	$38,700	(-$3,000)	$4,600	$700	(-$8,400)	$13,900	(-$7,500)	$30	$39,030
2029	$32,400	(-$3,000)	$3,500	$900	(-$8,200)	$14,100	(-$8,700)	$50	$31,050
2030	$32,400	(-$3,000)	$3,500	$900	(-$8,100)	$14,400	(-$8,700)	$50	$31,450
2031	$21,500	(-$3,000)	$2,300	$900	(-$8,000)	$14,600	(-$8,700)	$30	$19,630
2032	$10,700	(-$3,000)	$1,200	$900	(-$8,100)	$14,600	(-$8,600)	$50	$7,750
2033	$0	(-$3,000)	$0	$900	(-$8,200)	$14,600	(-$8,400)	$50	(-$4,050)
2034	$0	(-$3,000)	$0	$900	(-$8,300)	$14,600	(-$8,200)	$30	(-$3,970)
Total	$233,700	(-$28,300)	$29,000	$7,700	(-$76,400)	$127,500	(-$70,100)	$720	$223,820

ii. Trailer TRU Owner

Based on CARB's ARBER and Dun and Bradstreet[149] databases, 90 percent of trailer TRU fleets are considered small business. The average number of trailer TRUs owned by companies considered to be small business is seven. This is the same number of trailer TRUs owned by a typical business.

Therefore, the cost of owning trailer TRUs for a small business would be the same as the costs described for a typical business above. To show the feasibility of compliance for a small business owning trailer TRUs, staff compared the maximum amortized annual cost of $5,600 to the annual revenue of a small business in the truck transportation industry, which is $1.5 million.[150] The maximum amortized annual cost for a small business owning trailer TRUs to comply with the Proposed Amendments is less than 1 percent of their annual revenue.

The similar trailer TRU fleet size for a typical business (more than 100 employees) and small business (100 or fewer employees) may be due to the small sample size in which staff only had employee data from Dun and Bradstreet for 63 trailer TRU fleets reported in ARBER. It may also be due to the possibility that typical trucking companies may not specialize solely in refrigerated transport and their fleets may also include non-refrigerated trucks or trailers.

c. Direct Costs on Individuals

The Proposed Amendments will not result in any direct costs on individuals. However, staff anticipate the Proposed Amendments will result in indirect costs to individuals to the extent that affected businesses pass compliance costs through to consumers of refrigerated products. Assuming the total net costs of the Proposed Amendments are fully passed through to consumers, staff estimated the cost per California household by dividing the total cost of the Proposed Amendments by 13,272,939 California households.[151] Table X-13 shows the total impact of the Proposed Amendments from 2022 to 2034 is $78.35 per household with a yearly average of $6.03.

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[149] Dun and Bradstreet Database, Employee data for companies that own trailer TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[150] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)
[151] California Department of Finance, Demographic Research Unit, "P-4 Projected Households, Household Population, Group Quarters and Persons per Household for the Counties and State of California," June 10, 2020. (web link: https://www.dof.ca.gov/forecasting/demographics/projections/documents/P4_HHProjections_B2019.xlsx)

Table X-13. Cost of the Proposed Amendments per California Household from 2022 to 2034[152]

Year	Annual Net Cost of Proposed Amendments	Cost per Household
2022	$0	$0.00
2023	$32,800,000	$2.47
2024	$43,400,000	$3.27
2025	$61,500,000	$4.63
2026	$98,100,000	$7.39
2027	$124,800,000	$9.40
2028	$130,600,000	$9.84
2029	$129,800,000	$9.78
2030	$118,800,000	$8.95
2031	$101,800,000	$7.67
2032	$75,600,000	$5.70
2033	$63,200,000	$4.76
2034	$59,600,000	$4.49
Total	$1,040,000,000	$78.35

B. Benefits

1. Benefits to California Businesses

The Proposed Amendments provide opportunities for design, engineering, construction, and project management firms to design new and expanded infrastructure at an estimated 1,000 truck TRU home base facilities statewide. The increase in electric charging and fueling infrastructure will also benefit ZE fuel providers, infrastructure suppliers, equipment installers, and electricians. All of the installations will be in California and some of the infrastructure equipment may be manufactured in California. One manufacturer, ESL Power Systems, has primary operations based in California.[153]

Increased purchases of ZE TRUs under the Proposed Amendments will also benefit ZE TRU manufacturers, wholesalers, and retailers, as well as various businesses in the ZE TRU supply chain, including those involved in battery, fuel cell, cold plate, and solar photovoltaic technology throughout the State. One ZE TRU manufacturer, Clean Cold Power, has indicated to staff that equipment will be assembled in California.[154]

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[152] If the net costs to comply with the Proposed Amendments are not passed through to consumers of refrigerated products, the indirect cost to individuals will be lower than the numbers presented in this table.
[153] ESL Power Systems, Inc. (web link: https://eslpwr.com/, last accessed May 11, 2021)
[154] Phone conversation between Brett Gipe and Michael Britt (Clean Cold Power) and Lea Yamashita (CARB) on December 10, 2020.

Individual businesses that own ZE TRUs may also be able to lower their total cost of ownership with operational and maintenance cost savings and credits generated under the LCFS program.

2. Benefits to Small Businesses

Electricians, engineering, construction, and project management companies; parts and components businesses; and others involved in designing, installing, and maintaining electric and fueling infrastructure equipment may fall into the small business category. The benefits to ZE TRU manufacturers and other related businesses discussed above also apply to small businesses.

3. Benefits to Individuals

The Proposed Amendments benefit California residents by reducing cancer risk near facilities where TRUs operate; reducing non-cancer health impacts by lower direct PM exposure and secondary formation of PM2.5 from NOx; improving air quality and resulting ozone exposure from reductions in NOx; and providing GHG emission reductions needed to combat climate change. The Proposed Amendments are also expected to reduce occupational exposure of on-site workers, including, but not limited to TRU operators, truck drivers, and other individuals who work at facilities where TRUs operate. Staff estimated the statewide value of health benefits from reduced PM2.5 and NOx emissions, as well as the value of GHG emission reductions using the social cost of carbon, as described in Chapter V.

C. Fiscal Impacts

The Proposed Amendments will result in direct costs and cost benefits to local, State, and federal government agencies that own TRUs or applicable facilities. Local government agencies will also experience changes in revenue from utility user taxes, diesel fuel sales taxes, and local sales taxes. State government will experience changes in revenue from diesel fuel sales taxes, Energy Resources Fees, CARB fees, and State sales taxes. Costs to CARB include staffing and resources needed to implement and enforce the Proposed Amendments. In addition, the Proposed Amendments will result in health benefits to individuals in California, which may translate to cost savings for local and State healthcare providers.

1. Local Government

a. TRU and Applicable Facility Owner Costs

The Proposed Amendments will have a small fiscal impact to local government agencies that own TRUs or applicable facilities, relative to the total estimated cost of the Proposed Amendments. Using 2019 ARBER data, staff determined that local government owns 256 TRUs or 0.132 percent of the total number of TRUs. This percentage was applied to the total equipment-related direct costs in Table X-6 to estimate the costs incurred by local government TRU owners. Staff determined that

local government owns 25 truck TRU home base facilities and 19 applicable facilities.[155] Table X-14 shows the estimated direct costs to local government TRU and applicable facility owners from 2022 to 2034.

[155] California Air Resources Board, TRU Applicable Facility Inventory, April 2020.

Table X-14. Total Direct Equipment and Infrastructure-Related Costs to Local Government from 2022 to 2034 (2019$)

Year	TRU Capital Costs	TRU Maintenance Costs	Truck TRU Infrastructure Capital Costs	Truck TRU Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$23,000	$1,000	$28,000	$0	$0	$0	$0	$18,000	$70,000
2024	$48,000	$1,000	$63,000	$4,000	(-$2,000)	$3,000	(-$3,000)	$83,000	$197,000
2025	$72,000	$1,000	$93,000	$10,000	(-$5,000)	$8,000	(-$5,000)	$84,000	$258,000
2026	$108,000	$0	$140,000	$15,000	(-$7,000)	$11,000	(-$8,000)	$98,000	$357,000
2027	$152,000	$0	$179,000	$22,000	(-$11,000)	$17,000	(-$12,000)	$89,000	$436,000
2028	$157,000	$0	$186,000	$29,000	(-$14,000)	$23,000	(-$14,000)	$92,000	$459,000
2029	$155,000	(-$1,000)	$173,000	$34,000	(-$16,000)	$27,000	(-$17,000)	$97,000	$452,000
2030	$144,000	(-$1,000)	$147,000	$38,000	(-$17,000)	$31,000	(-$19,000)	$95,000	$418,000
2031	$121,000	(-$1,000)	$104,000	$39,000	(-$18,000)	$32,000	(-$19,000)	$98,000	$356,000
2032	$89,000	(-$1,000)	$69,000	$39,000	(-$18,000)	$32,000	(-$19,000)	$100,000	$291,000
2033	$74,000	(-$1,000)	$38,000	$40,000	(-$19,000)	$33,000	(-$19,000)	$99,000	$245,000
2034	$68,000	(-$1,000)	$20,000	$40,000	(-$19,000)	$33,000	(-$18,000)	$102,000	$225,000
Total	$1,211,000	(-$3,000)	$1,240,000	$310,000	(-$146,000)	$250,000	(-$153,000)	$1,055,000	$3,764,000

Note: Totals may not add due to rounding.

b. Utility User Tax

Several cities and counties in California levy a utility user tax on electricity usage. This tax varies from city to city and ranges from no tax to 11 percent. Staff used a value of 3.53 percent, representing a population-weighted average.[156] By increasing the amount of electricity used, the amount of utility user tax revenue collected by cities and counties will increase accordingly.

c. Diesel Fuel Sales Tax

Off-road diesel is exempt from on-road diesel taxes, but does incur sales tax.[157] Displacing diesel with electricity would decrease the total amount of diesel fuel dispensed in the State, resulting in a reduction in tax revenue collected by local governments. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[158] going towards State sales tax and 4.67 percent[159] going towards local sales tax.

d. Local Sales Tax

Sales tax is levied in California to fund a variety of programs at the local and State levels. The Proposed Amendments will result in the sale of more expensive TRUs and infrastructure in California, which will result in a direct increase in sales tax revenue collected by local government. However, overall, local sales tax revenue may increase less than the direct increase from TRU and infrastructure sales if overall business spending does not increase. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[160] going towards State sales tax and 4.67 percent[161] going towards local sales tax.

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[156] California State Controller's Office, California Cities Utility Users Taxes Revenue and Tax Rate Fiscal Year 2018-19, November 2020. (web link: https://www.sco.ca.gov/Files-ARD-Local/LocRep/2018-19_Cities_UUT.pdf)
[157] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)
[158] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)
[159] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)
[160] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)
[161] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

e. Fiscal Impact on Local Government

From 2022 to 2034, staff estimated the cost to local government due to the Proposed Amendments to be $3.8 million as a result of TRUs and applicable facilities owned by local government. Local government will also see a direct increase in utility user and local sales tax revenue of $19.1 million and a decrease in diesel fuel sales tax revenue of $4.9 million. Table X-15 shows the total fiscal impact on local government, which is estimated to be -$10.4 million from 2022 to 2034.

Table X-15. Estimated Fiscal Impact on Local Government from 2022 to 2034 (2019$)

Year	TRU and Applicable Facility Owner Costs	Utility User Tax Revenue	Local Diesel Fuel Sales Tax	Local Sales Tax	Total
2022	$0	$0	$0	$0	$0
2023	$70,000	$0	$0	($1,638,000)	($1,568,000)
2024	$197,000	(-$84,000)	$76,000	($2,204,000)	($2,015,000)
2025	$258,000	(-$195,000)	$170,000	($1,735,000)	($1,502,000)
2026	$357,000	(-$292,000)	$250,000	($3,332,000)	($3,017,000)
2027	$436,000	(-$445,000)	$366,000	($2,571,000)	($2,214,000)
2028	$459,000	(-$580,000)	$461,000	($2,108,000)	($1,768,000)
2029	$452,000	(-$708,000)	$538,000	($1,090,000)	($808,000)
2030	$418,000	(-$796,000)	$584,000	$392,000	$598,000
2031	$356,000	(-$824,000)	$591,000	$416,000	$539,000
2032	$291,000	(-$836,000)	$605,000	$436,000	$496,000
2033	$245,000	(-$848,000)	$625,000	$447,000	$469,000
2034	$225,000	(-$863,000)	$640,000	$384,000	$386,000
Total	$3,764,000	(-$6,471,000)	$4,906,000	($12,603,000)	($10,404,000)

2. State Government

a. TRU and Applicable Facility Owner Costs

The Proposed Amendments will have a small fiscal impact to State government agencies that own TRUs or applicable facilities, relative to the total estimated cost of the Proposed Amendments. Using 2019 ARBER data, staff determined that State government owns 154 TRUs, or 0.08 percent of the total number of TRUs. This percentage was applied to the total equipment-related direct costs in Table X-6 to estimate the costs incurred by State government TRU owners. Staff determined that

State government owns 6 truck TRU home base facilities and 2 applicable facilities.[162] Table X-16 shows the estimated direct costs to State government TRU and applicable facility owners from 2022 to 2034.

[162] California Air Resources Board, TRU Applicable Facility Inventory, April 2020.

Table X-16. Total Direct Equipment and Infrastructure-Related Cost to State Government from 2022 to 2034 (2019$)

Year	TRU Capital Costs	TRU Maintenance Costs	Truck TRU Infrastructure Capital Costs	Truck TRU Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$14,000	$1,000	$7,000	$0	$0	$0	$0	$9,000	$31,000
2024	$29,000	$1,000	$15,000	$1,000	(-$1,000)	$2,000	(-$2,000)	$2,000	$47,000
2025	$44,000	$0	$22,000	$2,000	(-$3,000)	$5,000	(-$3,000)	$2,000	$69,000
2026	$65,000	$0	$34,000	$4,000	(-$4,000)	$7,000	(-$5,000)	$8,000	$109,000
2027	$91,000	$0	$43,000	$5,000	(-$7,000)	$10,000	(-$7,000)	$3,000	$138,000
2028	$95,000	$0	$45,000	$7,000	(-$8,000)	$14,000	(-$9,000)	$4,000	$148,000
2029	$93,000	$0	$42,000	$8,000	(-$10,000)	$17,000	(-$10,000)	$5,000	$145,000
2030	$86,000	(-$1,000)	$35,000	$9,000	(-$10,000)	$19,000	(-$11,000)	$4,000	$131,000
2031	$73,000	(-$1,000)	$25,000	$9,000	(-$11,000)	$19,000	(-$11,000)	$5,000	$108,000
2032	$53,000	(-$1,000)	$17,000	$9,000	(-$11,000)	$20,000	(-$11,000)	$4,000	$80,000
2033	$45,000	(-$1,000)	$9,000	$10,000	(-$11,000)	$20,000	(-$11,000)	$4,000	$65,000
2034	$41,000	(-$1,000)	$5,000	$10,000	(-$11,000)	$20,000	(-$11,000)	$5,000	$58,000
Total	$729,000	(-$3,000)	$299,000	$74,000	(-$87,000)	$153,000	(-$91,000)	$55,000	$1,129,000

b. Diesel Fuel Sales Tax

Displacing diesel with electricity would decrease the total amount of diesel fuel dispensed in the State, resulting in a reduction in sales tax revenue collected by State government. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[163] going towards State sales tax and 4.67 percent[164] going towards local sales tax.

c. Energy Resources Fee

The Energy Resources Fee is a $0.0003/kWh surcharge levied on consumers of electricity purchased from electrical utilities.[165] The revenue collected is deposited into the Energy Resources Programs Account of the General Fund which is used for ongoing energy programs and projects deemed appropriate by the Legislature, including but not limited to, activities of the California Energy Commission.

d. CARB Fees

The Proposed Amendments include TRU operating fees and applicable facility registration fees. The proposed fee schedule is presented in Table X-5. The proposed fees will result in revenue to the State to offset costs to CARB to implement and enforce the Proposed Amendments.

e. State Sales Tax

Sales tax is levied in California to fund a variety of programs at the local and State levels. The Proposed Amendments will result in the sale of more expensive TRUs and infrastructure in California, which will result in a direct increase in sales tax revenue collected by the State. However, overall, State sales tax revenue may increase less than the direct increase from TRU and infrastructure sales if overall business spending does not increase. Staff used a combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[166] going towards State sales tax and 4.67 percent[167] going towards local sales tax.

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[163] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)
[164] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)
[165] California Department of Tax and Fee Administration, 2020 Electrical Energy Surcharge Rate, December 2019. (web link: https://www.cdtfa.ca.gov/formspubs/l725.pdf)
[166] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)
[167] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

f. Costs to CARB

The estimated costs to CARB as a result of the Proposed Amendments include the direct and indirect labor costs for the additional positions needed to successfully implement and enforce the Proposed Amendments as described below and operational costs (e.g., compliance labels, envelopes, and postage).

- 3.0 Air Pollution Specialist (APS) positions and 6.0 Air Resources Technician (ART) II positions in Fiscal Year 2022-2023.
- 1.0 Air Resources Supervisor I, 1.0 Staff Services Manager, 1.0 APS, and 10.0 ART II positions in Fiscal Year 2023-2024.

Implementation duties include assisting owners with TRU reporting and applicable facility registration, providing technical assistance, and issuing compliance labels. Enforcement duties include conducting unit, fleet, and facility inspections; fleet and facility investigations; and issuing and processing citations. The need for additional staff is due to added requirements in the Proposed Amendments requiring out-of-state based TRU reporting, TRU operating fees, applicable facility registration, applicable facility registration fees, and applicable facility reporting. Table X-17 shows the number of positions needed by CARB and the cost for each classification in 2021.

Table X-17. Number of CARB Positions Needed and 2021 Costs

Position	Number of Positions	Initial Budget Year Cost (Annual Salary plus Benefits per Position)	Ongoing Cost (Annual Salary plus Benefits per Position)
Air Resources Supervisor I	1	$238,000	$237,000
Staff Services Manager I	1	$168,000	$167,000
Air Pollution Specialist	4	$195,000	$194,000
Air Resources Technician II	16	$101,000	$100,000

SB 854 authorizes CARB to assess fees to cover its reasonable costs, with specific considerations, on all off-road and other mobile sources certification and compliance programs not currently covered under the existing fee regulation authority (Health & Saf. Code section 43019).[168] The Proposed Amendments include TRU operating fees and applicable facility registration fees. CARB intends to seek authority to use the collected fees to cover program costs.

[168] California Health and Safety Code § 43019.1, Division 26, Senate Bill No. 854, July 27, 2018. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB854)

g. Fiscal Impact on State Government

From 2022 to 2034, staff estimated the cost to State government due to the Proposed Amendments to be $1.1 million, resulting from TRUs and applicable facilities owned by State government; and approximately $47.1 million in costs to CARB. State government will also see a direct increase in revenue from Energy Resources Fees, TRU operating fees, applicable facility registration fees, and State sales tax of $71.8 million; as well as a decrease in diesel fuel tax revenue of $22.6 million. Table X-18 shows the total fiscal impact to State government agencies, which is estimated to be -$927,000 from 2022 to 2034. CARB will seek authorization to use collected fees to offset costs incurred to implement and enforce the Proposed Amendments.

Table X-18. Estimated Fiscal Impact to State Government from 2022 to 2034 (2019$)

Year	Costs to CARB	TRU and Facility Owner Costs	State Diesel Fuel Sales Tax	Energy Resources Fee	TRU Operating Fee and Applicable Facility Registration Fee	State Sales Tax	Total
2022	$750,000	$0	$0	$0	$0	$0	750,000
2023	$2,962,000	$31,000	$0	$0	(-$11,449,000)	(-$1,391,000)	(-$9,847,000)
2024	$3,955,000	$47,000	$331,000	(-$4,000)	(-$1,369,000)	(-$1,873,000)	$1,087,000
2025	$3,947,000	$69,000	$748,000	(-$9,000)	(-$1,203,000)	(-$1,474,000)	$2,078,000
2026	$3,947,000	$108,000	$1,099,000	(-$13,000)	(-$9,474,000)	(-$2,831,000)	(-$7,164,000)
2027	$3,947,000	$139,000	$1,641,000	(-$20,000)	(-$2,917,000)	(-$2,184,000)	$606,000
2028	$3,947,000	$147,000	$2,092,000	(-$25,000)	(-$4,037,000)	(-$1,791,000)	$333,000
2029	$3,947,000	$144,000	$2,495,000	(-$30,000)	(-$5,720,000)	($926,000)	(-$90,000)
2030	$3,947,000	$131,000	$2,746,000	(-$33,000)	(-$4,284,000)	$333,000	$2,840,000
2031	$3,947,000	$109,000	$2,789,000	(-$34,000)	(-$5,393,000)	$353,000	$1,771,000
2032	$3,947,000	$81,000	$2,837,000	(-$35,000)	(-$4,819,000)	$370,000	$2,381,000
2033	$3,947,000	$64,000	$2,891,000	(-$35,000)	(-$4,398,000)	$380,000	$2,849,000
2034	$3,947,000	$58,000	$2,941,000	(-$36,000)	(-$5,757,000)	$326,000	$1,479,000
Total	$47,137,000	$1,128,000	$22,610,000	(-$274,000)	(-$60,820,000)	(-$10,708,000)	(-$927,000)

3. Federal Government

a. TRU and Applicable Facility Owner Costs

The Proposed Amendments will have a small fiscal impact to federal government agencies that own TRUs or applicable facilities, relative to the total estimated cost of the Proposed Amendments. Using 2019 ARBER data, staff determined that federal government owns 7 TRUs, or 0.004 percent of the total number of TRUs. This percentage was applied to the total equipment-related direct costs in Table X-6 to estimate the costs incurred by federal government TRU owners. Staff determined that federal government owns 1 truck TRU home base facility and 12 applicable facilities.[169] Table X-19 shows the estimated direct costs to federal government TRU and applicable facility owners, which is estimated to be $119,800 from 2022 to 2034.

[169] California Air Resources Board, TRU Applicable Facility Inventory, April 2020.

Table X-19. Total Direct Equipment and Infrastructure-Related Costs to Federal Government from 2022 to 2034 (2019$)

Year	TRU Capital Costs	TRU Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	(-$)	$0	$0	$0	$0
2023	$600	$0	$1,100	$0	(-$)	$0	$0	$1,300	$3,000
2024	$1,300	$0	$2,500	$200	(-$100)	$100	(-$100)	$1,900	$5,800
2025	$2,000	$0	$3,700	$400	(-$100)	$200	(-$100)	$1,900	$8,000
2026	$3,000	$0	$5,600	$600	(-$200)	$300	(-$200)	$2,700	$11,800
2027	$4,100	$0	$7,100	$900	(-$300)	$500	(-$300)	$2,000	$14,000
2028	$4,300	$0	$7,400	$1,100	(-$400)	$600	(-$400)	$2,000	$14,600
2029	$4,200	$0	$6,900	$1,400	(-$400)	$800	(-$500)	$2,800	$15,200
2030	$3,900	$0	$5,900	$1,500	(-$500)	$800	(-$500)	$2,100	$13,200
2031	$3,300	$0	$4,200	$1,500	(-$500)	$900	(-$500)	$2,100	$11,000
2032	$2,400	$0	$2,800	$1,600	(-$500)	$900	(-$500)	$2,900	$9,600
2033	$2,000	$0	$1,500	$1,600	(-$500)	$900	(-$500)	$2,200	$7,200
2034	$1,900	$0	$800	$1,600	(-$500)	$900	(-$500)	$2,200	$6,400
Total	$33,000	$0	$49,500	$12,400	(-$4,000)	$6,900	(-$4,100)	$26,100	$119,800

b. Fiscal Impact on Federal Government

Staff do not anticipate any additional fiscal impact on federal government other than the direct costs discussed above.

D. Creation or Elimination of Jobs within the State of California.

Staff anticipate the statewide employment impacts of the Proposed Amendments to be slightly positive in 2023 and 2024, corresponding with demand for ZE truck TRUs and supporting infrastructure from in-state fleets. From 2025 through 2034, the employment impacts are estimated to be negative as the overall costs of the Proposed Amendments offset the positive impacts of additional in-state demand.

Staff used Regional Economic Models, Inc. (REMI) Policy Insight Plus Version 2.4.1 to estimate the macroeconomic impacts of the Proposed Amendments on the California economy. REMI is a structural economic forecasting and policy analysis model that integrates input-output, computable general equilibrium, and econometric and economic geography methodologies. The REMI model estimated at most a 0.01 percent increase or decrease in statewide employment, relative to the baseline, in any given year due to the Proposed Amendments. The economy is expected to grow over this period and therefore, reduced employment, relative to the baseline, can be interpreted as a reduction in employment growth. This amounted to a total increase in employment of 151 jobs in the year with the greatest positive impact and decreases in employment of -1,438 jobs in the year with the most negative impact.

E. Creation of New Business or the Elimination of Existing Businesses within the State of California

Staff do not anticipate the Proposed Amendments will directly result in business creation or elimination. However, the Proposed Amendments may have a small indirect impact on business creation or elimination. TRU fleets and applicable facilities face compliance costs. The potential for some of these businesses to be eliminated cannot be ruled out.

While changes in jobs for the California economy cannot directly estimate the broader impacts of business creation and elimination, job changes can be used to understand some of the potential impacts to businesses. The overall job impacts of the Proposed Amendments are small relative to the total California economy. The changes in statewide employment represent, at most, a 0.01 percent change relative to baseline California employment in any given year.

F. Expansion of Businesses Currently Doing Business within the State

Increased purchases of ZE TRUs under the Proposed Amendments will lead to increased revenue for ZE TRU manufacturers, wholesalers, and retailers, as well as various businesses in the ZE TRU supply chain, including those involved in battery, fuel cell, cold plate, and solar photovoltaic technology throughout the State.

The increased number of ZE TRUs will also lead to an increase in the number of ZE fueling and charging infrastructure installations in the State, which will benefit businesses that provide services for design, engineering, construction, and project management, as well as ZE infrastructure suppliers, equipment installers, electricians, and ZE fuel providers.

G. Competitive Advantages or Disadvantages for Businesses Currently Doing Business within the State

Staff anticipate businesses that own TRUs that do not operate in California may gain a slight competitive advantage compared to businesses that own TRUs that operate in California. CARB staff do not consider these impacts significant. This is because of California's extensive freight industry and the large volume of refrigerated traffic that moves through the State. Most fleets would need to upgrade a majority of their fleet because they have little control over where a certain TRU operates and require flexibility to move loads to any destination.

Staff do not anticipate impacts to the competitive advantage or disadvantage of businesses currently doing business in the State because the Proposed Amendments impose requirements equally on all TRUs that operate in California, whether the business that owns or operates them is based in-state or out-of-state. All businesses owning or operating TRUs would be subject to the same ZE truck TRU, PM emission standard, lower-GWP refrigerant, and administrative requirements, regardless of in-state or out-of-state ownership status. Thus, the Proposed Amendments would not create any competitive disadvantage to businesses located in California.

Businesses that already use ZE TRU technologies may gain a competitive advantage compared to fleets that rely on diesel-powered TRUs in the Baseline. Some businesses may already be using cold plate and cryogenic TRUs in addition to battery-electric TRUs. Such businesses will not have large compliance costs associated with the Proposed Amendments and may also gain a competitive advantage compared to fleets that rely on diesel-powered TRUs in the Baseline.

Applicable facilities are required to pay registration fees and ensure that TRUs operating on their property are compliant. The applicable facilities are based on size thresholds and facilities below these specific thresholds will not face direct costs

associated with the Proposed Amendments. Therefore, facilities below the threshold may gain a slight competitive advantage compared to larger facilities. Out-of-state facilities will not face the same registration fees and reporting costs. Therefore, California-based facilities may also face a competitive disadvantage to other similar-sized applicable facilities in close proximity, but in another state. Staff do not consider these impacts significant because fees and reporting costs are relatively small compared to the total revenue of these facilities and the total cost of the Proposed Amendments.

H. Increase or Decrease of Investment in the State

Private domestic investment consists of purchases of residential and nonresidential structures and of equipment and software by private businesses and nonprofit institutions. It is used as a proxy for impacts on investments in California because it provides an indicator of the future productive capacity of the economy.

Table X-20 provides the changes in private investment for the Proposed Amendments, relative to the Baseline. The change in private investment ranges from a decrease of $2 million in 2023 to a decrease of $48 million in 2029. In any given year, the change in private investment represents less than 0.01 percent of baseline investment.

Table X-20. Changes in Gross Domestic Private Investment

Units	2023	2025	2027	2029	2031	2033
Private Investment (2019B$)	448	484	493	503	514	530
Percent Change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Change (2019M$)	-2	-14	-36	-48	-39	-13

I. Incentives for Innovation in Products, Materials, or Processes

The Proposed Amendments provide a strong signal for the development of ZE TRU technologies and help in building a robust market for advanced technologies. Staff anticipate growth in the industries that manufacture ZE TRU technologies, which will strengthen the supply chain and result in technology improvements earlier than they would have otherwise occurred. For example, improvements in battery weight and range are needed to improve market acceptance and bring overall battery-electric technology costs down. These improvements will allow advanced technologies to expand further into extended range TRU applications, as well as other off-road sectors. In addition, due to the large volume of refrigerated freight that moves through California, there is the possibility that the Proposed Amendments will compel TRU OEMs to incorporate advanced technologies and lower-GWP refrigerant into units sold outside of the State.

XI. Evaluation of Regulatory Alternatives

Government Code section 11346.2, subdivision (b)(4) requires CARB to consider and evaluate reasonable alternatives to the proposed regulatory action and provide reasons for rejecting those alternatives. This section discusses alternatives evaluated and provides reasons why these alternatives were not included in the proposal. As explained below, no alternative proposed was found to be less burdensome and equally effective in achieving the purposes of the regulation in a manner than ensures full compliance with the authorizing law. The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business.

Staff solicited public input regarding alternatives to achieving the purposes of the Proposed Amendments throughout the development process and specifically at public workshops held on August 28, 2019 in Fontana, California, September 3, 2019 in Fresno, California, and September 11, 2019 in Sacramento, California. The Sacramento workshop was webcast with the ability to submit questions online to ensure the opportunity for broader public participation. Staff evaluated four alternatives as described below.

A. Alternative 1: ZE Truck TRUs, Stationary Operating Time Limit, Diesel Emission Standards, and Lower-GWP Refrigerant

Alternative 1 is a more stringent requirement for trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets operating in California. Under this alternative, all trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen set engines would be required to meet diesel emission standards for PM, NOx, and CO. This is in contrast to the Proposed Amendments, which only require newly-manufactured trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen set engines to meet a PM standard. Additionally, trailer TRUs, DSC TRUs, and TRU gen sets would be subject to a stationary operating time limit, in which they would be required to use ZE operation while stationary at certain facilities in California and be equipped with an electronic telematics system. Railcar TRUs would not be subject to the stationary operating time limit. Requirements for lower-GWP refrigerant and ZE truck TRUs would remain unchanged from the Proposed Amendments.

Alternative 1 would result in higher costs compared to the Proposed Amendments. The higher cost of Alternative 1 is due to the cost of trailer TRUs and DSC TRUs that meet the diesel emission standards, are capable of ZE operation, and equipped with an electronic telematics system; as well as the purchase and installation of 38,000 plugs at applicable facilities to support ZE operation of TRUs onsite. Alternative 1 would result in greater PM2.5, NOx, and GHG emission reductions than the Proposed Amendments. Staff evaluated the costs and benefits of Alternative 1 in the SRIA analysis (see Appendix B).

Staff rejected Alternative 1 because it does not meet the directive of EO N-79-20, which set a goal for 100 percent ZE off-road vehicles and equipment by 2035. In addition to the ZE truck TRU requirements in the Proposed Amendments, staff intend to pursue an additional rulemaking to transition the remaining TRU categories to ZE per the EO. Alternative 1 would impose significant costs on the TRU industry only to be subject to additional ZE requirements in the near future. Stakeholders have also expressed concern regarding the feasibility of the ZE operation while stationary requirement included in Alternative 1 because TRUs and the facilities where they operate are often not under the same ownership. In addition, there is not a standardized plug for electric-standby or hybrid-electric trailer TRUs that would be used to comply with the ZE operation requirement. Without plug standardization between the two major TRU manufacturers, it would be difficult to ensure compatibility between TRUs and facility infrastructure owned by different entities.

B. Alternative 2: ZE Requirement for All TRUs

Alternative 2 is a more stringent requirement for TRUs operating in California. Under this alternative, starting December 31, 2023, fleets would be required to transition 10 percent each year to ZE technology, such that all TRUs operating in California would be ZE by December 31, 2032. In contrast to the Proposed Amendments that only require the transition of truck TRUs to ZE technology, this alternative requires the transition of truck TRUs, trailer TRUs, DSC TRUs, and TRU gen sets to ZE technology. Similar to the ZE truck TRU requirement in the Proposed Amendments, Alternative 2 would not impose additional requirements such as the diesel emission standard, because TRUs would transition to ZE technology that has a higher incremental cost and would ultimately achieve the greatest emission reductions. Railcar TRUs would not be subject to the ZE requirement. This alternative aligns with proposals from environmental groups advocating for the full transition to ZE TRU operation and equipment as quickly as possible.[170]

Alternative 2 would result in higher costs compared to the Proposed Amendments. The higher cost of Alternative 2 is based on current cost estimates for ZE trailer TRUs, DSC TRUs, and TRU generators sets, as well as the purchase and installation of additional Level 2 chargers to support their operations. Alternative 2 would result in greater PM2.5, NOx, and GHG emission reductions than the Proposed Amendments.

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[170] Ageldis, Yasmine, et al., "Comments on the Transportation Refrigeration Unit Regulation Updated Concept," April 27, 2020. (web link: https://www.arb.ca.gov/lists/com-attach/12-truregulation-ws-AXVVIVQgWFQFYFQ7.pdf)

Staff rejected Alternative 2 because it has significantly higher costs than the Proposed Amendments. As previously mentioned, in addition to the ZE truck TRU requirements in the Proposed Amendments, staff intend to pursue an additional rulemaking to transition the remaining TRU categories to ZE per EO N-79-20. Staff plan to complete an assessment of ZE technologies for trailer TRUs and the remaining TRU categories, which will inform the development of requirements to transition all TRUs to ZE that are technologically feasible and cost-effective.

C. Alternative 3: Align Implementation of ZE Truck TRU Requirements with CARB's ZE Truck Rules

Alternative 3, proposed by TRU OEMs, would delay the requirements for ZE truck TRUs to align with CARB's implementation of ZE requirements for truck manufacturers and fleets.

Staff rejected Alternative 3 because it would result in extended use of diesel-powered truck TRUs, which would delay needed emission reductions. Alternative 3 also fails to foster the development of ZE TRU technology in the timeframe needed to support a subsequent rulemaking to transition trailer TRUs and the remaining TRU categories to ZE per EO N-79-20. As more fleets use ZE technologies in the truck TRU application as a result of the Proposed Amendments, the current state of ZE TRU technology will advance and expand into extended range applications needed to support the transition of trailer TRUs and the remaining TRU categories to ZE. Lastly, although CARB has adopted ZE requirements for truck manufacturers, the fleet rules are still under development. The current concept for the ZE truck fleet rule would not apply to all truck TRU types, resulting in further delays in emission reductions and technology advancement for all TRUs.

D. Alternative 4: Lower-GWP Refrigerant

Alternative 4, proposed by the Environmental Investigation Agency, would lower the GWP threshold for TRU refrigerant or include a second step for a further reduction in GWP to under 150 by 2025.[171]

Staff rejected Alternative 4 because although U.S. EPA approved R-744 (GWP = 1) for use in transport refrigeration applications in 2014 and both Carrier and Thermo King have successfully applied R-744 refrigerant in units in Europe, units with R-744 refrigerant are not yet available in North America. Staff are proposing a GWP threshold of 2,200 to ensure a quick transition to a lower-GWP alternative that is

[171] Starr, Christina, "Comments of the Environmental Investigation Agency re: Refrigerant GWP for New TRUs," October 11, 2019.

commercially available for the three equipment types (truck TRU, trailer TRU, and DSC TRU).

E. Small Business Alternative

The Board has not identified any reasonable alternatives that would lessen any adverse impact on small business.

F. Performance Standards in Place of Prescriptive Standards

Government Code sections 11346.2(b)(4)(A) and 11346.2(b)(1)[172] contain requirements for proposed regulations that would mandate the use of specific technologies or equipment. However, because the Proposed Amendments are performance-based and do not mandate the use of specific technologies or equipment, these Government Code requirements are not applicable.

G. Health and Safety Code Section 57005 Major Regulation Alternatives

CARB estimates the proposed regulation will have an economic impact on the State's business enterprises of more than $10 million in one or more years of implementation. CARB will evaluate alternatives submitted to CARB and consider whether there is a less costly alternative or combination of alternatives that would be equally as effective in achieving increments of environmental protection in full compliance with statutory mandates within the same amount of time as the proposed regulatory requirements, as required by Health & Saf. Code section 57005.[173]

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[172] Government Code §11346.2(b), Division 3, Public Participation: Procedure for Adoption of Regulations. (web link: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?lawCode=GOV&sectionNum=11346.2.)

[173] California Health and Safety Code § 57005, Division 37, Regulation of Environmental Protection. (web link: https://leginfo.legislature.ca.gov/faces/codes_displaysection.xhtml?lawCode=HSC&sectionNum=57005)

XII. Justification for Adoption of Regulations Different from Federal Regulations Contained in the Code of Federal Regulations

U.S. EPA and CARB regulate TRU engines as mobile non-road (off-road) engines (referred to as off-road throughout this rulemaking). Federal off-road compression-ignition engine emission standards are set forth for new engines in 40 Code of Federal Regulations Part 89. California standards for new off-road compression-ignition engines align with federal requirements and are set forth in CCR, title 13, Article 4, sections 2420-2427, under "Heavy Duty Off-road Diesel Cycle Engines."

The Proposed Amendments require new TRU engines operating in California to meet emission standards that generally align with the harmonized federal/State off-road compression-ignition engine emission standards. More specifically, the Proposed Amendments require newly-manufactured (MY 2023 and newer) trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines to meet a PM standard that aligns with the U.S. EPA Tier 4 final PM emission standard for engines greater than 25 horsepower, regardless of horsepower. Engines less than 25 horsepower would be required to meet a PM emission standard more stringent than the harmonized federal/California PM standard. In-use (MY 2022 and older) trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines would continue to operate under the current TRU ATCM requirements.

The more stringent PM standard for newly-manufactured trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines less than 25 horsepower is needed to address the emergence and growth in the number of units equipped with engines less than 25 horsepower. As discussed previously, the 2021 update to the statewide TRU emission inventory (Appendix H) indicates growing sales of trailer TRUs with less than 25 horsepower engines, which contrasts with previous inventories where all trailer TRU engines were over 25 horsepower. The California and federal PM off-road emission standard for engines less than 25 horsepower is 15 times higher than the standard for engines greater than 25 horsepower. As a result, diesel PM emissions have not been reduced under the TRU ATCM as expected. Similar trends are also expected for DSC TRUs, railcar TRUs, and TRU gen sets. Based on the TRU emission inventory, the number of units equipped with engines less than 25 horsepower will become responsible for the majority of PM emissions from TRUs in the near future, if current trends continue.

The Proposed Amendments follow the precedent set by the current TRU ATCM, which already requires more stringent in-use diesel emission standards than federal requirements. CARB adopted the TRU ATCM in 2004 and U.S. EPA authorized

California to enforce the regulation in 2009.[174] CARB subsequently adopted amendments in 2010 and 2011. U.S. EPA determined those amendments fell within the scope of the original authorization and also granted full authorization.[175, 176]

Section 209(e)(2) of the Clean Air Act sets forth the criteria for granting California authorization to adopt and enforce standards and other requirements relating to controlling emissions from new and in-use off-road engines that are not otherwise specifically preempted from all state regulations under section 209(e)(1). Under section 209(e)(2), the Administrator is directed to grant the authorization to California if it is determined that the State's standards will be, in the aggregate, at least as protective of public health and welfare as applicable federal standards, unless the Administrator finds that: (1) the protectiveness finding of the State is arbitrary and capricious; (2) California does not need separate state standards to meet compelling and extraordinary conditions; or (3) the State standards and accompanying enforcement procedures are not consistent with section 209 of the Clean Air Act.

First, in granting authorization, U.S. EPA acknowledged that the TRU ATCM is at least as protective of public health and welfare as applicable federal standards. Similarly, for new engines greater than 25 horsepower, the Proposed Amendments are at least as protective as federal standards for new engines. For new engines less than 25 horsepower, the Proposed Amendments are more protective than the federal PM standard for new engines.

Second, U.S. EPA agreed that unique circumstances exist in California necessitating the need for the State's own off-road mobile source pollution program. As discussed in Chapter II, California has a critical need to reduce exposure to air toxics such as diesel PM, as well as PM, NOx, and GHG emissions. The benefits of protecting public health and reducing emissions justify the cost of adopting regulations that differ from existing federal regulations.

Third, U.S. EPA determined that the TRU ATCM is consistent with section 209 of the Clean Air Act. Section 209(a) preempts all states and political subdivisions from adopting or attempting to enforce any standard relating to the control of emissions from new motor vehicles or new motor vehicle engines. TRUs are not covered by this preemption in that they are not a new motor vehicle or new motor vehicle engine.

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[174] United States Environmental Protection Agency, Federal Register, Vol. 74, No. 11, Page 3030, January 16, 2009. (web link: https://www.govinfo.gov/content/pkg/FR-2009-01-16/pdf/E9-907.pdf)
[175] United States Environmental Protection Agency, Federal Register, Vol. 78, No. 125, Page 39870, June 28, 2013. (web link: https://www.govinfo.gov/content/pkg/FR-2013-06-28/pdf/2013-15437.pdf)
[176] United States Environmental Protection Agency, Federal Register, Vol. 82, No. 12, Page 6525, January 19, 2017. (web link: https://thefederalregister.org/82-FR/6522/2017-01235.pdf)

Section 209(e)(1) establishes the federal preemption prohibiting states and local subdivisions from adopting or enforcing any standard or other requirement relating to the control of emissions of new engines used in farm and construction equipment that are smaller than 175 horsepower or engines used in new locomotives. Although TRU engines are less than 175 horsepower, they are not primarily used in farm and construction equipment and vehicles and are not used in locomotives.

Section 209(b)(1)(C) provides that no waiver shall be granted for on-road emission standards if the state standards and accompanying enforcement procedures are not consistent with section 202(a) of the Clean Air Act. Similarly, section 209(e)(2)(A)(iii) provides that no authorization shall be granted for nonroad emission standards if the state standards and accompanying enforcement procedures are not consistent with section 209 of the Clean Air Act. While section 209(b)(1)(C) does not apply here, section 209(e)(2)(A)(iii) does, and U.S. EPA has historically interpreted consistency under section 209(b)(1)(C) using a two-prong test: (1) that there is sufficient lead time to permit the development of technology necessary to meet the standards and other requirements, giving appropriate consideration to the cost of compliance in the time frame provided and (2) that the California and federal test procedures are sufficiently compatible to permit manufacturers to meet both the state and federal test requirements with one test vehicle or engine. As discussed in Chapter IX, the PM emission standard requirement is technically feasible, as both major TRU manufacturers have commercially available units with engines certified to meet the proposed standard.

There are no federal regulations establishing requirements on the use of ZE technologies or lower-GWP refrigerant for TRUs, as would be required by the Proposed Amendments.

XIII. Enforcement

CARB's goal is to ensure uniform compliance with its regulations to achieve a level playing-field and maximize emission reductions for public health and environmental protection. For this to happen, there must be an effective outreach campaign to inform stakeholders of the requirements under a given regulation and mechanisms in place to enforce compliance with regulatory requirements and deter violations. This includes mechanisms to quickly and easily identify all responsible parties subject to regulatory requirements, to hold all responsible parties accountable when violations are identified, to easily identify compliance, and include clear consequences for non-compliance. This chapter describes the mechanisms included in the Proposed Amendments that staff will use to uniformly enforce its requirements and staff's planned efforts to assist stakeholders in implementing the Proposed Amendments.

A. How will the Proposed Amendments be implemented?

Staff, in cooperation with stakeholders, will develop and conduct an extensive outreach campaign to ensure affected parties are aware of their responsibilities under the Proposed Amendments. This campaign will build on the outreach activities conducted throughout the regulatory development process. First, staff will continue to work with industry groups to inform their members about the Proposed Amendments. Second, staff will provide training and educational materials at workshops and via our website to help affected parties understand the requirements and help to determine a path to compliance. Third, staff will continue to operate a toll-free number to answer questions about the Proposed Amendments (1-888-878-2826). Staff will also notify affected parties prior to each compliance date as the Proposed Amendments take effect to ensure they are informed of requirements and their compliance deadlines. Lastly, staff will issue CARB compliance labels to enable staff and applicable facility owners and operators to easily determine the compliance status of a given TRU.

B. How will the Proposed Amendments be enforced?

CARB estimates that by 2023, approximately 35,000 TRUs and TRU gen sets based in California, and another 158,000 out-of-state TRUs and TRU gen sets will be operating in California. Learning from CARB's prior experience enforcing the current requirements of the TRU ATCM, staff have identified several compliance mechanisms necessary to include in the Proposed Amendments that work together beyond traditional inspections and investigations of TRUs alone to ensure industry-wide compliance, maximize emission reductions, and level the playing field between owners of compliant and non-compliant TRUs, and between owners of in-state and out-of-state TRUs.

These mechanisms include multiple-party responsibilities, added requirements for applicable facilities to ensure only compliant TRUs operate on their property, and expanded TRU reporting and labeling requirements. Staff will use the compliance mechanisms described below to enforce the Proposed Amendments by conducting unit, fleet, and facility inspections, and fleet and facility investigations. Inspections and investigations may result in corrective actions, including Department of Motor Vehicle registration holds on trucks where authorized and substantial civil penalties for violations of the Proposed Amendments.

1. Multiple-Party Responsibilities

The Proposed Amendments place responsibility on multiple parties to ensure compliance with regulatory requirements. The Proposed Amendments hold TRU owners, TRU operators, vehicle owners, drivers, and freight contractors responsible for checking a TRU's compliance status before hiring or transporting a TRU load and each party is liable for operating non-compliant units. To assist these parties with easily determining the compliance status of a TRU, the Proposed Amendments require each TRU operating in California to be reported to CARB and to display compliance labels. Placing responsibility on multiple parties will help to improve compliance, which in turn will ensure a level playing field between owners of compliant and non-compliant TRUs

2. Applicable Facility Reporting of TRUs

The Proposed Amendments require all applicable facilities to ensure that only compliant TRUs operate on their properties. To meet this requirement, the Proposed Amendments require applicable facilities to gather information on all TRUs that operate at their facilities and report that information to CARB quarterly. Alternatively, applicable facilities may provide a declaration, under penalty of perjury, that they do not allow non-compliant TRUs to operate on their properties. To assist an applicable facility with determining a TRU's compliance status, the Proposed Amendments require each TRU operating in California to display compliance labels.

TRU emissions are generated at applicable facilities and impact communities surrounding them. Therefore, applicable facility owners and operators should bear some responsibility for ensuring TRUs operating on their properties are compliant with regulatory requirements. Reporting accurate and comprehensive information on all TRUs that operate at applicable facilities will help staff better identify non-compliant TRUs operating in California and bring them into compliance. Alternatively, not allowing non-compliant TRUs to operate at an applicable facility incentivizes TRU owners to comply and achieves immediate emission reductions in impacted communities.

3. Expanded TRU Reporting and Labeling

The Proposed Amendments require TRU owners to report all TRUs that operate in California to CARB. TRU reporting helps CARB enforcement staff, as well as applicable facility owners, applicable facility operators, vehicle owners, drivers, and freight contractors, all of whom will be able to query CARB's website, to identify who is subject to the Proposed Amendments and the requirements that apply to them. CARB will verify self-reported TRU information using TRU OEM production reports.

The Proposed Amendments also include new compliance label requirements, in which TRU owners will be required to affix CARB-issued compliance labels to the TRU housing. Compliance labels will enable CARB enforcement staff and responsible parties to more quickly verify compliance of a TRU at the moment the TRU is operating. The ability to quickly and easily determine compliance is critical for responsible parties to meet the requirements of the Proposed Amendments. This ability is also critical for CARB enforcement staff to implement an efficient enforcement process that can reach a higher volume of units and therefore level the playing field even further.

The compliance labels will be valid for three years and non-compliant TRUs will not be issued new compliance labels if they remain out of compliance or have outstanding violations. Without a compliance label, these units run the risk of not being hired by a freight contractor, pulled by a vehicle owner, or allowed onto an applicable facility to avoid liability to these responsible parties, and/or being cited by CARB. This will incentivize owners to bring their non-compliant TRU into compliance in a timely manner.

XIV. Public Process for Development of the Proposed Action (Pre-Regulatory Information)

Consistent with Government Code sections 11346, subdivision (b), and 11346.45, subdivision (a), and with the Board's long-standing practice, staff held public workshops and had other meetings with interested persons during the development of the Proposed Amendments. These informal pre-rulemaking discussions provided useful information that staff considered during development of the Proposed Amendments that are now being proposed for formal public comment.

A. Public Engagement for Rulemaking Process

To ensure an open and transparent rulemaking, staff have engaged in an extensive public process since development of the Proposed Amendments began in early 2016. As of June 2021, staff have conducted more than 160 meetings with members of impacted communities, environmental justice advocates, air districts, industry stakeholders (including TRU owners and operators, TRU dealers and service centers, truck and trailer leasing companies, trade associations, TRU OEMs, electric utilities, freight facility owners and operators, infrastructure manufacturers, and ETS suppliers), and other interested parties. Meeting formats included public workshops, work group meetings, community meetings, informal meetings, phone calls, and site visits with individual stakeholders. Throughout the rulemaking process, access to information including meeting notices, slide presentations, and contact information were available on CARB's TRU Regulation website.

B. Public Workshops

Staff conducted eight public workshops to discuss regulatory concepts, methodology and data used to develop the emission inventory and conduct a health risk assessment (HRA), electric and fueling infrastructure considerations, enforcement and compliance mechanisms, as well as solicit stakeholder feedback. Staff notified stakeholders of all upcoming workshops with the issuance of a public notice at least three weeks prior to their occurrence. Staff posted the notices to the TRU Regulation website and distributed them through several public list serves that include over 17,000 recipients.[177] Each of these workshops was open to all members of the public. Staff

[177] Number of subscribers for the following CARB lists as of January 28, 2021: Agricultural Activities, Community Air, Environmental Justice ChERRP, Commerce, Environmental Justice ChERRP, Mira Loma, Environmental Justice ChERRP, Wilmington, Goods Movement Emission Reduction Program, Port Truck, Reduction of GHG Emissions from Refrigerated Shipping Containers, Stationary Equipment Refrigerant Management Program, Sustainable Freight Transport Initiative, and Transport Refrigeration Units.

posted meeting materials, including agendas, slide presentations, and draft regulatory language on CARB's TRU Regulation website in advance of the workshops.

Staff held an initial workshop on April 13, 2016, in Sacramento, California. During this workshop, staff discussed concepts to reduce emissions from stationary TRU operations and solicited stakeholder feedback and suggestions on additional ideas. The workshop was webcast with the ability to submit questions online to ensure all interested parties could access the information and participate in the discussion.

Staff held a second set of public workshops on August 16, 2017, in Sacramento, California, and on August 18, 2017, in Riverside, California. At these workshops, staff presented a draft concept to limit the amount of time that diesel-powered TRUs operate while they are stationary, as well as require an overall ZE mode operating time. Staff also discussed emission inventory updates, survey results, and information on available incentive funding. At these workshops, staff introduced stationary operating time limit and ETS requirements. The Sacramento workshop included 37 participants and 80 webcast participants. The Sacramento workshop was webcast with the ability to submit questions online to ensure the opportunity for broader public participation. The Riverside workshop included 21 participants.

Staff held a third set of public workshops on August 28, 2019, in Fontana, California, on September 3, 2019, in Fresno, California, and on September 11, 2019, in Sacramento, California. In response to the high costs associated with the concept presented at the previous workshops, staff presented a revised concept to require truck TRUs to transition to ZE technology, trailer TRUs to utilize ZE operation while stationary for more than 15 minutes at applicable facilities, and applicable facilities to install electric charging or fueling infrastructure. At these workshops, staff introduced diesel emission standards and lower-GWP refrigerant requirements. Staff also discussed infrastructure considerations, enforcement and compliance mechanisms, funding opportunities, and solicited stakeholder input on the concept as well as alternatives for the Standardized Regulatory Impact Assessment and EA prepared for the Proposed Amendments. These workshops therefore also served as CEQA scoping meetings. There were 30 participants at the Fontana workshop, 16 participants at the Fresno workshop, and 35 participants and 101 webcast participants at the Sacramento workshop. The Sacramento workshop was webcast with the ability to submit questions online to ensure the opportunity for broader public participation.

Staff held a non-regulatory workshop on October 31, 2019, in Sacramento, California, to discuss emission inventory updates and the preliminary health analyses for the draft concept of the Proposed Amendments. At this workshop, staff discussed updates to the statewide TRU emission inventory and presented draft results from these updates. Staff also presented the methodology, data inputs, and results related to the health impacts from TRUs. The workshop included 22 participants. The workshop was

webcast with the ability to submit questions online to ensure the opportunity for broader public participation.

Staff held a final workshop on March 19, 2020, via teleconference to discuss the updated concept in response to input received on the draft concept presented at workshops in August and September of 2019. During the call, staff discussed refined regulatory concepts, draft regulatory language, and health risk and emissions estimates. The teleconference included 299 participants. To facilitate the exchange of information, staff created an informal comment submittal form and made it available on the CARB website for stakeholders to submit comments on the draft regulatory language. The teleconference was open to the public and staff encouraged participation by all parties.

C. Freight Facility Workshops and Community Meetings

Staff conducted two workshops on August 29, 2017, in Los Angeles, California, and September 6, 2017, in Sacramento, California to discuss ways to reduce community health impacts from freight facilities. Staff presented potential sector-based and facility-based approaches, including requiring the use of ZE and near-ZE technologies for equipment, including TRUs, and supporting infrastructure at facilities, such as warehouses or distribution centers, seaports, and railyards.

Staff participated in four broader freight-focused community meetings during the week of September 18, 2017, in Lamont, Long Beach, Fontana, and Oakland, California with more than 130 attendees in total, including local residents and more than 70 organizations. Staff conducted the meetings using the World Café format, with one to two staff and multiple community members at each table. Staff set up tables for discussion topics related to achieving additional emission reductions at seaports, rail yards, warehouses, and distribution centers.

Staff also extended outreach efforts to communities surrounding facilities where TRUs operate by participating in meetings and monthly calls with the California Cleaner Freight Coalition (CCFC). These monthly calls focus on updating community advocacy groups on the development process of CARB's freight-related regulatory activities. In addition, staff met with representatives from the CCFC on September 21, 2018, in Long Beach, California to hear community advocates express their concerns, and to discuss staff's draft concepts for the Proposed Amendments.

D. Work Group Meetings

Staff conducted three work group meetings to discuss regulatory concepts, costs, infrastructure considerations, compliance and enforcement mechanisms, as well as solicit stakeholder feedback.

Staff held a work group meeting on November 3, 2017, in Sacramento, California to discuss costs, fleet operational needs, and technology readiness to successfully deploy and expand the ZE TRU market, as well as enforcement and infrastructure issues identified at the August 2017 workshops. To encourage focused discussions, staff invited key stakeholders. Participants included environmental justice advocate groups, air districts, TRU owners and operators, TRU dealers, trade associations, TRU OEMs, electric utilities, freight facility owners and operators, infrastructure manufacturers, and ETS suppliers. At the meeting, staff again requested suggestions for regulatory alternatives from the stakeholders present. The work group meeting included 47 participants.

Staff held a second work group meeting on December 17, 2019, in Sacramento, California, to discuss infrastructure related issues identified at the workshops held in August and September 2019. To encourage focused discussions, staff invited key stakeholders. Participants included TRU owners and operators, trade associations, TRU OEMs, fuel providers, freight facility owners and operators, and infrastructure manufacturers. At the meeting, staff discussed the proposed timeline for infrastructure, electricity costs, potential inclusion of a plug standard, and infrastructure related cost data and assumptions. Stakeholders indicated that CARB should not include a plug standard in the Proposed Amendments and allow the market and ongoing industry efforts to develop one. The work group meeting included 22 participants.

Staff held a third work group meeting on July 29, 2020, via webinar to discuss enforcement related issues identified at the workshops held in August 2019, September 2019, and March 2020. The work group meeting was open to the public. During the meeting, staff outlined potential enforcement strategies for each of the requirements in the Proposed Amendments and solicited stakeholder feedback. The work group meeting included 223 participants.

E. Stakeholder Meetings and Site Visits

Staff conducted informal meetings, phone calls, and site visits with a broad group of stakeholders to develop the Proposed Amendments, discuss concepts, and gather input. This includes members of impacted communities, environmental justice advocates, air districts, TRU owners and operators, trade associations, TRU OEMs, TRU dealers and service centers, truck and trailer dealers, truck and trailer leasing companies, freight brokers, forwarders, shippers, receivers, freight facility owners and operators, and other interested parties.

In addition to meeting with a wide range of stakeholders, staff also conducted targeted outreach to potential applicable facilities. This included mailing over 40,000 postcards to facilities with refrigerated operations potentially affected by the

Proposed Amendments to notify them of upcoming workshops and direct them to the TRU Regulation website for more information. In addition to meetings with facilities to discuss the Proposed Amendments, staff also visited several facilities, including refrigerated WHDCs, CSWs, seaport terminals, and railyards to learn more about their business operations and to better to understand potential implementation challenges associated with the Proposed Amendments.

Staff also had several meetings with agriculture stakeholders to discuss the Proposed Amendments. In 2017, staff traveled to Fresno, CA to discuss issues regarding freight facilities and TRUs. Staff held conference calls with several Agricultural Association representatives on August 15, 2018, and March 11, 2019, to brief them on the Proposed Amendments and received several comments regarding the industry's seasonal operations and their geographical distance from sensitive receptors. On September 3, 2019, staff traveled to Fresno to conduct a public workshop on the Proposed Amendments. Staff also provided an update to the San Joaquin Valley Air Pollution Control District Citizens Advisory Committee at their March 3, 2020 meeting and met with stakeholders to discuss the Proposed Amendments.

F. Preliminary Cost Document

In August 2020, staff posted a preliminary cost document on the TRU Regulation website for public comment which outlined the cost inputs and assumptions to be used for the economic analysis of the Proposed Amendments.

G. Outreach on Changes to the Regulatory Proposal

In October 2020, staff posted an update on the TRU Regulation website announcing the bifurcation of the draft TRU concept to transition diesel-powered TRUs to ZE technology in two parts. Previously, staff presented a draft TRU concept at public workshops held in 2019. The draft TRU concept included requirements for ZE truck TRUs; ZE operation while stationary for trailer TRUs, DSC TRUs, and TRU gen sets; infrastructure at applicable facilities; and the use of lower-GWP refrigerant. Because the Proposed Amendments are a subset of the draft concept previously workshopped, staff determined it was not necessary to conduct additional workshops. However, in response to stakeholder questions received, in January 2021, staff posted an informational document on the TRU Regulation website to provide additional clarification on the key elements included in the Proposed Amendments.

For additional information and a comprehensive list of outreach efforts, see Appendix E.

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XVI. Appendices

A. **Appendix A.1 and A.2: Proposed Regulation Order**

B. **Appendix B: Standardized Regulatory Impact Assessment (SRIA)**

C. **Appendix C: Summary and Response to DOF comments on the SRIA**

D. **Appendix D: Draft Supplemental Environmental Analysis**

E. **Appendix E: List of Public Workshops, Meetings, Conference Calls, Video Conferences, and Site Visits Supporting the Public Process for Development of the Proposed Amendments**

F. **Appendix F: Applicable Facility Determination Methodology**

G. **Appendix G: Fee Development**

H. **Appendix H: 2021 Update to the Statewide Emission Inventory for TRUs**

I. **Appendix I: Heath Analyses**

Appendix A.1

Proposed Regulation Order

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate.

Note: This version of the Proposed Regulation Order complies with Government Code section 11346.2 subdivision (a)(3). The proposed amendments are shown in underline to indicate additions and strikethrough to indicate deletions from the existing regulatory text. For ease of readability, CARB has also provided a version of the proposed amendments that can toggle between amendments in strikeout/underline and a "clean" version with amendments incorporated into the regulatory text, which can be found in Appendix A.2

Proposed Regulation Order

Amendments to Division 3, Chapter 9, Article 8, Sections 2477, 2477.1, 2477.2, 2477.3, 2477.4, 2477.5, 2477.6, 2477.7, 2477.8, 2477.9, 2477.10, 2477.11, 2477.12, 2477.13, 2477.14, 2477.15, 2477.16, 2477.17, 2477.18, 2477.19, 2477.20, and 2477.21, and Adoption of Division 3, Chapter 9, Article 8, Sections 2477.22, 2477.23, and 2477.24, Title 13, California Code of Regulations, to read as follows:

§ 2477. Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate. [Renumbered]

Sections 2477 through 2477.24 shall be known as the Transport Refrigeration Unit Regulation, or TRU Regulation.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and ~~43018~~43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.1. Purpose

Diesel particulate matter (PM) was identified in 1998 as a toxic air contaminant. This regulation implements provisions of the Diesel Risk Reduction Plan, adopted by the California Air Resources Board in October 2000, as mandated by the Health and Safety Code Sections 39650-39675, to reduce emissions of substances that have been determined to be toxic air contaminants. Specifically, this regulation uses a phased approach to reduce ~~the~~ diesel PM, oxides of nitrogen (NOx), and greenhouse gas (GHG) emissions from ~~in-use~~ transport refrigeration units (TRUs) and TRU generator (gen) set equipment used to power electrically driven refrigerated shipping containers and trailers that are operated in California.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and ~~43018~~43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.2. Applicability.

~~Owners and operators:~~ Except as provided in section 2477.3, ~~section~~this TRU Regulation applies to the following entities:

(a) Owners and operators: Section 2477.5 of this regulation applies to owners and operators of diesel-fueled TRUs and TRU gen sets ~~(see definition of operator and owner in section 2477.4)~~ that operate in the State of California, regardless of where the vehicle is based. This specifically includes California-based and non-California-based TRUs and TRU gen sets that are installed on trucks, trailers, shipping containers, and railcars.

(b) ~~Terminal operators~~Vehicle Owners: Section 2477.6 ~~of this regulation~~ applies to ~~operators of terminals located in California where TRU-equipped~~ vehicle owners of trucks~~,~~ or tractor-trailers~~, or shipping containers,~~ that use TRUs or TRU gen sets ~~are regularly garaged, maintained, operated, or dispatched from, including a dispatch office, cross-doc facility, maintenance shop, business, or private residence~~on California highways.

(c) Drivers: Section 2477.7 applies to drivers ~~(as defined in section 2477.4)~~ that drive trucks or tractor-trailers that use TRUs or TRU gen sets on California highways.

(d) Freight brokers and freight forwarders: Section 2477.8 applies to freight brokers and freight forwarders ~~(as defined in section 2477.4)~~ that arrange, hire, tender contracts for, or dispatch the transport of perishable goods on California highways or railways in trucks, trailers, shipping containers, or railcars that are equipped with TRUs or TRU gen sets.

(e) Carriers: Section 2477.9 applies to motor carriers ~~(as defined in section 2477.4)~~ that use, cause to be used, or dispatch TRU-equipped trucks, trailers, or railcars, or trailer chassis or shipping containers with TRU gen sets that are driven on California highways or railways.

(f) ~~California-based shippers~~Shippers: Section 2477.10 applies to ~~California-based~~ shippers ~~(as defined in section 2477.4)~~ that arrange, tender contracts for, or dispatch the transport of perishable goods ~~from any location in California in~~that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in California.

(g) ~~California-based receivers~~Receivers: Section 2477.11 applies to ~~California-based~~ receivers ~~(as defined in section 2477.4)~~ that arrange, tender contracts for, or dispatch the transport of perishable goods ~~to any location in California in~~that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in California.

(h) Lessors and Lessees: Section 2477.12 applies to any person that rents or leases (lessor) TRUs or TRU gen sets and those persons renting (renter) or leasing (lessee) such equipment that is operated in California or that is based in California.

(i) TRU ~~and~~, TRU gen set, and ZE truck TRU original equipment manufacturers: Section 2477.13 applies to original equipment manufacturers ~~(as defined in section 2477.4)~~ that direct TRU ~~or~~, TRU gen set, or ZE truck TRU sales to the California market.

(j) TRU, TRU gen set, and TRU-equipped truck and trailer dealers located in California: Section 2477.14 applies to TRU, TRU gen set, and TRU-equipped truck and trailer dealers that maintain a business location in California and sell, maintain, or repair new or in-use TRUs, TRU gen sets, or TRU-equipped trucks or trailers.

(k) Repair shops located in California that work on TRUs or TRU gen sets: Section 2477.15 applies to repair shops that maintain a business located in California and install replacement engines in TRUs or TRU gen sets, or retrofit TRUs or TRU gen sets with verified diesel emissions control strategies to comply with this subarticle.

(l) Engine rebuilders: Section 2477.16 applies to TRU or TRU gen set engine rebuilders that sell to the California market.

~~(m) Facilities: Section 2477.17 applies to facilities located in California with 20 or more loading dock spaces serving refrigerated areas where perishable goods are loaded or unloaded for distribution on trucks, trailers, shipping containers, or rail cars that are equipped with TRUs and TRU gen sets and that are owned, leased, or contracted for by the facility, its parent company, affiliate, or subsidiary that are under facility control (see definition).~~

(m) Applicable facility owners and operators: Section 2477.17 applies to owners and operators of applicable facilities located in California.

(n) To the extent not already covered under subsections (a) through (m), above, section 2477.18 of this regulation shall apply to any person in this State selling to an ultimate purchaser, or renting or leasing new or used TRUs or TRU gen sets, including, but not limited to, manufacturers, distributors, dealers, auctioneers, carriers, private fleets, independent owner-operators, and rental and leasing companies.

~~(o) For purposes of this subarticle, the terms "lease," "leased," "lessor," and "lessee" mean the same as "rental agreement," "rented," "owner of rented vehicle," and "renter," respectively.~~

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013 ~~and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.3. Exemptions.

(a) This ~~regulation~~TRU Regulation does not apply to military tactical support equipment.

(b) ~~Obviously non~~Non-operational TRUs or TRU gen sets are exempt ~~from certain sections of this subarticle, as specified below~~, except that the prohibitions in section 2477.18 apply with respect to selling, renting, or leasing to a person that could be reasonably expected to operate the TRU in California~~:~~.

~~(1) Any TRU that is removed or separated from the truck or trailer van, shipping container, or rail car. This exemption does not include TRU gen sets that are not attached to a shipping container or trailer chassis.~~

~~(2) Any trailer TRU housing that remains attached to a trailer van, but the fuel tank and battery have been removed and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and can be seen from 50 feet during daylight hours when the vehicle is stationary.~~

~~(3) Any truck TRU housing that remains attached to a truck van, but the positive and negative battery cables, fuel supply and return lines, and condensate drain line have been removed so that there are no visible ancillary connections to the TRU housing and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and can be seen from 50 feet during daylight hours when the vehicle is stationary.~~

~~(4) Any TRU or TRU gen set that has no engine or fuel injection system installed, making the engine incapable of being started.~~

~~(5) TRU gen sets that have been quarantined in a designated area that is separated from other compliant TRU gen sets by a cordon or barrier with signs that read "NONCOMPLIANT - DO NOT OPERATE IN CALIFORNIA". Bright red tags must be affixed to the TRU gen set control panel at all times while in California that read: "NONCOMPLIANT - DO NOT OPERATE IN CALIFORNIA". TRU gen sets may be stored in a shipping container in lieu of being quarantined in a cordoned area.~~

(c) Transport refrigeration systems that are not driven by an integral diesel internal combustion engine are exempt from the requirements of this subarticle~~.~~, except for units used to comply with the ZE truck TRU requirements in section 2477.5(b). Examples of exempt equipment include, but are not limited to:

(1) transport refrigeration systems that are driven by gasoline-fueled internal combustion engines;

(2) transport refrigeration systems that are driven by electric motors with no integral diesel engine providing power; or

(3) Pure cryogenic temperature control systems with no diesel engine driven refrigeration system integration.

(d) TRUs ~~that are~~ used during an emergency ~~(as defined)~~ are exempt from the ~~in-use performance standards of section~~requirements of sections 2477.5(a), (b), (c), and (d) of this subarticle, provided the requirements of section 2477.5(~~j~~l) are met. ~~This exemption expires on January 1,~~ TRUs operating in~~2025.~~ California~~-based TRUs~~ are not exempt from the ~~ARBER registration~~TRU reporting requirements in section 2477.5(~~e~~g).

~~(1)~~(e) Noncompliant TRUs on refrigerated railcars that are not operated while traveling through California shall be exempted provided the Executive Officer has previously approved a written compliance plan submitted by the railway carrier~~.~~, as follows:

~~(2)~~(1) The written compliance plan ~~must~~shall clearly identify the monitoring, recordkeeping, and reporting procedures that the railway carrier will implement and utilize to ensure that noncompliant TRUs on refrigerated railcars will not operate while in California.

~~(3)~~(2) The compliance plan shall establish monitoring, recordkeeping, and reporting procedural requirements that the Executive Officer finds are sufficient to identify non-compliant TRUs being moved on railways in California and to ensure that such TRUs will not operate at any time while they are present within California.

(A) The compliance plan ~~must~~shall include, without limitation: the procedure for tracking and recording routes and dates of travel within California of each noncompliant TRU, information identifying each noncompliant TRU (e.g. the railway carrier's reporting mark followed by the one-to-six-digit number which together uniquely identifies the railcar), a description of the automated monitoring and recordkeeping system for reporting the TRU "engine on" or "engine off" status, and the procedure for expeditiously reporting violations observed and/or discovered by the railway carrier.

(B) ~~A~~The compliance plan shall include a statement ~~is required~~, signed by an authorized railroad representative, declaring that the railway carrier agrees to be bound by the compliance plan.

~~(4)~~(3) Within 30 days of the submission of a complete compliance plan, the Executive Officer shall approve or disapprove the compliance plan based on the information submitted by a railway carrier as specified in sections 2477.3(e)(~~2~~1) and (~~3~~2) above, and based on good engineering judgment. If the compliance plan is disapproved, the Executive Officer shall inform the railway carrier of the reasons for the disapproval. The railway carrier may revise the compliance plan to address the basis for disapproval and resubmit the compliance plan for EO approval or disapproval.

~~(5)~~(4) The railway carrier shall maintain records collected pursuant to the approved compliance plan for a period of at least three (3) years and make these records available to ~~ARB~~CARB upon request.

~~(e)~~(f) Railway carriers are exempt from the owner or owner/operator requirements of section 2477.5 for any TRU or TRU gen set that is not owned by the railway carrier, provided:

(1) The TRU or TRU gen set is not leased by the railway carrier, in which case, section 2477.12 applies; or

(2) The railway carrier or its agent is only fueling, monitoring to assure proper operation, keeping in operation, arranging repairs at the request of the owner, or restarting the TRU or TRU gen set engine after an unscheduled shut-down or repair, and is not performing any of the other activities listed under the definition of "operate".

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and ~~43018~~43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.4. Definitions.

(a) For purposes of this ~~regulation~~TRU Regulation, the following definitions apply:

~~(1) "Affiliate or Affiliation" refers to a relationship of direct or indirect control or shared interests between the subject business and another business.~~

~~(2) "Alternative Fuel" means natural gas, propane, ethanol, methanol, or advanced technologies that do not rely on diesel fuel, except as a pilot ignition source at an average ratio of less than 1 part diesel fuel to 10 parts total fuel on an energy equivalent basis. Alternative fuels also means any of these fuels used in combination with each other or in combination with other non-diesel fuels. Alternative-fueled engines shall not have the capability of idling or operating solely on diesel fuel at any time.~~

~~(3) "Alternative Fueled Engine" means an engine that is fueled with a fuel meeting the definition of alternative fuel.~~

~~(4)~~ "Alternative Diesel Fuel" means any fuel used in diesel engines that is not commonly or commercially known, sold or represented as No. 1-D or No. 2-D, pursuant to the specification for Diesel Fuel Oils D975-81, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g~~.~~., recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer Tropsch fuels, and emulsions of water in diesel fuel. Natural gas is not an alternative diesel fuel. An emission control strategy using a fuel additive will be treated as an alternative diesel fuel based strategy unless:

~~(A)~~(1) The additive is supplied to the vehicle or engine fuel by an on-board dosing mechanism, or

~~(B)~~(2) The additive is directly mixed into the base fuel inside the fuel tank of the vehicle or engine, or

~~(C)~~(3) The additive and base fuel are not mixed until vehicle or engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.

~~(5) "ARB" means the California Air Resources Board.~~

~~(6) "ARBER" means the ARB's Equipment Registration system.~~

"Alternative Fuel" means natural gas, propane, ethanol, methanol, or advanced technologies that do not rely on diesel fuel, except as a pilot ignition source at an average ratio of less than 1 part diesel fuel to 10 parts total fuel on an energy equivalent basis. Alternative fuels also mean any of these fuels used in combination with each other or in combination with other non-diesel fuels. Alternative-fueled engines shall not have the capability of idling or operating solely on diesel fuel at any time.

"Alternative-Fueled Engine" means an engine that is fueled with a fuel meeting the definition of alternative fuel.

"Applicable Facility" is any of the following facilities if one or more TRUs operate within the facility fence line or legal property boundary:

(1) A Refrigerated Warehouse or Distribution Center, with a building size greater than or equal to 20,000 square feet; or

(2) A Grocery Store, with a building size greater than or equal to 15,000 square feet; or

(3) A Seaport Facility; or

(4) An Intermodal Railyard.

"Applicable Facility Operator" means any person who leases, operates, controls, or supervises an applicable facility. An applicable facility may have more than one applicable facility operator.

"Applicable Facility Owner" means the person legally holding title (or its equivalent) to an applicable facility. An applicable facility may have more than one applicable facility owner. An applicable facility owner who leases or rents the applicable facility to another party may delegate the responsibilities in this regulation to the applicable facility operator (e.g., the lessee). The applicable facility owner shall notify CARB and the applicable facility operator in writing of this delegation.

"Applicable Facility Owner/Operator" means a requirement applies to the owner and/or operator of an applicable facility, as determined by agreement or contract between the parties if the two are separate business entities.

~~(7)~~ "B100 Biodiesel Fuel" means 100% biodiesel fuel derived from vegetable oil or animal fat and complying with American Society for Testing Materials (ASTM) D 6751-02 and commonly or commercially known, sold, or represented as "neat" biodiesel or B100. B100 biodiesel fuel is an alternative diesel fuel.

~~(8)~~ "B100 Biodiesel-Fueled" (compression-ignition engine) means a compression-ignition engine that is fueled by B100 biodiesel fuel.

~~(9)~~ "Broker" means a person, other than a motor carrier or an employee or agent of a motor carrier, that as a principal or agent sells, offers for sale, negotiates for, or holds itself out by solicitation, advertisement, or otherwise as selling, providing, or arranging for, transportation by motor carrier for compensation.

~~(10)~~ "Business" means an entity organized for profit including, but not limited to, an individual, sole proprietorship, partnership, limited liability partnership, corporation, limited liability company, joint venture, association or cooperative; or solely for purposes of the Prompt Payment Act (Government Code 927 et seq.), a duly authorized nonprofit corporation.

~~(11)~~ "California~~-based shipper~~" means ~~a shipper that operates a facility~~the State of California and does not include Indian Country in California ~~where wholesale freight is located prior to its transportation.~~

~~(12)~~ ~~"California-based receiver" means a receiver that operates a facility in California where wholesale freight is received~~under Indian or federal jurisdiction.

~~(13)~~ "California-Based TRUs and TRU Gen Sets" means TRUs and TRU gen sets equipped on trucks, trailers, shipping containers, or railcars that a reasonable person would find to be regularly assigned to terminals within California.

"CARB" means the California Air Resources Board.

~~(14)~~ "CARB Diesel Fuel" means any diesel fuel that is commonly or commercially known, sold, or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specification for Diesel Fuel Oils D975-81 and meets the specifications defined in *13 CCR 2281, 13 CCR 2282, and 13 CCR 2284*.

"CARB Online System" means a CARB online system that TRU and applicable facility owners or owner/operators shall report information to for the purposes of this regulation. The CARB online system may be found at: https://arber.arb.ca.gov.

~~(15)~~ "Carbon Monoxide (CO)" means a colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels.

~~(16)~~ "Carrier" means "motor carrier".

~~(17)~~ "Certification" means the obtaining of an Executive Order for a new off-road compression-ignition engine family that complies with the off-road compression-ignition emission standards and requirements specified in title 13 California Code of Regulations, section 2423. A "certified engine" is an engine that belongs to an engine family that has received a certification Executive Order.

~~(18)~~ "Certification Data" means the ~~ARB~~CARB Executive Order number and related exhaust emission data for each test cycle mode used to certify the engine family and obtain the certification level shown in the certification Executive Order. Such data includes modal exhaust emissions data for nitrogen oxides, nonmethane hydrocarbons, carbon monoxide, and particulate matter includes, as a minimum, torque, engine speed, weighting factor, power, mass emission rate (grams per hour), and certification test fuel.

"Class I Railroad" is a railroad that is defined as Class I by the Surface Transportation Board.

~~(19)~~ "Compression Ignition (CI) Engine" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

~~(20)~~ "Consignee" (see receiver).

~~(21)~~ "Consignor" (see shipper).

~~(22)~~ "Cryogenic Temperature Control System" means a heating and cooling system that uses a cryogen, such as liquid carbon dioxide or liquid nitrogen that is routed through an evaporator coil that cools air blown over the coil. The cryogenic system uses a vapor motor to drive a fan and alternator, and a propane-fired heater superheats the carbon dioxide for heating and defrosting. Electrically driven fans may be used instead of a vapor motor and heating and defrost needs may be met by using electric heaters and/or vehicle engine coolant.

~~(23)~~ "Delegation" means entrusting by contract another party to act on the owner's behalf without forfeiture of any rights or property.

~~(24)~~ "Deterioration Factor (DF)" means a factor that is applied to the certification emission test data to represent emissions at the end of the useful life of the engine. Separate DFs apply to each measured pollutant, except that a combined NMHC+NOx DF applies to engines that do not use aftertreatment devices. Decreasing emissions over time would not be allowed to offset increasing emissions of the other pollutant in this combined DF.

~~(25)~~ "Diesel Fuel" means any fuel that is commonly or commercially known, sold, or represented as diesel fuel, including any mixture of primarily liquid hydrocarbons - organic compounds consisting exclusively of the elements carbon and hydrogen - that is sold or represented as suitable for use in an internal combustion, compression-ignition engine.

~~(26)~~ "Diesel-Fueled" means fueled by diesel fuel or CARB diesel fuel in whole or in part, except as allowed for a pilot ignition source under the definition for "alternative fuel".

~~(27)~~ "Diesel Oxidation Catalyst (DOC)" means the use of a catalyst to promote the oxidation processes in diesel exhaust. Usually refers to an emission control device that includes a flow-through substrate where the surfaces that contact the exhaust flow have been catalyzed to reduce emissions of the organic fraction of diesel particulates, gas-phase hydrocarbons, and carbon monoxide.

~~(28)~~ "Diesel Particulate Filter (DPF)" means an emission control technology that reduces PM emissions by trapping the particles in a flow filter substrate. Periodically the collected particles are either physically removed or oxidized (burned off) in a process called regeneration.

~~(29)~~ "Diesel Particulate Matter" means the particles found in the exhaust of diesel-fueled CI engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

~~(30)~~ "Dispatch" means to coordinate delivery, pickup, and drop-off schedules of vehicles; and monitor the delivery of freight from these vehicles.

~~(31)~~ "Dispatched driver" means the driver of a truck or tractor-trailer combination that has been dispatched by a motor carrier, freight broker or forwarder, shipper, or receiver.

~~(32)~~ "Driver" means a person who physically operates a truck or tractor. Drivers may also be an owner or an operator. Drivers are not railroad engineers.

~~(33)~~ "Dual-Fuel Engine" means an engine designed to operate on a combination of alternative fuel, such as compressed natural gas (CNG) or liquefied petroleum gas (LPG), and conventional fuel, such as diesel or gasoline. These engines have two separate fuel systems, which either inject both fuels simultaneously into the engine combustion chamber or fumigate the gaseous fuel with the intake air and inject the liquid fuel into the combustion chamber.

~~(34)~~ "Effective model year" or "effective engine model year" is an alternative model-year designation (see definition of "model year") for a new replacement engine, rebuilt replacement engine, or flexibility engine when the engine does not meet, at the time of manufacture, the most stringent emission tier standard for a new engine in effect for the horsepower rating of the engine. When an engine is manufactured to meet a less stringent prior-tier emissions standard than is currently in effect, the effective model year is the last year that the prior-tier emission standard was in effect. Table 1 lists the tier standards that apply to TRUs and TRU gen sets and the corresponding effective model years.

Table 1: Effective Model Year

Prior-Tier Engine Emissions Standard	Tier Standard Effective Years	Effective Model Year
Tier 1, 25-50 Hp (trailer)	1999-2003	2003
Tier 1, under 25 Hp (truck)	2000-2004	2004
Tier 2, 25-50 Hp (trailer)	2004-2007	2007
Tier 2, under 25 Hp (truck)	2005-2007	2007
Tier 4i, 25-50 hp (trailer)	2008-2012	2012[1]

~~(35)~~ "Electric-Standby-Equipped TRU" means a TRU that is equipped with an integral diesel-fueled internal combustion engine and electric-powered motor and the refrigeration system may be driven by either the diesel-fueled internal combustion engine or the integral electric motor.

~~(36)~~ "Electronic Tracking System" means a system that meets the following criteria:

[1] Effective model year applies for this tier only after Tier 4f becomes effective in 2013 for 25 to less than 50 hp engines.

~~(A)~~(1) The tracking device ~~must~~shall acquire, at a minimum, date, time, TRU engine hour meter reading, and location data at a rate of at least one reading per minute, with no more than 10 minutes data gap.

~~(B)~~(2) The tracking device ~~must~~shall be capable of determining if the TRU or TRU gen set location is within California and determining the TRU engine run time in California for each day.

~~(C)~~(3) The tracking records ~~must~~shall be collected by an independent entity with no business relationship to the owner or operator of the TRU or TRU gen set being tracked, other than to provide the tracking service. The data shall be stored on a server that is secure from tampering and inaccessible to the TRU or TRU gen set owner or operator, other than to download reports over the Internet. An inspector shall have free access to download reports from this website over the Internet that show the TRU or TRU gen set engine operation in California for each day.

~~(37)~~ "Emergency" means any of the following times:

~~(A)~~(1) A failure or loss of normal power service that is not part of an "interruptible service contract~~" (see definition in section 2477.4);~~."

~~(B)~~(2) A failure of a facility's internal power distribution system, provided the failure is beyond the reasonable control of the operator~~;~~.

~~(C)~~(3) When an affected facility is placed under an involuntary "rotating outage~~" (see definition in section 2477.4).~~."

~~(D)~~(4) When the President of the United States or the Governor of the State of California declares a state of emergency related to any type of disaster where TRU-equipped trucks or trailers provide foodservice to incident responders, including but not limited to, forest fires and earthquakes.

~~(E)~~(5) When the National Interagency Fire Center dispatches mobile catering service businesses with TRU-equipped trucks or trailers to provide foodservice to incident responders located in California.

(6) When the Executive Officer has determined that an emergency event arising from sudden and reasonably unforeseen natural disaster such as earthquake, flood, fire, or other unforeseen events that threaten public health and safety has occurred that requires the immediate temporary operation TRUs or TRU gen sets.

~~(38)~~ "Emissions Control Group" has the same meaning as defined in title 13 CCR, section 2701

~~(39)~~ "Emission Control Strategy" means any device, system, or strategy employed with a diesel-fueled CI engine that is intended to reduce emissions. Examples of emission control strategies include, but are not limited to, particulate filters, diesel oxidation catalysts, selective catalytic reduction systems, alternative fuels, fuel additives used in combination with particulate filters, alternative diesel fuels, and combinations of the above.

~~(40)~~ "Emissions Rate" means the weight of a pollutant emitted per unit of time (e.g., grams per second).

~~(41)~~ "Executive Officer" means the Executive Officer of the California Air Resources Board or his or her delegate.

~~(42) "Facility" means any facility where TRU-equipped trucks, trailers, shipping containers or railcars are loaded or unloaded with perishable goods. This includes, but is not limited to, grocery distribution centers, food service distribution centers, cold storage warehouses, and intermodal facilities. Each business entity at a commercial development is a separate facility for the purposes of this regulation, provided the businesses are "independently owned and operated" (see definition in section 2477.4).~~

~~(43) "Facility Control (of TRUs or TRU Gen Sets)" means the TRUs or TRU gen sets located at the facility are owned or leased by the facility, its parent company, affiliate, or a subsidiary, or under contract for the purpose of providing carrier service to the facility, and the TRUs' or TRU gen sets' arrival, departure, loading, unloading, shipping and/or receiving of cargo is determined by the facility, parent company, affiliate, or subsidiary (e.g. scheduled receiving, dispatched shipments).~~

~~(44)~~ "Fischer-Tropsch Diesel Fuel" See "ultra-low-aromatic synthetic diesel fuel".

~~(45) "Flexibility engine" means an engine installed in new equipment by an original equipment manufacturer under the Transitional Program for Equipment Manufacturers in accordance with title 40 Code of Federal Regulations (40 CFR) sections 89.102 and 1039.625, and title 13 CCR section 2423(d). Such engines shall use the "effective model year" designation for purposes of compliance with this subarticle, except as allowed under section 2477.5(b)(5)(A).~~

"Fleet" means one or more TRUs or TRU gen sets, owned by a person, business, military installation, or government agency operating in California and subject to this regulation. A fleet does not include TRUs that do not operate in California.

~~(46)~~ "Freight Broker" means "broker", as defined herein.

~~(47)~~ "Freight Forwarder" means a person holding itself out to the general public (other than as a pipeline, rail, motor, or water carrier) to provide transportation of property for compensation and in the ordinary course of its business does the following:

~~(A)~~(1) Assembles and consolidates, or provides for assembling and consolidating, shipments and performs or provides for break-bulk and distribution operations of the shipments;

~~(B)~~(2) Assumes responsibility for the transportation from the place of receipt to the place of destination; and

~~(C)~~(3) Uses for any part of the transportation a motor carrier or rail carrier.

~~(48)~~ "Fuel Additive" means any substance designed to be added to fuel or fuel systems or other engine-related engine systems such that it is present in-cylinder during combustion and has any of the following effects: decreased emissions, improved fuel economy, increased performance of the engine; or assists diesel emission control strategies in decreasing emissions, or improving fuel economy or increasing performance of the engine.

~~(49)~~ "Generator Set (gen set)" means a CI engine coupled to a generator used as a source of electricity.

"Global Warming Potential (GWP)" means the 100-year GWP value first published by the Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Working Group 1 Report (AR4) (IPCC, 2007); and if not contained in AR4, then the GWP Value means the 100-year GWP value published by the IPCC in its Fifth Assessment Working Group 1 Report (AR5) (IPCC 2013).

"Grocery Store" means a retail facility that sells food products. This includes, but is not limited to establishments commonly known as supermarkets, food stores, grocery stores, food warehouses, and any other food merchandising stores.

~~(50)~~ "Highway" has the same meaning as defined in California Vehicle Code section- 360.

"Hybrid Cryogenic Temperature Control System" means a temperature control system that uses a cryogenic temperature control system in conjunction with a conventional TRU.

~~(51)~~ "Hybrid electric TRU" means a TRU that is powered by an integral diesel-fueled internal combustion engine coupled to an electric generator that provides electric power to an electric motor-driven refrigeration system and fans within the same housing and is designed to control the environment of

temperature sensitive products that are transported in trucks and refrigerated trailers. Hybrid electric TRUs may be capable of both cooling and heating.

~~(52) "Hybrid Cryogenic Temperature Control System" means a temperature control system that uses a cryogenic temperature control system in conjunction with a conventional TRU.~~

~~(53) "Independently Owned and Operated" means a business concern that independently manages and controls the day-to-day operations of its own business through its ownership and management, without undue influence by an outside entity or person that may have an ownership and/or financial interest in the management responsibilities of the applicant business or small business.~~

~~(54)~~ "Intermodal Facility" means a facility involved in the movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing modes. Such a facility is typically involved in loading and unloading refrigerated shipping containers and trailers to and from railcars, trucks, and ocean-going ships.

"Intermodal Railyard" means an intermodal facility owned or operated by a Class I Railroad.

~~(55)~~ "Interruptible Service Contract" means any arrangement in which a nonresidential electrical customer agrees to reduce or consider reducing its electrical consumption during periods of peak demand or at the request of the System Operator in exchange for compensation, or assurances not to be blacked out or other similar non-monetary assurances.

~~(56)~~ "In-Use TRU, TRU gen set, or engine" means a TRU, TRU gen set, or engine that is not a "new" TRU, TRU gen set, or engine.

~~(57) "Low Emission TRU (LETRU or L)" means a TRU or TRU gen set that meets the performance standards described under section 2477.5(a)(1) and (2).~~

~~(58)~~ "Manufacturer" means a business as defined in Government Code § 14837(c).

"Military Installation" has the same meaning as defined in title 10 United States Code § 2801(c)(4).

~~(59)~~ "Military tactical support equipment (TSE)" means equipment or vehicles that ~~meets~~meet military specifications, are owned or operated by the U.S. Department of Defense and/or the U.S. military services, and are used in

combat, combat support, combat service support, tactical or relief operations, or training for such operations.

~~(60)~~ "Model Year (MY)" means the following:

~~(A)~~(1) The designation used for engines manufactured to meet the emissions tier standard in effect for new engines at time of manufacture (see alternative designation, "effective model year, defined above); and

~~(B)~~(2) The diesel-fueled engine manufacturer's annual production period, which includes January 1st of a calendar year, or if the manufacturer has no annual production period, the calendar year.

~~(61)~~ "Motor Carrier" means a person providing motor vehicle transportation for compensation.

~~(62)~~ "New TRU, TRU Gen Set, or Engine" means any TRU, TRU gen set, or engine that has never been subject to a retail sale or lease to an "ultimate purchaser~~" (see definition in section 2477.4).~~."

~~(63)~~ "Nitrogen Oxide (NOx)" means compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition.

~~(64)~~ "Non-California-Based TRUs and TRU Gen Sets" means TRUs and TRU gen sets that are equipped on or used in trucks, trailers, shipping containers, or railcars that a reasonable person would find to be regularly assigned to terminals outside of California and operate in California from time to time for the purpose of transporting perishable goods into or out of the state.

~~(65)~~ "Non-methane Hydrocarbons (NMHC)" means the sum of all hydrocarbon air pollutants except methane. NMHCs are precursors to ozone formation.

"Non-operational" means one of the following:

(1) Any TRU that is removed or separated from the truck, trailer, shipping container, or railcar on which it was originally mounted. This does not include TRU gen sets that are not attached to a shipping container or trailer chassis.

(2) Any trailer TRU housing that remains attached to a trailer, but the fuel tank and battery have been removed and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and may be seen from 50 feet during daylight hours when the vehicle is stationary.

(3) Any truck TRU housing that remains attached to a truck, but the positive and negative battery cables, fuel supply and return lines, and condensate drain line have been removed so that there are no visible ancillary connections to the TRU housing and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and may be seen from 50 feet during daylight hours when the vehicle is stationary.

(4) Any TRU that has no engine or fuel injection system installed, making the engine incapable of being started and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and may be seen from 50 feet during daylight hours when the vehicle is stationary.

(5) TRU gen sets that have been quarantined in a designated area that is separated from compliant TRU gen sets by a cordon or barrier with signs that read "NONCOMPLIANT – DO NOT OPERATE IN CALIFORNIA". Bright red tags shall be affixed to the TRU gen set control panel at all times while in California that read: "NONCOMPLIANT – DO NOT OPERATE IN CALIFORNIA". TRU gen sets may be stored in a shipping container in lieu of being quarantined in a cordoned area.

~~(66)~~ "Nonretail Delivery or Pick-up Point" means wholesale perishable goods distribution facilities or businesses in the supply chain prior to retail facilities or businesses. This includes, but is not limited to, food manufacturing facilities, shipper warehouses, transfer points, distribution centers, cold storage warehouses, and intermodal facilities where perishable goods are loaded or unloaded.

~~(67)~~ "Operate" means to start, cause to function, program the temperature controller, select an operating program or otherwise control, fuel, monitor to assure proper operation, or keep in operation. A TRU that is operational (e.g~~.~~., capable of being operated) shall be considered to operate if it is in California.

~~(68)~~ "Operator" means any person ~~(as defined),~~, party or entity that operates a TRU or TRU gen set for the purposes of transporting perishable goods, excluding an employee driver and third party maintenance and repair service, and including but not limited to a manufacturer, producer, supplier, carrier, shipper, consignor, consignee, receiver, distribution center, or warehouse of perishable goods. An operator may also be the driver if it is also the owner (e.g~~.~~., independent owner-operator).

~~(69)~~ "Original equipment manufacturer (OEM)" means any person that originally manufactured new equipment for sale in commerce. This does not include a dealer who receives new equipment for sale in commerce.

~~(70)~~ "Owner" means, except as modified by paragraphs (~~A~~1), (2) or (~~B~~3) below, the person legally holding title (or its equivalent) to the TRU or TRU gen set, or either the person ~~(see definition)~~ registered as the owner or lessee of a vehicle by the California Department of Motor Vehicles or its equivalent in another state, province, or country, as evidenced on the vehicle registration document carried in the vehicle to which the TRU is attached~~, unless such person, can clearly demonstrate, with written documentation, that another person (e.g., a lessee) is financially responsible for the maintenance of the TRU or TRU gen set, including responsibility for installing and maintaining the emissions control technologies on the TRU or TRU gen set, and registering the TRU with the California Air Resources Board's Equipment Registration (ARBER) system, as required by this subarticle.~~. An owner may also be a driver or operator.

~~(A)~~(1) ~~(A)~~ Banks, other financial lending institutions, or other entities engaged in the act of financing TRUs are not owners, for the purposes of this subarticle unless they otherwise have an obligation to comply with this regulation (e.g., contractually responsible for the maintenance of a TRU under a sales or lease agreement).

~~(B)~~(2) ~~(B)~~ For a TRU-equipped truck or trailer, or TRU gen set owned by the federal government and not registered in any state or local jurisdiction, the owner means the department, agency, branch, or other entity of the United States, including the United States Postal Service, to which the vehicles in the fleet are assigned or which have responsibility for maintenance of the vehicles.

(3) For a TRU-equipped truck or trailer, or TRU gen set that is rented or leased:

(A) The owner shall be presumed to be the rental or leasing entity for purposes of compliance with section 2477.5, if:

1. The rental or lease agreement is for a period of less than one year; or

2. The rental or lease agreement is for a period of one year or longer, unless the terms of the rental or lease agreement or other equally reliable evidence identifies the party responsible for compliance with State laws that apply to TRUs to be the renting operator or lessee.

~~(71)~~ "Owner/Operator" means a requirement applies to the owner and/or operator of a TRU or TRU gen set, as determined by agreement or contract between the parties if the two are separate business entities.

~~(72) "Parent Company" means a company that has a controlling interest in another company, usually through ownership of more than one-half the voting stock.~~

~~(73)~~ "Particulate Matter (PM)" means the particles found in the exhaust of CI engines, which may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

~~(74)~~ "Person" means an individual, corporation, business trust, estate, trust, partnership, limited liability company, association, joint venture, government, governmental subdivision, agency, or instrumentality, public corporation, or any other legal or commercial entity.

~~(75)~~ "Prior-Tier Replacement Engine" means a new replacement engine manufactured under title 40 CFR, section 89.1003 and 1068.240, and title 13 CCR, section 2423(j), as those sections existed on August 31, 2012, that meets a prior tier of the new engine emissions standards than the tier of standards currently in effect at the time of manufacture.

~~(76)~~ "Rail Carrier" means a person providing common carrier railroad transportation for compensation, but does not include street, suburban, or interurban electric railways not operated as part of the general system of rail transportation.

"Railcar TRU" means a TRU designed to control the environment of temperature sensitive products in a railcar.

~~(77)~~ "Rated Brake Horsepower" means the power delivered, according to the statement of the engine manufacturer, at the rated speed.

~~(78) "Real Emission Reductions" means that an action is taken that results in reductions in the PM emission rate of an in-use engine (e.g. a VDECS is installed that reduced the PM emissions rate by more than 50%).~~

~~(79)~~ "Receiver" means the person that receives shipped goods, cargo, or commodities.

~~(80)~~ "Refrigerated Trailer" means a trailer van, railcar, or shipping container equipped with a TRU or TRU gen set. Pursuant to Health and Safety Code section 39618, refrigerated trailers are mobile sources and shall be regulated by ~~the ARB~~CARB on a statewide basis.

~~(81) "Repower" means to replace an existing engine in a vehicle or piece of equipment with another engine that is within the same category as the original engine and that is certified to emissions standards that are more stringent than the emission standards of the original engine (e.g. replacing a Tier 1 engine with a Tier 2 or later engine).~~

"Refrigerated Warehouse or Distribution Center (WHDC)" means a facility with cold storage used for the reception and storage of products. This includes but is not limited to cold storage warehouses, packing houses, cross-dock facilities, and 3rd Party Logistic centers.

~~(82)~~ "Retail Delivery Point" means facilities or businesses where perishable goods are delivered to retail businesses that sell these goods to end users. This includes, but is not limited to, grocery stores, convenience stores, drug stores, restaurants, and prison or school cafeterias.

~~(83)~~ "Rotating Outage" means a controlled involuntary curtailment of electrical power service to consumers as ordered by the system operator~~—see definition in section 2477.4~~.

"Seaport Facility" means any non-military independent marine terminal or operational seaport where the seaport functions as a marine terminal operator.

~~(84)~~ "Semitrailer" means a "Semitrailer" as defined in section 550 of the California Vehicle Code.

~~(85)~~ "Shipper" means the person, party, or entity who usually owns or supplies the commodities transported by a carrier, or that has possession of freight prior to its transportation. This may include, but is not limited to, food manufacturers, processers, packing plants, temporary cold storage facilities, and distribution centers.

"Statement of Accuracy" means the person responsible for submitting information under the TRU Regulation submits and signs the following statement along with the information provided: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."

"Square Footage" means for properties owned and operated by one business entity, the total square footage of all buildings on that property, as calculated from the building floor plan(s) or blueprint(s) archived by the local permitting agency or records office. For businesses leasing all or part of a building, the square footage shall be the usable area, as specified in the lease agreement.

~~(86)~~ "System Operator" means one of the several organizations that control energy in California. System operators include, but are not limited to, the California Independent System Operator, the Los Angeles Department of Water and Power, the Imperial Irrigation District, the Sacramento Municipal Utility District.

~~(87)~~ "Terminal" means any place where a TRU or TRU gen set equipped truck, trailer, shipping container, railcar or TRU gen set is regularly garaged,

maintained, operated, or dispatched from, including a dispatch office, cross-dock facility, maintenance shop, business, or private residence.

~~(88) "Terminal Operator" means the person that owns a terminal.~~

"Third Party Agreement Confirmation Information" means the information used to notify CARB that responsibility for reporting a TRU or TRU gen set to CARB has been delegated to the lessee or to a consultant.

~~(89)~~ "Tier 4 Nonroad/Off-road Emission Standards" means the emission standards and associated procedures promulgated by U.S. Environmental Protection Agency in "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule" (Vol. 69, No. 124 Fed. Reg. pp. 38957-39273 (June 29, 2004).

~~(90) "Third Party Agreement Confirmation Information" means the information used to notify ARB that responsibility for registering a TRU in ARBER has been delegated to the lessee or to a consultant.~~

"Trailer" means a semitrailer.

"Trailer TRU" means a TRU that is mounted on or in a trailer or domestic shipping container (DSC) that can be attached and detached to a tractor, commonly referenced together as a "tractor-trailer."

~~(91)~~ "Transport Refrigeration Unit (TRU)" means refrigeration systems powered by integral internal combustion engines designed to control the environment of temperature sensitive products that are transported in trucks and refrigerated trailers. TRUs may be capable of both cooling and heating.

"Truck TRU" means a TRU that is mounted on or in a truck cargo box that is permanently attached to a truck, in contrast to a detachable trailer.

~~(92) "Trailer" means a semitrailer.~~

~~(93)~~ "TRU Generator Set (TRU gen set)" means a generator set that is designed and used to provide electric power to electrically driven refrigeration units of any kind. This includes, but is not limited to gen sets that provide electricity to electrically powered refrigeration systems for semi-trailer vans and shipping containers.

~~(94)~~ "Ultimate Purchaser" means with respect to a new TRU, TRU gen set, or engine, the first person who in good faith purchases a new TRU, TRU gen set, or engine for purposes other than resale.

~~(95)~~ "Ultra-Low-Aromatic Synthetic Diesel Fuel" means fuel produced from natural gas, coal, or biomass by the Fischer-Tropsch gas-to-liquid chemical conversion process, or similar process that meets the following properties:

Table 2

Property	*ASTM*	*Value*
Sulfur Content (ppmw)	D5453-93	<1
Total Aromatic Content (wt %)	D5186-96	<1.5%
Polynuclear Aromatic ~~Cotent~~Content (wt %)	D5186-96	<0.5%
Natural Cetane Number	D613-84	>74

~~(96)~~ "Ultra-Low Emission TRU (ULETRU or U)" means a TRU or TRU gen set that meets the performance standards described under subparagraphs 2477.5(~~a~~c)(1) and 2477.5(~~a~~c)(2) or that uses an "alternative technology" in accordance with subparagraph 2477.5(~~a~~c)(3).

"Vehicle Owner" means the person registered as the owner or lessee of a vehicle by the California Department of Motor Vehicles or its equivalent in another state, province, or as evidenced on the vehicle registration document carried in the vehicle to which the TRU is attached. For example, the owner of the truck or tractor pulling a TRU equipped trailer or container.

~~(97)~~ "Verification Classification Level" means the classification assigned to a Diesel Emission Control Strategy by the Executive Officer as defined in the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emission from Diesel Engines (13 CCR Sections 2700-2710)*. PM reductions correspond as follows: Level 1: ≥25%; Level 2: ≥50%; Level 3: ≥85% or 0.01 g/hp-hr.

~~(98)~~ "Verified Diesel Emission Control Strategy" (VDECS) means an emission control strategy designed primarily for the reduction of diesel particulate matter emissions that has been verified per the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (13 CCR Sections 2700-2710)*. Examples of diesel retrofit systems that may be verified include, but are not limited to, diesel particulate filters, diesel oxidation catalysts, fuel additives (e.g~~.~~., fuel-borne catalysts), alternative fuels (e.g~~.~~., dual fuel), alternative diesel fuels, and combinations of the above.

"Zero-Emission Fueling Infrastructure" means a fueling system that provides the appropriate fuel type to power a ZE truck TRU (e.g., electric charging infrastructure or cryogenic fueling tank and dispenser).

"Zero-Emission Truck TRU" (ZE truck TRU) means a truck refrigeration system whose operation results in zero exhaust emissions of any criteria pollutant (or precursor pollutant) or GHG under any possible operational modes or

conditions. The ZE truck TRU may draw power from the truck or stored energy source that is recharged by the truck only if the truck produces zero exhaust emissions while operating. The stored energy source may not be recharged by a CI engine coupled to a generator as a source of electricity. Weight of the stored energy source does not alone qualify as "a decrease in fuel efficiency." For example, a ZE truck TRU on a diesel-powered truck may draw power from a battery that in turn is charged by a solar cell so long as the ZE truck TRU does not also draw power from the truck's internal combustion engine.

(b) The terms "lease," "leased," "lessor," and "lessee" mean the same as "rental agreement," "rented," "owner of rented vehicle," and "renter," respectively.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013 and 43018, 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43109.1, Health and Safety Code.

§ 2477.5. Requirements for Owners or Owner/Operators.

(a) ~~In-Use Performance Standards: In accordance with the schedule set forth below in paragraph (b),~~Refrigerant Requirements. The term TRU as used in this subsection (a) refers only to truck TRUs, ZE truck TRUs, trailer TRUs, and DSC TRUs. Railcar TRUs and TRU gen sets are exempt from the requirements of this subsection (a).

~~(a)~~ Beginning December 31, 2022, no owner or owner/operator shall operate ~~a TRU~~ or ~~TRU gen set~~cause to be operated in California, a TRU with a manufacture date after December 31, 2022, unless ~~it meets~~ the ~~in-use emission category performance standards set forth below.~~

(1) ~~In-Use performance standard categories for TRU and TRU gen set engines~~TRU uses a refrigerant with ~~rated brake horsepower~~a GWP value less than ~~25 horsepower (<25 hp) are shown in Table 3, along with the engine certification standards~~ or ~~the level of Verified Diesel Emission Control Strategy (VDECS) (see definition) that is necessary to qualify for each category~~equal to 2,200, or uses no refrigerant at all.

~~Table 3: <25 HP TRU and TRU Gen Set In-Use PM Performance Standards~~

(2) Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a TRU with a manufacture date after December 31, 2022, with an unreadable or inadequately maintained TRU OEM supplied refrigerant label.

(b) Zero-Emission Truck TRU Requirements. The term TRU as used in this subsection (b) refers only to truck TRUs. Trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets are exempt from the requirements of this subsection (b).

(1) Beginning December 31, 2023, no owner or owner/operator shall operate or cause to be operated in California, any truck TRU in the owner's truck TRU fleet, unless the fleet meets or exceeds the required ZE truck TRU fleet percentages specified in Table 3.

TRU owners shall replace their diesel-powered truck TRUs with ZE truck TRUs in accordance with the fleet percentages and phase-in compliance schedule specified in Table 3. The required number of ZE truck TRUs is based on the truck TRU fleet size reported to CARB on December 31, 2023 or December 31 of each year, whichever reported truck TRU fleet size is greater. A TRU owner may downsize their truck TRU fleet size only if the TRU owner has not purchased additional direct-drive refrigeration units, in which the compressor is powered from the truck's diesel engine, to replace the original diesel-powered units being sold or retired. The required number of ZE truck TRUs for a given year shall be calculated using the following formula:

"Minimum Number of ZE Truck TRUs = Required ZE Truck TRU Fleet % × Total Truck TRU Fleet"; Where:

Minimum Number of ZE Truck TRUs is the required minimum number of ZE truck TRUs in an owner's fleet as of the specified Compliance Date in Table 3.

Required ZE Truck TRU Fleet percentage (%) is listed in the second column of Table 3.

Total Truck TRU Fleet is the maximum of the December 31, 2023 Fleet Size or the Total Current Fleet Size; Where:

Number of Truck TRUs is the sum of all diesel-fueled truck TRUs plus all ZE truck TRUs in the owner's truck TRU fleet.

December 31, 2023 Fleet Size is the number of truck TRUs reported to CARB as of December 31, 2023.

Total Current Fleet Size is the Number of Truck TRUs in the owner's truck TRU fleet as of the applicable Compliance Date in Table 3.

Table 3: Phase-in Compliance Schedule for ZE Truck TRU Fleets

~~In-Use Emission~~	~~Engine Certificatio~~	~~Level~~Compliance Date as of ~~VDECS Equipped with~~December 31	Required ZE Truck TRU Fleet Percentage

2023	15%	
~~Low Emission TRU (LETRU or L)~~2024	~~0.~~30[2]%	~~Level 2~~
2025~~Ultra Low Emission TRU~~	45%	
~~(ULETRU or U)~~2026	~~NA~~[3]60%	~~Level 3~~
2027	75%	
2028	90%	
2029 and thereafter	100%	

~~(A) Compliance with the in-use performance standards can be achieved by:~~

(2) Downsizing a fleet. A TRU owner may have a smaller "Total Truck TRU Fleet" than otherwise required for a given Compliance Date if, between January 1 and December 31, inclusive, of the prior Compliance year, the TRU owner has not purchased any additional direct-drive refrigeration units in which the compressor is powered from the truck's diesel engine, to replace the original diesel-powered units being sold or retired.

(A) Prior to the Compliance Date, the TRU owner shall report to CARB their intent to downsize their fleet, the proposed Number of Truck TRUs in the fleet, any TRUs acquired or sold in the prior Compliance Year, and all information required by section 2477.20(f).

(B) The downsized Number of Truck TRUs shall replace the Total Truck TRU Fleet number going forward.

(3) If the calculated 'number of ZE Truck TRUs' is not equal to a whole number, the owner shall round up to a whole number when the fractional part of the required number of ZE truck TRUs is equal to or greater than 0.5, and round down if less than 0.5. For example:

(A) A fleet consisting of one truck TRU that operates in California shall contain one ZE truck TRU by December 31, 2026.

[2] ~~The Engine Certification value for the Low Emission TRU category corresponds to the Tier 4 Nonroad/Off-road Emission Standards that are to go into effect in 2008~~.

[3] ~~Not Applicable - must choose another compliance option~~.

(B) A fleet consisting of two truck TRUs that operate in California shall contain one ZE truck TRU by December 31, 2024 and two ZE truck TRUs by December 31, 2027.

(c) In-Use Performance Standards for MY 2022 and Older TRU and TRU Gen Set Engines. The term TRU as used in this subsection (c) refers only to trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets. Truck TRUs are exempt from the requirements of this subsection (c). In accordance with the schedule set forth below in paragraph (c)(4), no owner or owner/operator shall operate or cause to be operated in California, a MY 2022 and older TRU or TRU gen set engine, unless it meets one of the in-use emission category performance standards set forth in (1) to (3) below.

~~1.~~(1) Use a certified engine that meets the Ultra-Low Emission TRU (ULETRU or U) in-use PM performance standard of 0.02 g/hp-hr[4] or less. The engine shall meet the applicable nonroad/off-road emissions standards for all regulated pollutants and the in-use PM performance standard. Only engines for which certification data and deterioration factors have been provided to ~~ARB~~CARB shall be considered when determining compliance. The Executive Officer ~~will~~shall consider such submittals, publish, and make available a list of qualifying engines.

~~2.~~(2) Equipping the engine with ~~the required~~a Level ~~of~~3 VDECS.

~~(2) In-Use performance standard categories for TRU and TRU gen set engines with rated brake horsepower greater than or equal to 25 horsepower (≥25 hp) are shown in Table 4, along with the engine certification standards or the level of VDECS that is necessary to qualify for each category.~~

~~Table 4: ≥25 HP TRU and TRU Gen Set In-Use PM Performance Standards~~

~~*In-Use Emission Category*~~	~~*Engine Certification (g/hp-hr)*~~	~~*Level of VDECS Equipped with*~~
~~Low Emission TRU (LETRU or L)~~	~~0.22[5]~~	~~Level 2~~
~~Ultra-Low Emission TRU (ULETRU or U)~~	~~0.02[6]~~	~~Level 3~~

~~(A) Compliance with the in-use performance standards can be achieved by:~~

[4] The Engine Certification value for the Ultra-Low Emission TRU category corresponds to the Tier 4 "final" Nonroad/Off-road Emission Standards for greater than 25 horsepower engines.

~~[5] The Engine Certification value for Low Emission TRU category corresponds to the "Interim" Tier 4 Nonroad/Off-road Emission Standards that are to go into effect in 2008.~~

~~[6] The Engine Certification value for the Ultra-Low Emission TRU category corresponds to the Tier 4 "final" Nonroad/Off-road Emission Standards that will go into effect in 2012 or 2013.~~

~~1. Using a certified engine meeting the applicable nonroad/off-road emissions standards for all regulated pollutants and the in-use PM performance standard. Only engines for which certification data and deterioration factors have been provided to ARB shall be considered when determining compliance. The Executive Officer will consider such submittals, publish, and make available a list of qualifying engines.~~

~~2. Equipping the engine with the required Level of VDECS.~~

(3) As an alternative to meeting the ULETRU in-use performance ~~standards~~standard in ~~sections~~section 2477.5(~~a~~c)(1) ~~and~~or (2), an owner/operator may operate a MY 2022 and older TRU or TRU gen set in California meeting one of the *Alternative Technology* options listed below. Alternative Technologies qualify to meet the ULETRU in-use performance standard only if the TRU or TRU gen set is operated under the conditions included in the description listed below.

(A) Hybrid Electric TRU or electric standby-equipped TRU ~~may~~shall qualify as an Alternative Technology, provided all of the following conditions are met:

1. The TRU shall not operate under diesel engine power while at a nonretail facility, except during:

a. An emergency ~~(as defined);~~;

b. Normal ingress, egress, and yard maneuvering, limited to 5 minutes per movement inside the facility ~~fenceline~~fence line or property boundary; or

c. Unit/engine pre-trip inspections, troubleshooting diagnostics, and post-repair check-out (however, this exception does not apply to the initial van chill-down before loading);

2. The facility or facilities that a TRU is normally based or frequents to load or unload perishable goods shall be equipped with electric power plugs located in the parking areas and loading spaces and the TRU shall be plugged into these power plugs during initial chill-down and whenever the refrigerated van or container contains perishable products;

3. All nonretail delivery and pick-up points ~~(as defined)~~ that the E/S-~~-~~equipped TRU frequents to load or unload goods shall be equipped with electric power plugs if the van load includes perishable goods. Electric power plugs shall be located in the parking areas and loading spaces and the TRU shall be plugged into these power plugs during initial chill-down and whenever the refrigerated van or container contain perishable goods and may need to operate;

4. The TRU engine run time at retail delivery points ~~(as defined)~~ shall not exceed 30 minutes, otherwise electric power plugs are also required at those retail delivery points and ~~must~~shall be used to prevent engine operations that exceed 30 minutes at the delivery point;

5. The TRU shall be equipped with non-resettable engine hour meters and electric power use hour meters;

6. ~~At least 50 percent of an owner's hybrid electric or electric standby-equipped TRUs shall be equipped with an electronic tracking systems by December 31, 2012, and~~ 100 percent of an owner's hybrid electric or electric standby-equipped TRUs shall be equipped with electronic tracking systems by December 31, 2013; and

7. The TRU shall be ~~registered in ARBER~~reported to CARB in accordance with section 2477.5(~~e~~g).

(B) Hybrid cryogenic temperature control systems ~~may~~shall qualify as an Alternative Technology, provided all of the following conditions are met:

1. The TRU does not operate under diesel engine power while at a nonretail facility, except during:

   a. An emergency;

   b. Normal ingress and egress yard maneuvering; or

   c. Unit/engine pre-trip inspections, diagnostics, and repair operations;

2. The TRU engine run time at retail delivery points ~~(as defined)~~ shall not exceed 30 minutes, otherwise purely cryogenic temperature control shall be used at those retail delivery points to prevent engine operations that exceed 30 minutes at the delivery point;

3. The TRU shall be equipped with non-resettable engine hour meter and cryogenic system use hour meter;

4. The TRU shall be equipped with an electronic tracking system; and

5. The TRU shall be ~~registered in ARBER~~reported to CARB in accordance with section 2477.5(~~e~~g).

(C) Alternative-fueled engines~~ (see definition in section 2477.4).~~. If the engine is a CI engine, a VDECS is required.

Note: If the engine is not a compression ignition diesel fueled engine, this regulation would not apply, but the engine may have to meet other emission standards (e.g~~.~~., large spark-ignited engine standards if >25 hp).

(D) Fuel exclusively with an alternative diesel fuel~~ (see definition in section 2477.4)~~ that has been verified as a VDECS, provided it is used in accordance with the requirements of section 2477.5(~~h~~j)(1) and the alternative diesel fuel contains no conventional diesel or CARB diesel fuel, except in trace amounts.

(E) Power by fuel cells. If a reformer is used with diesel fuel as the source of hydrocarbons, then emissions ~~must~~shall be evaluated and verified through the *Verification Procedure Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (13CCR section 2700 - 2710).*

(F) Equip with any other system approved by the Executive Officer to not emit diesel PM or increase public health risk while at a facility.

~~(b)~~(4) In-Use Compliance Dates~~:~~ for MY 2022 and Older TRU and TRU Gen Set Engines. In-use compliance dates are based upon the engine model year ~~or effective model year (as defined in section 2477.4, as listed below, except as allowed in subparagraphs 2477.5(b)(5)(A) and (C)[7,8].~~. Compliance dates may also be extended if the requirements of subparagraphs 2477.5(~~f), (g), (k), (l~~m) or (~~m~~n) are met.

~~(1) No~~Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a ~~2001~~MY 2022 and older ~~model year (MY)~~ TRU or TRU gen set engine~~ in California~~, unless it meets the in-use performance criteria set forth in section 2477.5(~~a) for~~

[7] ~~Further explanation is provided in section 2477.5(i).~~
[8] ~~Compliance dates may also be extended if the requirements of subparagraphs 2477.5(f), (g), (k), (l), or (m) are met.~~

~~(A) LETRU on or before December 31, 2008, and~~

~~(B) ULETRU on or before December 31, 2015, as shown in Tables 5 and 6.~~

~~(2) No owner or owner/operator shall operate a 2002 MY TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in section 2477.5(a) for~~

~~(A) LETRU on or before December 31, 2009, and~~

~~(B) ULETRU on or before December 31, 2016, as shown in Tables 5 and 6.~~

~~(3) No owner or owner/operator shall operate a 2003 MY TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in section 2477.5(a) for~~

~~(A) LETRU on or before December 31, 2010, and~~

~~(B) ULETRU on or before December 31, 2017, as shown in Tables 5 and 6.~~

~~(4)~~(A) ~~No owner or owner/operator shall operate a 2004 MY and subsequent MY TRU or TRU gen set engine in California unless it meets the in-use performance criteria set forth in section 2477.5(a~~c) for ULETRU on or before December 31st of the seventh year past the engine's model year~~, as shown in Tables 5[9] and 6[8], with the following exception~~. For example:

~~(A) Less than 25 hp model year 2004 engines shall meet the in-use performance criteria set forth in section 2477.5(a), shown in Table 5, for:~~

~~1. LETRU on or before December 31, 2011, and~~

~~2. ULETRU by December 31, 2018.~~

~~[9] Model years 2013 and subsequent (not shown in tables 5 and 6), shall meet ULETRU by December 31st of the seventh year after the engine model year or effective model year, except as allowed under section 2477.5(b)(5).~~

~~Table 5: <25 HP TRU and TRU Gen Set Engines In-Use Compliance Dates[10,11]~~

MY	In-Use Compliance Year[9]													
	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
'01 & Older		L	L	L	L	L	L	L	U	U	U	U	U	U
'02			L	L	L	L	L	L	L	U	U	U	U	U
'03				L	L	L	L	L	L	L	U	U	U	U
'04					L	L	L	L	L	L	L	U	U	U
'05[10]						U	U	U	U	U	U	U	U	U
'06							U	U	U	U	U	U	U	U
'07								U	U	U	U	U	U	U
'08									U	U	U	U	U	U
'09										U	U	U	U	U
'10											U	U	U	U
'11												U	U	U
'12													U	U
'13[8]														U

~~Table 6: ≥25 HP TRU and TRU Gen Set Engines In-Use Compliance Dates[12,13]~~

MY	In-Use Compliance Year[11]													
	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20
'01 & Older		L	L	L	L	L	L	L	U	U	U	U	U	U
'02			L	L	L	L	L	L	L	U	U	U	U	U
'03				L	L	L	L	L	L	L	U	U	U	U
'04[12]					U	U	U	U	U	U	U	U	U	U
'05						U	U	U	U	U	U	U	U	U
'06							U	U	U	U	U	U	U	U
'07								U	U	U	U	U	U	U
'08									U	U	U	U	U	U
'09										U	U	U	U	U
'10											U	U	U	U
'11												U	U	U
'12													U	U
'13[8]														U

~~[10] Compliance date is December 31st of the compliance year shown. "MY" means model year. Black shaded areas are years with no in-use performance standard requirements since in-use compliance year precedes engine model year. Dark shaded areas without letter codes have no in-use performance standard requirements, pending in-use compliance date. "L" means must meet LETRU in-use performance standards. "U" means must meet ULETRU in-use performance standards.~~

~~[11] TRUs and TRU gen sets with MY 2005 engines and subsequent MY engines shall be required to comply with ULETRU requirements by the end of the seventh year after the model year or effective model year, except as allowed under subsection 2477.5(b)(5)(A).~~

~~[12] Compliance date is December 31st of the compliance year shown. "MY" means model year. Black shaded areas are years with no in-use performance standard requirements since in-use compliance year precedes engine model year. Dark shaded areas without letter codes have no in-use performance standard requirements, pending in-use compliance date. "L" means must meet LETRU in-use performance standards. "U" means must meet ULETRU in-use performance standards.~~

~~[13] TRUs and TRU gen sets with MY 2004 engines and subsequent MY engines shall be required to comply with ULETRU requirements by the end of the seventh year after the model year or effective~~

~~(5) Requirements for TRUs or TRU gen sets that are equipped with flexibility engines and~~No owner or owner/operator shall operate or cause to be operated in California~~.~~

~~(A)~~1. ~~Flexibility engines installed in TRUs and TRU gen sets manufactured prior to March 7, 2011, and operated in California shall meet the in-use performance standards of section 2477.5(a) by December 31st of the seventh year after the~~, a MY 2020 TRU or TRU gen set ~~engine's manufacture year instead of the effective model year provided the TRU or TRU gen set owner registers the flexibility~~ engine ~~equipped TRU or TRU gen set in ARBER in accordance with section 2477.5(c) by May 6, 2011~~, unless it meets ULETRU on or before December 31, 2027.

~~(B) To allow TRU and TRU gen set owners to meet the registration requirements of subsection (A) above, the original equipment manufacturer shall by April 6, 2011:~~

~~1. Provide the following unit and flexibility engine information to ARB in electronic format:~~

~~a. TRU or TRU gen set manufacturer;~~

~~b. TRU or TRU model name;~~

~~c. TRU or TRU gen set serial number;~~

~~d. TRU manufacture date;~~

~~e. Engine manufacturer;~~

~~f. Engine Family;~~

~~g. Engine manufacture year; and~~

~~h. Engine serial number.~~

~~2. Notify the TRU or TRU gen set owners in writing that:~~

~~a. The unit they own is equipped with a flexibility or TPEM engine; and~~

~~model year, except as allowed under section 2477.5(b)(5)(A). Tier 4 final standards go into effect in 2013 which would meet ULETRU in-use performance standards in the 25 hp to less than 50 hp category. If engines installed by original equipment manufacturers do not meet ULETRU in 2013, then section 2477.5(b)(5)(C) applies.~~

~~b. The owner must register the TRU or TRU gen set that is equipped with a flexibility engine in ARBER by May 6, 2011.~~

~~3. Provide directly or through its dealers instructions and assistance on registration in ARBER to all owners of TRUs and TRU gen sets equipped with flexibility engines that request such help, which shall include specific instructions and assistance that ensures that information entered in ARBER is consistent with what appears on the unit label and engine emissions label, including the model year.~~

~~(C) The following requirements shall apply to flexibility engines installed in TRUs and TRU gen sets manufactured after March 7, 2011, and operated in California:~~

~~1. The owner of a TRU or TRU gen set that is operated in California shall comply with the in-use performance standards set forth in section 2477.5(a) by December 31st of the seventh year after the engine's effective model year.~~

~~2. The original equipment manufacturer shall provide a written disclosure to the ultimate purchaser of a TRU or TRU gen set that is equipped with a flexibility engine prior to its sale in accordance with section 2477.13(a)(3).~~

~~(6)~~(B) The manufacture year of the TRU unit may be used instead of the TRU engine model year to determine the TRU ATCM in-use performance standards that must be met and the related compliance dates; however, this exception only applies if the unit manufacture year shown on the TRU unit label is no more than one year later than the engine model year shown on the TRU engine emissions label. If the difference between the engine model year on the engine emissions label and the unit manufacture year is greater than one year, then the engine model year shall be used in accordance with ~~subsections~~subsection 2477.5(~~b)(1), (2), (3), and (c)~~(4)(A).

~~(A)~~1. If the owner complies with the TRU ATCM in-use performance standard by retrofitting with a VDECS, the engine model year shown on the engine emissions label shall be used to determine engine compatibility with the VDECS, in accordance with the Executive Order for that VDECS.

~~(B)~~2. If the owner of a TRU is required to ~~apply for an ARB Identification Number (IDN),~~report the TRU to CARB, in accordance with section 2477.5(~~e~~g), the engine model year that is shown on the engine emissions label shall be ~~entered on the IDN application in~~ provided as the engine model year ~~space~~.

(d) ~~Replacements Due to~~ PM Emission Standard for MY 2023 and Newer TRU and TRU Gen Set Engines. The term TRU as used in this subsection (d) refers only to trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets. Truck TRUs are exempt from the requirements of this subsection (d). Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a MY 2023 and newer TRU or TRU gen set engine, unless it meets a PM emission standard of 0.02 g/hp-hr or lower.

(1) For TRU and TRU gen set engines with rated brake horsepower <25 hp, compliance with the PM emission standard shall be achieved by using a certified engine meeting the PM emission standard. Only engines for which certification data and deterioration factors have been provided to CARB shall be considered when determining compliance. The Executive Officer shall consider such submittals, publish, and make available a list of qualifying engines.

(2) For TRU and TRU gen set engines with rated brake horsepower ≥25 hp, compliance with the PM emission standard shall be achieved by using a certified engine meeting the applicable nonroad/off-road emissions standards for all regulated pollutants and the PM emission standard. Only engines for which certification data and deterioration factors have been provided to CARB shall be considered when determining compliance. The Executive Officer shall consider such submittals, publish, and make available a list of qualifying engines.

~~(c)~~(e) VDECS ~~Failures~~Requirements.

(1) VDECS Installation. Before installing a VDECS on a TRU or TRU gen set, the owner or owner/operator shall ensure that:

(A) The VDECS is verified for use on the TRU or TRU gen set engine, as described in the Executive Order for the VDECS.

(B) Use of the TRU or TRU gen set is consistent with the conditions of the Executive Order for the VDECS.

(C) The VDECS is installed in a verified configuration.

(D) The engine to be retrofitted shall be in its original certified configuration, free of excess oil consumption, shall not have malfunctioning fuel delivery systems, or any other mechanical condition that may impair the proper functioning of the VDECS.

(E) The VDECS label is visible after installation.

(2) VDECS Maintenance. If an owner or owner/operator installs a VDECS to meet the requirements of section 2477.5(c), the VDECS shall remain installed until the VDECS fails, is damaged, or is replaced with a similar or higher level VDECS. The owner or owner/operator shall ensure that the VDECS and TRU or TRU gen set engine are properly maintained as recommended by the respective manufacturers.

(3) Failure or Damage of a VDECS. In the event of a failure or damage of a VDECS, the following conditions shall apply:

~~(1)~~(A) If a VDECS fails within its warranty period, the owner/operator of the TRU or TRU gen set must replace it with the same VDECS or a higher verification classification level, if available.

~~(2)~~(B) If a VDECS fails outside its warranty period and a higher verification classification level VDECS is available, then the owner/operator of the TRU or TRU gen set shall upgrade to the highest level VDECS required under paragraphs 2477.5(~~a)(1) and 2477.5(a)(2~~c) that is determined to be cost-effective by the Executive Officer.

~~(d)~~(f) In-Use Recordkeeping and Reporting. In-use recordkeeping and reporting shall be completed by the owner or operator in accordance with the following:

~~(1) An owner that is also an operator, shall complete and maintain the operator report in accordance with section 2477.6(a).~~

~~(2)~~(1) An owner that has elected to comply by using a verified alternative diesel fuel in accordance with section 2477.5(c)(3)(D), shall comply with the recordkeeping requirements in section 2477.5(~~h~~j)(1).

~~(3)~~(2) An owner that has elected to comply by using a hybrid electric TRU or electric standby-equipped TRU ~~must meet the following recordkeeping, and reporting requirements for each unit.~~in accordance with section 2477.5(c)(3)(A) or a hybrid cryogenic temperature control system in accordance with section 2477.5(c)(3)(B), shall use an electronic tracking system that meets the recordkeeping requirements of section 2477.20(d).

~~(A) Beginning November 14, 2012, manual recordkeeping is required for all such units until automated monitoring, recordkeeping, and reporting is required under the phased compliance schedule in subparagraph (B), below. Manual records shall include the following, for each TRU that is equipped with electric standby or hybrid electric:~~

~~1. ARB Identification Number of the unit, issued under section 2477.5(e);~~

~~2. Date;~~

~~3. Address of each stationary location lasting more than 5 minutes. This record may be a location code for each stationary location, provided the owner or operator also provides a cross-reference of location codes with the corresponding physical addresses;~~

~~4. Time of arrival and departure, and the elapsed time calculated from those readings to show the duration of the stationary position;~~

~~5. Engine hour meter readings taken at arrival and departure and the elapsed time calculated from those readings to show the TRU engine run time while the vehicle is at the stationary location; and~~

~~6. Electric shore power driven electric motor hour meter readings taken at arrival and departure and the elapsed time that electric shore power drove the refrigeration system while the vehicle is at the stationary location.~~

~~(B) Automated monitoring, recordkeeping, and reporting is required for at least 50 percent of an owner's TRUs by December 31, 2012 and 100 percent of an owners TRUs by December 31, 2013. Automated monitoring, recordkeeping and reporting is required with an electronic tracking system (as defined in section 2477.4) and shall include data that includes the following for each stationary location lasting more than 5 minutes (300 seconds):~~

~~1. ARB Identification Number of the unit, issued under section 2477.5(e);~~

~~2. Date;~~

~~3. Address of each stationary location lasting more than 5 minutes (300 seconds). This record may be the GPS coordinates and a location code for each stationary location, provided the owner or operator also provides a cross-reference of location codes with the corresponding physical addresses;~~

~~4. Time of arrival and departure, and the elapsed time calculated from those readings to show the duration of the stationary position;~~

~~5. Engine hour meter readings taken at arrival and departure and the elapsed time calculated from those readings to show the TRU engine run time while the vehicle is at the stationary location;~~

~~6. Electric motor hour meter readings taken at arrival and departure and the elapsed time that electric shore power is powering the refrigeration system while the vehicle is at the stationary location; and~~

~~7. The electronic tracking system shall generate a report that lists all stationary locations lasting more than 5 minutes where the TRU engine operated for more than 30 minutes, resulting in a violation.~~

~~(C) Records shall be kept available for a minimum of three (3) years and shall be compiled and made available to ARB upon request.~~

~~(D) Record submittals shall include the owner's or responsible official's signature after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~(4) Hybrid cryogenic temperature control recordkeeping. An owner that has elected to comply by using a hybrid cryogenic temperature control system must meet the following automatic monitoring, recordkeeping, and reporting requirements with an electronic tracking system (as defined in section 2477.4). Automated recordkeeping shall include data that includes the following for each stationary location lasting more than 300 seconds (5 minutes):~~

~~(A) ARB Identification Number of the unit, issued under section 2477.5(e);~~

~~(B) Date;~~

~~(C) Location: GPS coordinates or coded, with full address in code look-up table;~~

~~(D) Time of arrival and departure, and the elapsed time calculated from those readings to show the duration of the stationary position;~~

~~(E) Engine hour meter readings taken at arrival and departure and the elapsed time calculated from those readings to show the TRU engine run time while the vehicle is stationary;~~

~~(F) Cryogenic system use hour meter readings taken at arrival and departure and the elapsed time calculated from those readings to show the cryogenic system run time while the vehicle is stationary;~~

~~(G) The electronic tracking system shall generate a report that lists all stationary locations lasting more than 5 minutes where the TRU engine operated for more than 30 minutes, resulting in a violation;~~

~~(H) Records shall be kept available for a minimum of three (3) years and shall be compiled and made available to ARB upon request; and~~

~~(I) Record submittals shall include the owner's or responsible official's signature after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~(e) ARB Identification Numbering~~TRU Reporting Requirements. ~~Identification numbers (IDN) will be issued to help expedite the inspection procedure and prevent shipping delays~~[14]

~~(1)~~(g) ~~California-based TRUs~~ The term TRU as used in this subsection (g) refers to TRUs and TRU gen sets~~:~~, as well as ZE truck TRUs used to comply with section 2477.5(b).

~~(A)~~(1) On or before January 31, 2009, owners or owner/operators ~~of~~shall report all California-based TRUs ~~and TRU gen sets subject to this regulation shall apply for an ARB IDN for all California-based TRUs or TRU gen sets~~ operated by the owner or owner/operator to CARB by ~~submitting an application that includes~~providing the information listed ~~below~~in section 2477.20(f) for each TRU.

[14] ~~IDNs are obtained by registering a TRU or TRU gen set in the ARB's Equipment Registration (ARBER) system.~~

~~1. Company Information~~

~~a. Company/business name, address, and contact information for the responsible official (e.g. title, phone number, email address).~~

~~b. Company/business tax identification number/federal employer identification number (EIN) or equivalent for other country (e.g. Canadian Business Number).~~

~~2. Rental or lease status. Indicate if the unit is a rental unit (no contract term) or a lease unit (under contract term, typically more than one year)~~

~~3. Applicant identity indication. Indicate who is filling out application, either:~~

~~a. The owner (or an employee of owner), or~~

~~b. A third party entering the application information under a third party agreement between the owner or lessor and a consultant or lessee.~~

~~4. TRU or TRU gen set unit information:~~

~~a. Unit Type:~~

~~i. Truck TRU;~~

~~ii. Trailer TRU;~~

~~iii. Refrigerated railcar TRU;~~

~~iv. Refrigerated domestic shipping container TRU; or~~

~~v. TRU generator set.~~

~~b. Unit manufacturer,~~

~~c. Unit model,~~

~~d. Unit model year, and~~

~~e. Unit serial number.~~

~~5. Other TRU or TRU generator set identifying numbers. Provide all that apply:~~

~~a. If unit is installed on a truck or trailer, provide:~~

~~i. Vehicle Identification Number (VIN), and~~

~~ii. Vehicle license number, country of issuance, and state or province of issuance;~~

~~iii. Unique Bureau International de Container (BIC) Code, if trailer is multimodal~~

~~b. If unit is installed on refrigerated railcar, provide railcar reporting mark;~~

~~c. If unit is installed on domestic refrigerated shipping container, provide unique BIC Code;~~

~~d. If unit is a TRU gen set, provide unique BIC Code;~~

~~e. Provide company equipment number if company has labeled the equipment.~~

~~6. TRU status information. Indicate if the unit is:~~

~~a. Active (unit is operational);~~

~~b. Removed from service (unit is scrapped or inactive for foreseeable future); or~~

~~c. Sold. If last registered owner sold unit, then they must provide:~~

~~i. Date of sale, and~~

~~ii. New owner's company name, address, and contact information~~

~~7. TRU engine information. Provide the following:~~

~~a. Engine manufacturer;~~

~~b. Engine model;~~

~~c. Engine model year, or "MY";~~

~~d. Engine serial number;~~

~~e. Engine power rating. Indicate either:~~

~~i. Under 25 hp (under 19 kW), or~~

~~ii. 25 hp or greater (19 Kw or greater);~~

~~f. Engine family; and~~

~~g. Emissions standard tier that engine meets.~~

~~8. Compliance status with in-use performance standards, under sections 2477.5(a) and (b).~~

~~a. Indicate if the ULETRU Early Compliance Extension has been granted~~

~~b. Indicate if compliance was achieved with an engine option:~~

~~i. Indicate if the engine currently in the unit is an original engine;~~

~~ii. Indicate if the engine currently in the unit is a new replacement engine and if so, provide:~~

~~I. Emissions standard tier that the engine meets; and~~

~~II. Installation date.~~

~~iii. Indicate if the engine currently in the unit is a rebuilt replacement engine installed to comply with the in-use requirements and if so, provide:~~

~~I. Emissions standard tier that the engine meets;~~

~~II. Rebuild year; and~~

~~III. Installation date.~~

~~c. Indicate if compliance was achieved with VDECS retrofit, and if so:~~

~~i. Provide the following from the VDECS label:~~

~~I. VDECS manufacturer name;~~

~~II. VDECS Family Name;~~

~~III. VDECS serial number;~~

~~IV. VDECS manufacture year; and~~

~~ii. Provide the VDECS installation date.~~

~~d. Indicate if compliance was achieved by using an Alternative Technology option under section 2477.5(a)(3), and if so provide the type used and the date installed or employed:~~

~~i. Electric standby-equipped TRU or hybrid electric TRU;~~

~~ii. Hybrid cryogenic temperature controlled system;~~

~~iii. Alternative fueled engine;~~

~~iv. Fueled exclusively with pure alternative diesel fuel;~~

~~v. Powered by fuel cells; or~~

~~vi. Other system approved by the Executive Officer.~~

~~e. If compliance was achieved by replacing an engine or retrofitting with a VDECS, provide the installer's company name, physical address, and contact information.~~

~~9. Indicate what state or province that the TRU or TRU gen set is based in:~~

~~a. California; or~~

~~b. Outside of California. If based outside of California identify:~~

~~i. U.S. state;~~

~~ii. Mexican state; or~~

~~iii. Canadian province.~~

~~10. Owner's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~(B) Applications shall be submitted by one of the following methods:~~

~~1. Mail or deliver a physical report to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (SSD/ARBER)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~2. Electronically submit through the ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~3. Electronically submit by email to: arber@arb.ca.gov~~

(2) ~~TRUs and TRU gen sets~~ On or before December 31, 2023, owners or owner/operators shall report all non-California-based TRUs operated in California by the owner or owner/operator to CARB by providing the information listed in section 2477.20(f) for each TRU.

~~(C)~~(3) California-based TRUs added to an owner's or owner/operator's ~~TRU~~ operations after January 31, 2009 and non-California based TRUs added to an owner's or owner/operator's operations after December 31, 2023 shall be brought into compliance with section 2477.5(~~e~~~~). An application shall be submitted to ARB~~g)(1) and (2) within 30 days of the unit entering the owner or owner/operator's control or beginning operations in California. The owner or owner/operator shall request:

~~1.~~(A) ~~Requesting an ARB I.D. number~~A CARB IDN for a new TRU ~~or TRU gen set~~ that was not previously numbered, or

~~2.~~(B) ~~Requesting a~~A change in owner or owner/operator ~~(or other pertinent application information) for used equipment~~ for a TRU that already has ~~an ARB I.D.~~a CARB IDN number.

~~(D) Failure to apply or submittal of false information is a violation of this rule and subject to civil penalty.~~

(4) If reported information for any TRU changes, then the owner or owner/operator shall update the information within 30 days of those changes.

~~(E)~~(5) On or before February 1, 2009, the Executive Officer shall begin issuing identification numbers ~~to TRU and TRU gen set owners or owner/operators~~ for each ~~unit based in California for which a complete application has been filed.~~TRU reported to CARB. The number ~~will~~shall include a 2-digit prefix for model year (e.g~~.~~., 2001 model year would have a prefix 01); a 6-digit serial number and a check- digit. ~~In the event that an operator applies for an early compliance certificate in accordance with section 2477.5(f), ARB will also issue a certificate which acknowledges early compliance per subparagraph 2477.5(f)(3).~~

~~(F)~~(6) Within 30 days of receipt of the ~~ARB-issued identification number, owners~~CARB IDN, the owner or owner/~~operators~~operator shall permanently affix or paint the ~~identification number~~CARB IDN on the TRU~~ or TRU gen set~~ chassis housing in clear view according to the ~~following specification:~~specifications in section 2477.20(e). Beginning December 31, 2023, the requirements of this subsection 2477.5(g)(6) shall be superseded by the TRU compliance label requirements in section 2477.5(i).

~~1. The ARB identification number shall be preceded by the letters "ARB".~~

~~2. Letters and numbers shall contrast sharply in color with the color of the background surface on which the letters are p~~laced.

~~3. The location of the I.D. number shall be as follows:~~

~~a. Truck and trailer TRUs - both sides of TRU chassis housing.~~

~~b. Rail car and shipping container TRUs - both sides of the TRU.~~

~~c. TRU gen sets - both sides of gen set housing.~~

~~4. Letters and numbers shall be readily legible during daylight hours, from a distance of 50 feet (15.24 meters) while unit is stationary~~.

~~5. Marking shall be kept maintained in a manner that retains the legibility required by the subparagraph immediately above.~~

~~(2) Non-California-based TRUs and TRU Gen Sets:~~

~~(A) Owners or owner/operators of non-California based TRUs and TRU gen sets may voluntarily apply for ARB identification numbers for TRUs that are based outside of California but operate within California during the normal course of business. Non-California-based owners or owner/operators may voluntarily submit the same application information listed above in subparagraph 2477.5(e)(1), above, using the same methods of submittal listed in subparagraph 2477.5(e)(1)(B), above. Upon application approval, ARB would issue identification numbers to the operator in accordance with subparagraph 2477.5(e)(1)(E), above. The non-California-based owner or owner/operator would then permanently affix or paint the identification number on the TRU or TRU gen set chassis in clear view, in accordance with subparagraph 2477.5(e)(1)(F), above.~~

(h) TRU Operating Fees. The term TRU as used in this subsection (h) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of TRUs that operate in California to recover the costs to the Executive Officer administering the TRU ATCM as specified under section 2477.21(a).

(i) TRU Compliance Labels. The term TRU as used in this subsection (i) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) Beginning December 31, 2023, the TRU compliance label requirements in this subsection (i) shall supersede the IDN labeling requirements in section 2477.5(g)(6).

(2) Beginning December 31, 2023, upon verifying the information reported under section 2477.5(g) and all TRU operating fees have been received in accordance with section 2477.5(h), the Executive Officer shall issue two compliance labels for each TRU.

(3) Within 30 days of receipt of the CARB compliance labels, owners or owner/operators shall affix the labels in clear view, correct side up, un-obstructed; and kept and maintained in a manner that retains legibility. The location of the label shall be as follows:

(A) Truck and trailer TRUs - both sides of TRU chassis housing.

(B) Rail car and shipping container TRUs - both sides of the TRU.

(C) TRU gen sets - both sides of gen set housing.

(4) TRU compliance labels shall be valid for three (3) years from date of issuance.

(5) TRUs with pending enforcement actions shall not be issued a new compliance label until they are settled.

~~(3)~~ Owners or owner/operators may use alternative unique equipment identification markings instead of affixing ~~an ARB IDN~~the CARB compliance label, provided the ~~following conditions are met:~~

~~(A) The owner or owner/operator registers the TRU or TRU gen set in ARBER and enters the unique equipment number in ARBER.~~

~~(B) The alternative identification number shall be truly unique. Examples of unique identification numbers include the Reporting Marks that are issued by the American Association of Railroads' contractor, RailInc, for their UMLER system and the BIC Codes issued by Bureau International de Containers. Company equipment numbers that are not truly unique on a worldwide basis do not qualify.~~

~~(C) Alternative identification numbers must be affixed or attached to both sides of the TRU gen set, shipping container (if the TRU is permanently attached), semitrailer, or railcar and meet all of the requirements of subparagraph 2477.5.(e)(1)(F).~~

~~(D) The ARB IDN shall be used in the Operator Report under section 2477.6(a).~~

~~(f) Early Compliance with LETRU In-Use Performance Standards.~~

~~(1) For 2002 and older MY TRU and TRU gen set engines, owners or owner/operators that meet the LETRU in-use performance standard earlier than required in paragraph 2477.5(b) may apply to the Executive Officer for a delay in the ULETRU in-use performance standard. Except as provided below, early compliance would be achieved through any of the options available in paragraph 2477.5(a).~~

~~(A) This delay would not be available to the owner or owner/operator if the engine manufacturer of the replacement engine is using the early compliance with engine emissions standards in U.S. EPA's Averaging, Banking, and Trading Program (or California's equivalent program).~~

~~(B) Early compliance is conditioned upon real emission reductions (refer to definition in section 2477.4) occurring earlier than the applicable compliance deadline.~~

~~(C) This delay may not be available to the owner or owner/operator if public funds were used for early compliance. The applicant shall disclose whether public funds were used for any portion of early compliance and what program the funding came from.~~

~~(2) Early LETRU compliance with real emission reductions would allow specific units to delay compliance with ULETRU in-use performance standards by up to three years, according to the rounding conventions and examples listed below.~~

~~(A) Each year of early compliance with the LETRU in-use performance standards would be rewarded with 1 year delay in the ULETRU in-use performance standard.~~

~~1. One full year early compliance qualifies for one full year delay in meeting ULETRU compliance.~~

~~2. Two full years early compliance qualifies for two full years delay in meeting ULETRU compliance.~~

~~3. Three full years early compliance qualifies for three full years delay in meeting ULETRU compliance.~~

~~(B) A partial year of early LETRU compliance would be rounded to the nearest full year for the delayed ULETRU requirements.~~

~~1. Early LETRU compliance of 183 days or more in a calendar year would count toward a one year ULETRU delay.~~

~~2. Early LETRU compliance of 182 days or less in a calendar year would not count toward a ULETRU delay.~~

~~(3) Upon receipt of an application to delay ULETRU compliance, the Executive Officer shall determine if the application demonstrates early compliance with LETRU in-use performance standards in accordance with section 2477.5(f)(1), and if the application is approved, shall delay the in-use ULETRU compliance date for specific TRUs and TRU gen sets operating in California in accordance with subparagraph 2477.5(f)(2).~~

~~(4) Upon approval of the application, ARB shall issue a certificate and ARB identification number in accordance with section 2477.5(e)(1)(E) which acknowledges early compliance with LETRU~~ requirements ~~and discloses the number of years delay granted, and resulting ULETRU compliance date.~~

~~(5)~~(6) ~~The owner or owner/operator shall maintain a legible copy of the certificate in a water-tight sleeve mounted inside the TRU or TRU gen set chassis housing. The owner or owner/operator shall paint the identification number in clear view in accordance with~~ of section 2477~~(e)(1)(F) on the specific TRU or TRU gen set that was granted the compliance extension.~~.20(e)(6) are met.

~~(g) ULETRU Extension for Compliance by Original Compliance Date~~

~~(1) An owner of model year 2001 and older TRUs or TRU gen sets that complied by the original December 31, 2008, compliance date may qualify for a one year extension to the ULETRU compliance date, provided the following conditions are met:~~

~~(A) The original engine was retrofit with a Level 2 VDECS, or~~

~~(B) The original TRU was repowered with a replacement engine meeting either:~~

~~1. Tier 4 final Non-Road/Off-Road Emission Standards, if the engine is rated at less than 25 hp, or~~

~~2. Tier 4 interim Non-Road/Off-Road Emission Standards, if the engine is rated between 25 hp and less than 50 hp, or~~

~~(C) The original TRU was replaced with a new unit equipped with an engine meeting either:~~

~~1. Tier 4 final Non-Road/Off-Road Emission Standards, if the engine is rated at less than 25 hp, or~~

~~2. Tier 4 interim Non-Road/Off-Road Emission Standards, if the engine is rated between 25 hp and less than 50 hp, and~~

~~(D) The TRU or TRU gen set is registered in ARBER, the compliance information is complete and correct, and the IDN has been affixed to both sides of the TRU or TRU gen set housing.~~

~~(2) Owner must apply for the ULETRU extension at least 90 days before the ULETRU compliance date by submitting an ARB application that includes the following information:~~

~~(A) Owner name and Owner-Operator Number (OON);~~

~~(B) The affected unit's IDN;~~

~~(C) A statement that the unit was in compliance on or before December 31, 2008, and the IDN has been affixed to both sides of the TRU or TRU gen set housing in accordance with section 2477.5(e)(1)(F);~~

~~(D) Documentation that demonstrates that the LETRU in-use standard was met before December 31, 2008;~~

~~(E) In the case of a unit replacement, documentation on the old noncompliant unit that was replaced; and~~

~~(F) Owner's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~(3) The owner or responsible official must submit an application for "ULETRU Extension for Compliance by the Original Compliance Date" to the Executive Officer by one of the following methods:~~

~~(A) Mail or deliver to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~(B) Electronically submit by email to: arber@arb.ca.gov; or~~

~~(C) Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~(4) Upon receipt of application for ULETRU extension, the Executive Officer shall determine if the application demonstrates the unit qualifies for ULETRU extension.~~

~~(5) Upon approval of the application, the Executive Officer shall:~~

~~(A) Change the "Compliant Through" date in ARBER; and~~

~~(B) Notify the owner with a revised ARBER TRU Certification showing the new "Compliant Through" date.~~

~~(h)~~(j) Fuel Requirements.

(1) Owners or Owner/Operators Choosing to Use Alternative Diesel Fuels. Owners or owner/operators choosing to use alternative diesel fuels in compression ignition TRU and TRU gen set engines to meet the requirements of section 2477.5(~~a~~c) shall:

(A) Maintain records that document exclusive use of the chosen fuel or additive for each affected engine and hours of engine operation. Appropriate records would be copies of receipts or invoices of appropriate fuel and/or fuel additive and engine hour meter logs.

1. Records shall be kept available for a minimum of three (3) years and shall be compiled and made available to ~~the ARB~~CARB upon request.

(B) Use only fuel that is a VDECS alternative diesel fuel that contains no conventional diesel or CARB diesel fuel in TRUs or TRU gen sets operated in California.

(C) Permanently affix a label in clear view near the fill spout that identifies the proper fuel that is required to be in compliance.

(D) In the event that the owner or owner/operator decides to revert to using conventional diesel or CARB diesel fuel, the owner or owner/operator shall comply with the requirements of section 2477.5(~~a~~c) within 10 days of discontinuation of alternative diesel fuel use. Within 10 days of discontinuation, the owner or owner/operator shall notify the Executive Officer in writing of this change in fuel use and shall include an update to the compliance information submitted to ~~ARBER submitted~~CARB to comply with ~~sections~~section 2477.5(~~e), 2477.5(f), or 2477.6.~~g).

(2) Owners or Owner/Operators that Retrofit TRUs or TRU Gen Sets with a VDECS. Owners or owner/operators that retrofit TRUs or TRU gen sets with a VDECS that requires certain fuel properties to be met in order to achieve the required PM reduction or PM emissions shall only fuel the subject TRU or TRU gen set with fuel that meets these specifications when operating in the state of California. In addition, owners or owner/operators that choose a VDECS that requires certain fuel properties to be met in order to prevent damage to the VDECS or an increase in toxic air contaminants, other harmful compounds, or in the nature of the emitted PM shall only fuel the subject TRU or TRU gen set with fuel that meets these specifications.

~~(i)~~(k) Compliance by Replacing Engines.

A new or rebuilt replacement engine shall meet more stringent emissions standards than the original engine. The new or rebuilt replacement engine must subsequently meet the in-use performance standard requirements of section 2477.5(~~a~~c) by the compliance dates of section 2477.5(~~b~~c)(4), which are based on the new or rebuilt replacement engine's model year or effective model year~~ (see definition).~~.

(1) Current tier new replacement engines. Current tier new replacement engines shall use the engine model year to determine requirements and compliance dates. The engine model year is shown on the engine emissions label if the engine is manufactured when an emissions standard tier is in effect. Emissions label language examples include, but are not limited to:

(A) "THIS ENGINE MEETS 2008 INT. TIER 4 EMISSION REGULATIONS FOR U.S. EPA AND CALIFORNIA NONROAD CI ENGINES." This label language indicates the engine is a current-tier 2008 model year engine for the purposes of in-use requirements and registration.

(B) "THIS ENGINE COMPLIES WITH U.S. EPA AND CALIFORNIA REULATIONS FOR 2009 M.Y. NONROAD AND STATIONARY/OFF-ROAD DIESEL ENGINES." This label language indicates the engine is a current-tier 2009 model year engine for the purposes of in-use requirements and registration.

(2) Prior tier new replacement engines. Prior-tier new replacement engines shall use the effective model year (see definition) to determine requirements and compliance dates. The manufacture year and the installation year of a prior tier replacement engine shall not be used to determine the in-use requirements and the compliance dates. Prior-tier new replacement engine emissions labels typically do not clearly show the effective model year, but provide dates that indicate the prior-tier emissions standard that the engine meets. The year in the first sentence of the replacement engine emission label is the first year of the tier met. The date in the second sentence of the replacement engine label is the first day of the next tier standard. Table 1 in section 2477.4 and the following example of replacement engine emissions label language show how these labels shall be interpreted for this subarticle:

(A) "THIS ENGINE COMPLIES WITH CALIFORNIA OFF-ROAD AND U.S. EPA NONROAD EMISSION REQUIREMENTS FOR 2004 ENGINES UNDER 13 CCR 2423(j) AND 40 CFR 89.1003(b)(7). SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN TO REPLACE AN OFF-ROAD ENGINE BUILT BEFORE JANUARY 1, 2008 MAY BE A VIOLATION OF CALIFORNIA AND FEDERAL LAW SUBJECT TO CIVIL PENALTY." The first sentence includes the year 2004 (the first year of the tier). The second sentence indicates the next tier started on January 1, 2008, so the last year of the tier the engine met would be 2007. The center column of Table 1 shows the effective years 2004 to 2007 matches a Tier 2 engine in the 25-50 hp (trailer) category.

(3) Rebuilt replacement engines. Rebuilt replacement engines must meet the requirements of section 2477.16.

(A) Prior tier rebuilt replacement engines. If the rebuilt engine meets a prior tier emissions standard, then the effective model year (see definition) shall be used to determine the requirements and compliance dates. The rebuild year and the installation year of a prior tier replacement engine shall not be used to determine the in-use requirements and the compliance dates.

(B) Current tier rebuilt replacement engines. It the rebuilt engine meets the tier standard that is currently in effect, then the model year is the year that the rebuild is completed and this year shall be used to determine the requirements and compliance dates.

~~(j)~~(l) Mobile Catering Company Exemption Requirements.

(1) The Executive Officer ~~may~~shall grant a one~~-~~-year exemption to mobile catering companies for TRUs that are not compliant with the ~~in-use performance standards~~requirements under ~~section~~sections 2477.5(a), (b), (c), or (d) if the following conditions are met:

(A) The mobile catering company ~~must~~shall be under contract with the National Interagency Fire Center to provide mobile catering food service to emergency incidents for the year that the exemption would apply.

(B) All ~~California based~~ TRUs shall comply with the ~~ARBER registration~~TRU reporting requirements under section 2477.5(~~e~~g) and have ~~an ARB~~a CARB Identification Number (IDN) affixed to both sides of the TRU housing. All TRUs owned or leased by the mobile catering company that are based outside of California that the owner wants included in the mobile catering company exemption ~~must~~shall be ~~registered in ARBER~~reported to CARB in accordance with section 2477.5(~~e~~g).

~~(C)~~ The mobile catering company ~~must~~shall submit an application ~~each year for a Mobile Catering Company Exemption to the Executive Officer by one of the following methods:~~

~~1. Mail or deliver to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~2. Electronically submit by email to: arber@arb.ca.gov; or~~

~~3. Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~(D) Applications~~ for Mobile Catering Service Exemption ~~shall include~~with the ~~following~~ information~~:~~

~~1. Business name;~~

~~2. Business street address, state, zip code;~~

~~3. Business phone number;~~

~~4. Responsible official's name;~~

~~5. Responsible official's mobile phone number;~~

~~6. Federal Tax Identification Number (EIN) and Owner-Operator Number (OON) issued to the owner by ARBER when they registered in ARBER.~~

~~7. A list of ARB IDNs issued by ARBER for all TRUs that are to be included under the exemption. For TRUs that are not in compliance with the in-use standards~~ required under section 2477~~(a) that do not have ARB IDNs, provide the unit serial number instead of the IDN on this list;~~

~~8. A copy of the mobile catering company's contract with the National Interagency Fire Center shall be provided with the application; and~~

~~9. Owner's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~(E)~~(C) .20(g). The owner shall update the application information within 30 days of any changes to the information submitted. For example, if the owner buys, sells, or leases TRUs, the IDN and unit serial number list required under ~~subparagraph (j)(1)(D)7.~~section 2477.20(g)(7) shall be amended.

~~(F)~~(D) The owner shall provide the driver with a copy of the current Mobile Catering Service Exemption that has been approved by the Executive Officer and the Mobile Food and Shower Service Request Form issued by the National Interagency Fire Center for the incident they are traveling to or from.

~~(G)~~(E) During transit on California highways, the driver ~~must~~shall, upon request:

1. Present to the ~~ARB~~CARB inspector the Mobile Catering Service Exemption that has been approved by the Executive Officer and the Mobile Food and Shower Service Request Form issued by the National Interagency Fire Center, and

2. Allow the ~~ARB~~CARB inspector to inspect the TRU to confirm the Mobile Catering Service exemption applies to the equipment.

~~(H)~~(F) All circumstances at the time of inspection shall be consistent with the Mobile Catering Service Exemption that has been approved by the Executive Officer and the Mobile Food and Shower Service Request Form issued by the National Interagency Fire Center.

~~(l)~~(G) Mobile Catering Company Exemptions shall expire on December- 31st of each year. Mobile catering companies shall re-apply for this exemption annually.

~~(k)~~(m) Compliance Extension ~~for In-Use Performance Standards~~ Based on Unavailability of Compliance Technology.

(1) If there is no compliance technology available for a specific TRU or TRU gen set within six months of a compliance date, the Executive Officer may grant a one-year extension ~~of~~to the normal compliance ~~deadline,~~date set forth in sections 2477.5 (a), (b), (c), and (d), provided the following conditions are met:

(A) ~~A person or applicant must submit a written application to the Executive Officer that~~The owner demonstrates the absence of any suitable compliance option that can be used on the specific equipment and the owner cannot otherwise meet the requirements of section 2477.5(a), (b), (c), and (d) by the compliance dates ~~of section 2477.5(b). The application for and issuance of any extension pursuant to this subsection shall be subject to the following requirements:~~.

~~1. Except for the units for which the extension is sought, the applicant shall demonstrate that all other units subject to the owner or operator's direct control meet the requirements of sections 2477.5(a) and (b);~~

~~2. The application shall be submitted to and received by the Executive Officer no later than six months before the compliance date of the engine for which the extension is requested;~~

~~3. The application shall identify each unit and engine for which the extension is requested;~~

~~4. For each engine identified in paragraph 2477.5(k)(1)(A)3., immediately above, the applicant shall provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that no suitable control technologies are available. The description shall include, without limitation, detailed engineering diagrams and calculations that support the applicants claim that there are no suitable control technologies available.~~

~~a. For a replacement engine to be determined suitable or unsuitable, the concerns that will be considered are if the replacement engine will physically fit and functionally perform in the equipment.~~

~~5. Owners or responsible officials shall provide their signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~6. The owner or responsible official must submit an application for Compliance Extension to the Executive Officer by one of the following methods:~~

~~a. Mail or deliver to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~b. Electronically submit by email to: arber@arb.ca.gov; or~~

~~c. Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~7.~~(B) The TRU or TRU gen set ~~shall be registered in ARBER~~is reported to CARB as required under section 2477.5(~~e~~g).

(C) The owner shall submit an application to CARB as required under section 2477.20(h).

~~(B)~~(D) The Executive Officer may grant additional one-year extensions provided the same procedures are followed~~, as described in section 2477.5(k)(1), immediately above~~ for each extension.

~~(l)~~(n) Compliance Extension ~~for In-Use Performance Standards~~ Based on Delays Due to Private Financing, Equipment Manufacture Delays, or Installer Delays.

(1) The Executive Officer ~~may~~shall grant a one-time, maximum four-month extension to the normal compliance date set forth in ~~section 2477.5(b) for meeting the in-use performance standards set forth in section~~sections 2477.5(a), (b), (c), and (d), provided ~~certain~~the following conditions are met:

(A) The owner ~~must~~shall have ordered the compliance technology from the manufacturer no later than two months before the compliance date for VDECS retrofit compliance technologies and no later than four months before the compliance date for engine replacements, unit replacements, and trailer replacements, and the purchase order must be consistent with these limits~~;~~.

(B) The TRU or TRU gen set is ~~registered in ARBER;~~reported to CARB as required under section 2477.5(g).

(C) ~~An extension~~The owner shall submit an application ~~is submitted before~~as required under 2477.20(i) prior to the compliance deadline~~ that explains in detail why a~~ .

(o) Compliance Extension Based on Delays Due to Installation of Zero-Emission Fueling Infrastructure.

(1) The Executive Officer shall grant an annual extension in compliance~~-~~, up to a maximum of two years, to an owner for the ZE truck TRU requirements specified in section 2477.5(b) due to unforeseen, temporary, or extenuating circumstances outside of the owner's or owner/operator's control that prevents the installation of zero emission fueling Infrastructure at the facility at which the truck TRU fleet is domiciled.

(2) For the purposes of this subsection (o), circumstances beyond the truck TRU owner's control may include:

(A) A delay in the manufacture and shipment of zero-emission fueling infrastructure equipment

(B) A delay in obtaining construction permit(s)

(C) A delay in obtaining power from a utility

(D) A delay due to private financing

(E) A delay in the installation of zero-emission fueling infrastructure

(F) A natural disaster

(G) The discovery of archeological, historical, or tribal cultural resources under the California Environmental Quality Act

(3) The owner shall submit an application as required under section 2477.20(i)(5) at least 12 months prior to the compliance deadline in section 2477.5(b) if the delay is due to a utility infrastructure upgrade, and at least 3 months prior for all other delay types.

~~(C)~~(4) The owner may, 60 days prior to the expiration of the extension ~~is needed and how much~~ , apply for an additional ~~time to comply is needed, including:~~one-year extension. In such a case, the truck TRU owner shall once again be required to demonstrate that the conditions set forth in section 2477.20(i)(5) have been met.

~~1. If delivery is the cause for delay, explain the status, and provide documentation from the manufacturer to demonstrate this is true, along with an updated delivery schedule.~~

~~2. If installation is the cause for delay, report the date that compliance technology was delivered, explain the installation status and provide documentation from the installer to demonstrate the facts, along with an updated installation schedule.~~

~~3. If there are other circumstances causing the delay, such as financing, explain the status and provide documentation from the financier to demonstrate this is true, along with an updated schedule.~~

(5) ~~The owner or responsible official shall provide their signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and~~ The owner may, 60 days prior to the expiration of the second extension, apply for an additional compliance extension beyond the first two annual extensions due to a delay in obtaining power from a utility. In such a case, the owner shall once again be required to demonstrate that the conditions set forth in section 2477.20(i)(5) have been met.

~~4.~~ Within 45 days of the submission of a complete~~."~~

~~5. The owner or responsible official must submit an~~ application ~~for Compliance Extension to~~ , the Executive Officer ~~by one of the following methods:~~

~~a. Mail or deliver to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~b. Electronically submit by email to: arber@arb.ca.gov; or~~

~~c. Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~(m) ULETRU Extension for Compliance with LETRU.~~

~~(1) The ULETRU compliance dates required under subparagraphs 2477.5(b)(1) through (4) may be extended one year for TRUs or TRU gen sets equipped with MY 2003 or older engines if they complied by meeting~~shall approve, modify, or disapprove the ~~LETRU In-Use Performance Standard by the compliance dates listed below and the following qualifications are met:~~

~~(A) Compliance with LETRU was achieved by the following compliance dates:~~

~~1. December 31, 2009 for MY 2001 and older engines;~~

~~2. December 31, 2009 for MY 2002 engines; and~~

~~3. December 31, 2010 for MY 2003 engines.~~

~~(B) The original engine met the LETRU in-use standard by being retrofit with a Level 2 VDECS; or~~

~~(C) The unit was repowered with a replacement engine meeting the LETRU in-use standard:~~

~~1. Tier 4 final Non-Road/Off-Road Emission Standards, if the engine is rated at less than 25 hp~~

~~2. Tier 4 interim Non-Road/Off-Road Emission Standards, if the engine is rated between 25 hp and less than 50 hp~~

~~(D) The original TRU or TRU gen set was replaced with a new TRU or TRU gen set that is equipped with an engine that meets the LETRU in-use performance standard:~~

~~1. Tier 4 final Non-Road/Off-Road Emission Standards, if the engine is rated at less than 25 hp, or~~

~~2. Tier 4 interim Non-Road/Off-Road Emission Standards, if the engine is rated between 25 hp and less than 50 hp, or~~

~~(E) The unit is registered in ARBER under subparagraph 2477.5(e)~~

~~(F)~~(6) ~~Owner must apply for the ULETRU extension by submitting an~~ application ~~to the~~ and notify the applicant accordingly. If the application is modified or disapproved, the Executive Officer ~~at least 90 days before the ULETRU compliance date that includes the following information:~~shall state the reasons for the modification or disapproval in the notification. The notification to the applicant and approved plan, if applicable, shall be made available to the public on CARB's website

~~1. Owner name and Owner Operator Number (OON);~~

~~2. The affected unit's IDN;~~

~~3. A statement that the unit was in compliance on or before the compliance date required under section 2477.5(m)(1)(A), above;~~

~~4. Documentation that demonstrates that the LETRU in-use standard was met before the compliance date required under section 2477.5(m)(1)(A), above;~~

~~5. In the case of a unit replacement that meets LETRU, additional information that demonstrates the old noncompliant unit that was replaced, including:~~

~~a. A statement that the owner replaced a MY 2003 or older (actual model year must be specified) TRU or TRU gen set with a new TRU or TRU gen set that was equipped with an engine that is certified to meet a new engine emissions standard that meets the LETRU in-use performance standard;~~

~~b. Receipts for the purchase of the new TRU or TRU gen set, dated on or before the compliance date required under section 2477.5(m)(1)(A), above;~~

~~c. Documentation for the old, replaced TRU or TRU generator set that supports the statement in subparagraph 2477.5(m)(1)(F)5.a., above; and~~

~~6. Owner's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~(G) The owner or responsible official must submit an application for ULETRU Compliance Extension for Compliance with LETRU for TRU or TRU gen set replacement under subparagraph 2477.5(m)(1)(C), above, to the Executive Officer by one of the following methods:~~

~~1. Mail or deliver to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~2. Electronically submit by email to: arber@arb.ca.gov; or~~

~~3. Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~(n)~~(p) Safe Passage for Noncompliant Equipment Traveling in California.

(1) The Executive Officer ~~may~~shall grant a safe passage permit to a TRU or TRU gen set owner to travel on California highways with a specific noncompliant TRU or TRU gen set, provided the following conditions are met:

(A) The purpose of traveling on California highways is to take the noncompliant equipment to a dealer or installer to bring the equipment into compliance.

(B) Only one permit shall be allowed ~~if the specific~~for each TRU or TRU gen set ~~must comply with the ULETRU in-use standard, and two permits shall be allowed if the specific TRU or TRU gen set must comply with both the LETRU and ULETRU in-use standards~~.

(C) The TRU or TRU gen set shall not ~~be operating~~operate (with the engine running) while in a noncompliant state in California~~;~~.

(D) ~~No temperature~~Temperature-sensitive products shall not be transported in a vehicle with a noncompliant TRU or TRU gen set~~;~~.

~~(E)~~ The owner shall submit an application for a safe passage permit to the Executive Officer~~. Safe passage permit applications shall be submitted by one of the following methods:~~

~~1. Mail or deliver a physical report to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~2. Electronically submit by email to: arber@arb.ca.gov~~

~~3. Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm~~

~~(F) Applications for safe passage permits shall include the following information:~~

~~1. Owner's name;~~

~~2. Business name (if different);~~

~~3. Owner's street address, state, zip code;~~

~~4. Contact person's name;~~

~~5. Contact person's business phone number;~~

~~6. Date(s) transport will take place;~~

~~7. Statement that the reason for transporting the noncompliant equipment on California highways is strictly to take the noncompliant equipment to a dealer or installer to bring the equipment into compliance;~~

~~8. TRU or TRU gen set serial number;~~

~~9. Vehicle Identification Number (VIN), BIC Code (for TRU gen sets and domestic shipping containers), or railcar reporting mark;~~

~~10. Physical address of starting location or point of entry into California;~~

~~11. Dealer's or installer's business name and physical address where compliance technology will be installed; and~~

~~12.~~(E) ~~Owner's or responsible official's signature, after the statement: "I certify~~, as required under ~~penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~section 2477.20(j).

~~(G)~~(F) The Executive Officer shall provide a decision within 15 days of the application submittal.

~~(H)~~(G) The owner shall provide the driver with a copy of the safe passage permit that has been approved by the Executive Officer.

~~(I)~~(H) During transit on California highways, the driver ~~must~~shall, upon request:

1. Show an inspector that no temperature-sensitive products are being transported;

2. Present to the inspector the safe passage permit for the noncompliant TRU or TRU gen set that has been approved by the Executive Officer; and

3. Allow the inspector to inspect the TRU or TRU gen set to confirm the permit applies to the noncompliant equipment.

~~(J)~~(I) All circumstances at the time of inspection shall be consistent with the safe passage permit.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.6. Requirements for ~~Terminal Operators~~Vehicle Owners.

~~(a) Operator Reporting.~~

~~(1) All terminal operators subject to this regulation~~Beginning December 31, 2022, a vehicle owner shall ~~submit an Operator Report to ARB by January 31, 2009, for each terminal located~~not operate or cause to be operated in California ~~that shall include the following information:~~

~~(A) Terminal operator name, address, and contact information for the responsible official (phone number, email address, fax number).~~

~~(B) Terminal address, phone number, and terminal contact name for each California terminal where TRUs or~~ , a TRU ~~generator sets are garaged, maintained, operated,~~ equipped truck or ~~dispatched from.~~

~~(C) List of ARB Identification Numbers issued in accordance~~tractor-trailer equipped with ~~section 2477.5(e) for all TRUs and~~ a TRU or TRU gen ~~sets assigned to each California terminal.~~

~~(2) The Operator Report shall be updated within 30 days when changes to any of the above operator information occur. An Operator Report shall be submitted to ARBER within 30 days of the start-up of any new facility and shall be removed from ARBER within 30 days of a terminal shutting down.~~

~~(A) Operator Reports shall be submitted by one of the following methods:~~

~~1. Mail or deliver a physical report to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~2. Electronically submit through ARB's ARBER website at: http://www.arb.ca.gov/arber/arber.htm.~~

~~3. Electronically submit by email to: arber@arb.ca.gov~~

~~(3)~~(a) ~~Failure to report~~set, unless the TRU or ~~submittal of false information is a separate violation of this rule and subject to civil penalty.~~TRU gen set complies with sections 2477.5(a), (b), (c), and (d).

(b) Beginning December 31, 2022, a vehicle owner of a TRU-equipped truck or tractor-trailer equipped with a TRU or TRU gen set shall, upon request by CARB enforcement personnel, provide the following:

(1) Driver's license

(2) Truck or tractor registration

(3) Trailer registration

(4) Bill of lading or freight bill with origin and destination of freight being transported, the consignor (shipper) and consignee (receiver);

(5) The company name and contact information of the carrier that dispatched the driver; and

(6) The company name and contact information of the business entity (e.g., shipper, freight broker, freight forwarder, or receiver) that arranged, hired, or contracted for the transport of the perishable goods being hauled, subject to the requirements in sections 2477.8, 2477.9, 2477.10, and 2477.11.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013~~ and~~, 43018, and 43019.1, Health and Safety Code.

§ 2477.7. Requirements for Drivers.

(a) Beginning January 1, 2013, a driver shall not operate a TRU-equipped truck or tractor-trailer equipped with a TRU or TRU gen set on a California highway unless the TRU or TRU gen set complies with ~~section~~sections 2477.5(a), (b), (c), and (d).

(b) A driver ~~must~~shall, upon request by CARB enforcement personnel, provide the following~~ available information to authorized enforcement personnel~~:

(1) Driver's license;

(2) Truck or tractor registration;

(3) Trailer registration;

(4) Bill of lading or freight bill with origin and destination of freight being transported, the consignor (shipper) and consignee (receiver);

(5) The company name and contact information of the carrier that dispatched the driver; and

(6) The company name and contact information of the business entity (e.g~~.~~., shipper, freight broker, freight forwarder, or receiver) that arranged, hired, or contracted for the transport of the perishable goods being hauled, subject to the requirements in sections 2477.8, 2477.9, 2477.10, and 2477.11.

(c) A driver shall allow CARB personnel to conduct a visual inspection of TRU or TRU gen sets to determine whether emission control components have been tampered with, inadequately maintained, or are defective. The driver shall do the following:

(1) Temporarily turn off the TRU or TRU gen set engine

(2) Allow access to the TRU or TRU gen set engine compartment

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43109.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.8. Requirements for Freight Brokers and Freight Forwarders.

(a) Beginning January 1, 2013, freight brokers and freight forwarders that arrange, hire, contract for, or dispatch the transport of perishable goods in TRU~~-~~-equipped or TRU gen set-equipped trucks, tractor-trailers, shipping containers, or railcars on California highways or railways ~~must~~shall:

(1) Require the carriers they hire or contract with for transport of perishable goods, to only dispatch TRU-equipped trucks, trailers, shipping containers, and railcars or TRU gen sets that comply with ~~section~~sections 2477.5(a~~)~~), (b), (c), and (d), if they travel on California highways or railways.

(2) Provide the following information to the carrier for their dispatched driver who will be traveling on a California highway or railway:

(A) Freight broker's or freight forwarder's business name;

(B) Freight broker's or freight forwarder's street address, state, zip code;

(C) Freight broker's or freight forwarder's contact person's name; and

(D) Freight broker or freight forwarder contact person's business phone number.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43109.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.9. Requirements for Motor Carriers.

(a) Beginning January 1, 2013, motor carriers that dispatch TRU-equipped trucks, trailers, or shipping containers equipped with a TRU or TRU gen set that travel on a highway within California ~~must~~shall:

(1) Only dispatch TRUs or TRU gen sets that comply with section 2477.5.

(2) Provide the following information to a dispatched driver who will be traveling on a highway within California:

(A) Carrier's business name;

(B) Carrier's street address, state, zip code;

(C) Carrier contact person's name; and

(D) Carrier contact person's business phone number.

(3) Provide the dispatched driver with the business name, address, contact person, and phone number of the business entity (e.g~~.~~., freight broker, freight forwarder, shipper or receiver) that arranged, hired, contracted for, or dispatched the transport of the perishable goods being hauled.

~~(b) Carriers may also have to comply with terminal operator requirements, under section 2477.6, if they have terminals located in California.~~

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.10. Requirements for ~~California-Based~~ Shippers.

(a) Beginning January 1, 2013, ~~California-based~~ shippers that arrange, hire, contract for, or dispatch the transport of perishable goods in TRU-equipped trucks, trailers, shipping containers, or railcars, or TRU gen sets on California highways or railways ~~must~~shall:

(1) Dispatch TRUs or TRU gen sets that comply with ~~section~~sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; or

(2) Require the carriers they hire or contract with for transport of perishable goods, to only dispatch TRUs or TRU gen sets that comply with ~~section~~sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; and

(3) Provide the following information to the carrier or a dispatched driver who will be traveling on a highway within California:

(A) Shipper's business name and address;

(B) Receiver's business name and address;

(C) Freight broker or forwarder business name and address (if any); and

(D) Contact person's name, and phone number at the shipper, broker, or receiver with knowledge of the transport arrangements.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013 ~~and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.11. Requirements for ~~California-Based~~ Receivers.

(a) Beginning January 1, 2013, ~~California-based~~ receivers that arrange, hire, contract for, or dispatch the transport of perishable goods in TRU-equipped trucks, trailers, shipping containers, or railcars; or TRU gen sets on California highways or railways ~~must~~shall:

(1) Dispatch TRUs or TRU gen sets that comply with ~~section~~sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; or

(2) Require the carriers they hire or contract with for transport of perishable goods, to only dispatch TRUs or TRU gen sets that comply with ~~section~~sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; and

(3) Provide the following information to the carrier or a dispatched driver who will be traveling on a highway within California:

(A) Shipper's business name, address;

(B) Receiver's business name, address;

(C) Freight broker or forwarder business name and address (if any); and

(D) Contact person's name, and phone number at the shipper, broker, or receiver with knowledge of the transport arrangements.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.12. Requirements for Lessors and Lessees.

(a) Lessors shall be subject to all of the following:

(1) The lessor is responsible for the owner requirements set forth in section 2477.5. See the definition of "owner" in section 2477.4 for clarification related to banks and financial institutions.

(A) The lessor may delegate the ~~responsibility for applying for an IDN (registering in ARBER)~~responsibilities under section 2477.5(~~e~~g), (h), and (i) to the lessee, if the following conditions are met:

1. The lease contract ~~must~~shall show clear delegation of the ~~ARBER registration~~TRU reporting, operating fee, and compliance label requirements to the lessee;

~~2.~~ The lessor ~~must~~shall submit third party agreement confirmation information as required under section 2477.20(k) for leased units to ~~ARB~~CARB at least 10 days prior to the lessee ~~applying for an IDN. The following information is required:~~

~~a. Unit serial numbers for each TRU or TRU gen set;~~

~~b. Unique company equipment number;~~

~~c. Vehicle license number;~~

~~d. Vehicle Identification Number (VIN);~~

~~f. Lessor company name, address, federal tax ID (EIN), contact person, and contact information;~~

~~g. Lessee company name, address, federal tax I.D (EIN), contact person, and contact information;~~

2. ~~e. Copy of~~reporting the ~~contract pages of the lease contract with the language highlighted that identifies the lessee as the responsible party for registration; and~~TRU or TRU gen set to CARB.

~~f. Owner's/lessor's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."~~

~~3. The lessor must submit third party agreement confirmation information for leased units to the Executive Officer by one of the following methods:~~

~~a. Mail or deliver to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (ARBER/TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~b. Electronically submit by email to: arber@arb.ca.gov~~

~~4.~~3. ~~The lessor must~~The lessor shall notify the lessee in writing of this delegation.

(B) The lessor shall not delegate owner requirements for complying with ~~the in-use standards under section~~sections 2477.5(a), (b), (c), and (d) to the lessee unless the lessor is a bank or financial institution ~~(see definition of "owner" in section 2477.4).~~.

~~(2) When TRUs or TRU gen sets are at a lessor's California terminal for 30 or more days, the lessor shall be subject to the operator report requirements set forth in section 2477.6.~~

(b) Lessees shall be subject to all of the following:

~~(1) The terminal operator requirements set forth in section 2477.6 if a leased or rented TRU or TRU generator set has been assigned to the lessee's California terminal for 30 or more days.~~

~~(2)~~(1) If delegated by contract and the lessor has submitted third party agreement confirmation information for leased units to ~~ARB~~CARB under section 2477.12(a)(1)(A) and notified the lessee of delegation under section 2477.12(a)(1)(A)3., the lessee is responsible for the ~~registration~~TRU reporting, operating fee, and compliance label requirements of ~~section~~sections 2477.5(~~e~~g), (h), and (i) and shall complete all of the following:

(A) ~~Submit a registration application for an IDN~~Report the TRU or TRU gen set to CARB and pay applicable TRU operating fees after at least 10 days of the lessor submitting the third party agreement confirmation information for leased units to ~~ARB~~CARB, but no more than 30 days after the lessor's notice;

(B) Submit a copy of the ~~ARBER~~ TRU Certification to the lessor within 30 days after ~~registration in ARBER is completed~~reporting the TRU or TRU gen set to CARB and ~~an ARBER~~a TRU Certification is issued; and

(C) Affix (attach) the IDN to the TRU or TRU gen set housing within 30 days in accordance with subparagraph 2477.5(~~e)(1)(F~~g)(6).

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.13. Requirements for TRU ~~and~~, TRU Gen Set~~-~~, and ZE Truck TRU Original Equipment Manufacturers.

~~(a) TRU and TRU original equipment manufacturers that equip TRUs or TRU gen sets with flexibility engines, as defined in section 2477.4, shall do all of the following:~~

~~(1) Beginning November 14, 2012, provide written notification to the Executive Officer of their intent to equip TRUs or TRU gen sets with flexibility engines. This notification shall be submitted at least 12 months in advance of the first flexibility engine being installed in production, to:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (TRU)~~
~~P.O. BOX 2815~~
~~SACRAMENTO, CA 95812~~

~~(2) Beginning February 12, 2013, provide supplemental labels that list all of the engine information needed to register the TRU or TRU gen set in ARBER under section 2477.5(e), if the engine manufacturer's emissions label does not provide this information.~~

~~(A) The supplemental label shall be permanently affixed to the flexibility engine in an easily accessible place, in accordance with 40 CFR 89.110 (for Tier 1 or Tier 2) or 40 CFR 1039.135 (for Tier 4). Alternative supplemental label locations and font sizes may be necessary, such as on the equipment frame, subject to Executive Officer approval.~~

~~(3) Beginning February 12, 2013, the original equipment manufacturer shall provide written disclosures with new TRUs or TRU gen sets that are equipped with flexibility engines. These written disclosures may be included with documentation that is shipped with the TRU or TRU gen set and must include instructions to dealers telling them they are required by California law to notify the ultimate purchaser of these disclosures prior to sale and to pass these written disclosures to the ultimate purchaser at point of sale. The following disclosures are required:~~

~~(A) The TRU or TRU gen set is equipped with a flexibility engine. Flexibility engines meet less stringent emissions standards than the emission standards that were in effect at the time the flexibility engine was manufactured.~~

~~(B) Provide the effective model year of the flexibility engine, as shown in section 2477.4, Table 1.~~

~~(C) Notify the ultimate purchaser that if they register the TRU or TRU gen set in ARBER under section 2477.5(e), they are required report the effective model year of the engine, not the year that the engine was manufactured. Noncompliance may result in penalty.~~

~~(D) If the TRU or TRU gen set is operated in California, the owner will be required to bring the engine into compliance with the ULETRU in-use standard seven years after the effective model year of the engine, in accordance with section 2477.5(a) and (b).~~

(a) Beginning December 31, 2022, TRU OEMs shall not manufacture for sale or use in California, a truck TRU, ZE truck TRU, trailer TRU, or DSC TRU, unless that TRU uses a refrigerant with a GWP value less than or equal to 2,200, or uses no refrigerant at all.

(1) The TRU shall include a refrigerant label that is readily visible and legible, and include the following statement, or its equivalent: "THIS UNIT CONTAINS REFRIGERANT WITH A GWP LESS THAN OR EQUAL TO 2,200 AND IS COMPLIANT FOR USE IN THE STATE OF CALIFORNIA."

(A) Readily visible to the average person means that a label is readable from a distance of 46 centimeters (18 inches) without any obstructions from the TRU or engine parts, except for flexible parts that may be moved out of the way without disconnection.

(b) Beginning December 31, 2023, TRU OEMs shall not manufacture for sale or use in California, a truck TRU, unless it is a ZE truck TRU.

(c) Beginning May 31, 2023, TRU OEMs shall not manufacture for sale or use in California, a trailer TRU, DSC TRU, railcar TRU, or TRU gen set, unless it is equipped with an engine that meets or outperforms the performance standard set forth in section 2477.5 (d).

~~(b)~~(d) Original Equipment Manufacturer Reporting

~~(1) Current Production Reports:~~ Monthly production reports. Beginning April 6, 2011, ~~and by January 1st and June 30th of each calendar year thereafter,~~ TRU ~~and TRU gen set original equipment manufacturers~~OEMs shall provide ~~to ARB~~by the ~~information listed below for all TRUs and TRU gen sets that will be manufactured and marketed for sale in~~ end of the ~~following markets: California, United States, Canada, and Mexico. The following data shall be provided for TRUs and TRU gen sets that will be produced during the six month period following the report due date for each market area:~~

~~(A) TRU or TRU genset manufacturer and model name, as it appears on the unit label; and~~

~~(B) The following engine information for each TRU or TRU gen set model:~~

~~1. Engine manufacturer;~~

~~2. Engine model, as it appears on the engine emissions label;~~

~~3. Engine model, as it appears on the serial number label, if different;~~

~~4. Engine Family;~~

~~5. Rated horsepower and rated speed;~~

~~6. Displacement (liters);~~

~~7. Exhaust Emissions Control System;~~

~~8. Tier standard met; and~~

~~9. ARB's Executive Order that the engines are manufactured under.~~

~~(C) Current Production Reports shall be submitted by one~~second business day of ~~the following methods:~~

~~1. Mail or deliver a physical report in electronic format to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (TRU)~~
~~1001 I STREET~~

~~SACRAMENTO, CA 95814~~

~~2. Electronically submit to ARB's TRU Program via email at:~~

~~arber@arb.ca.gov~~

~~(D) Original equipment manufacturers that produce less than 100 TRUs or TRU gen sets per~~each calendar ~~year may submit Current Production Year Reports within ten days of installing the first engine in a~~month, a monthly production ~~run of a new model.~~

~~(2) Prior Production Reports:~~

~~(A) Prior unit and engine data. TRU and TRU gen set original equipment manufacturers shall:~~

~~1.~~(1) ~~By April 6, 2011, provide a production~~ report to ~~ARB~~CARB with the information listed ~~below~~ in ~~subparagraph~~section 2477.~~13(b)(2)(C~~20(l) for the previous ~~five~~ calendar ~~years~~month for each TRU ~~or~~, TRU gen set, or ZE truck TRU produced for sale in California, North America, Canada, and Mexico~~; or~~.

~~2. If the TRU or TRU gen set original equipment manufacturer elects not to provide the information in subparagraph 2477.13(b)(2)(A)1., then within 30 days of any request from ARB, the TRU or TRU gen set original equipment manufacturer shall provide a production report to ARB with the information listed below in subparagraph 2477.13(b)(2)(C) for the unit and engine serial numbers provided in ARB's request.~~

~~(B) Monthly production reports. TRU and TRU gen set original equipment manufacturers shall either:~~

~~1. Beginning April 6, 2011, provide by the 15th of each calendar month, a monthly production report to ARB with the information listed below in subparagraph 2477.13(b)(2)(C) for the previous calendar month for each TRU or TRU gen set produced for sale in California, North America, Canada, and Mexico; or~~

~~2. As an alternative, the TRU or TRU gen set original equipment manufacturer may request reporting that is equivalent to and at least as effective as subparagraph 2477.13(b)(2)(B)1., immediately above, subject to Executive Officer approval.~~

~~(C) Original equipment manufacturers shall provide the following information for each TRU and TRU gen set:~~

~~1. TRU or TRU gen set model name, as it appears on the unit label;~~

~~2. TRU or TRU gen set serial number;~~

~~3. Engine manufacturer;~~

~~4. Engine model, as it appears on the engine emissions label;~~

~~5. Engine model, as it appears on the serial number label, if different;~~

~~6. Engine Family;~~

~~7. Engine serial number;~~

~~8. Rated horsepower and rated speed; and~~

~~9. Tier standard met.~~

~~(D) Prior Production Reports and Flexibility Engine Reports shall be submitted on CD or DVD to:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (TRU)~~
~~1001 I STREET~~
~~SACRAMENTO, CA 95814~~

~~(3)~~(2) Confidentiality of ~~current and prior~~ production reports. TRU and TRU gen set original equipment manufacturers may designate ~~current and prior~~specific production report information as confidential or trade secret, and ~~such~~CARB shall handle designated information ~~will be handled~~ in accordance with title 17 CCR, section 91000.

~~(c)~~(e) Beginning February 12, 2013, TRU and TRU gen set original equipment manufacturers (OEM) that sell TRUs, TRU gen sets, ZE truck TRUs, or replacement engines in California shall:

(1) Provide a supplemental label with all new and rebuilt replacement engines that provides the information that is required to ~~register~~report the unit ~~in ARBER~~to CARB under section 2477.5(~~e~~g), if the engine manufacturer's emissions label does not provide this information. If a prior-tier replacement engine ~~(as defined in section 2477.4)~~ is used, the effective model year ~~(as defined in section 2477.4)~~ shall be listed on the supplemental label.

(A) The supplemental label shall be permanently affixed to the replacement engine in an easily accessible place, in accordance with 40 CFR 89.110 (for Tier 1 or Tier 2 engines) or 40 CFR 1039.135 (for Tier 4 engines). Alternative supplemental label locations and font sizes may be necessary if accessible engine surface space is not available, subject to Executive Officer approval.

(2) Provide a registration information document with each new TRU ~~and~~, TRU gen set, and ZE truck TRU that includes:

(A) All of the TRU ~~or~~, TRU gen set~~-~~, or ZE truck TRU unit information that is needed to ~~register~~report the TRU ~~or~~, TRU gen set ~~in ARBER~~to CARB under section~~-~~ 2477.5(~~e~~g). This information ~~must~~shall be the same as the information on the unit label that is attached to the unit.

(B) All of the TRU or TRU gen set engine information needed to ~~register in ARBER~~report to CARB under section 2477.5(~~e~~g). This information ~~must~~shall be the same as the information on the engine labels that are attached to the engine.

(C) The registration information document shall include a certification statement by the TRU OEM stating that the unit registration information provided is exactly the same as listed on the TRU ~~or~~, TRU gen set, or ZE truck TRU unit label and the engine registration information provided is exactly the same as listed on the engine labels.

(D) As an alternative to providing the registration information document, the TRU or TRU gen set original equipment manufacturer may provide a web-based, on-line lookup system for registration information that is at least as effective as section 2477.13(~~c~~e)(2)(A), (B), and (C), subject to advance Executive Officer approval. In determining whether a specific web-based, on-line lookup system for registration information is at least as effective as section 2477.13(~~c~~e)(2)(A), (B), and (C), the Executive Officer shall consider information submitted by the manufacturer and shall exercise good scientific and engineering judgment.

(3) Provide a registration information document with each new and rebuilt replacement engine supplied by the OEM that includes:

(A) All of the engine information needed to ~~register in ARBER~~report to CARB under section 2477.5(~~e~~g). This information ~~must~~shall be the same as the information on the new replacement engine labels or rebuilt replacement engine supplemental labels (see section 2477.16(b~~)~~) that are attached to the engine or an alternative location approved by the Executive Officer.

(B) The registration information document shall include a certification statement by the TRU OEM stating that the engine registration information provided is exactly the same as listed on the replacement engine labels.

(C) Include entry spaces and instructions for the dealer or installer to fill in the unit information that is needed to ~~register~~report the unit ~~in ARBER~~to CARB pursuant to section 2477.~~5(e)(1)(A)~~20(f)(4~~.~~). Include a certification statement for the dealer or installer to sign under, stating that the unit information entered is exactly the same as listed on the unit label that the replacement engine is installed into.

(D) As an alternative to providing the registration document, the TRU or TRU gen set original equipment manufacturer may provide a web-based, on-line lookup system for registration information that is at least as effective as section 2477.13(~~c~~e)(3)(A), (B), and (C), subject to advance Executive Officer approval. In determining whether a specific web-based, on-line lookup system for registration information is at least as effective as section 2477.13(~~c)(2~~e)(3)(A), (B), and (C), the Executive Officer shall consider information submitted by the manufacturer and shall exercise good scientific and engineering judgment.

~~(d)~~(f) Beginning November 14, 2012, OEMs shall provide written disclose with each prior-tier replacement engine they supply that shall be passed on to interested buyers prior to sale of a prior-tier replacement engine notifying them that the engine was manufactured to meet less stringent emissions standards than are currently required. This notification must also provide the effective model year of the prior-tier replacement engine and the ULETRU compliance deadline.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.14. Requirements for TRU, TRU Gen Set, and TRU-Equipped Truck and Trailer Dealers.

(a) Beginning February 12, 2013, dealers that sell and/or install TRUs, TRU gen sets, ZE truck TRUs, or replacement engines in California shall:

(1) Pass the registration information document provided by the TRU or TRU gen set OEM (under section 2477.13) or print-out from the OEM's web-based look-up system (under section 2477.13(~~c~~e)(2)(D) or 2477.13(~~c~~e)(3)(D)) to the ultimate purchaser upon sale of a new TRU~~ or~~, TRU gen set-, or ZE truck TRU that includes the TRU~~ or~~, TRU gen set, or ZE truck TRU unit information and the TRU engine information required for registration under section 2477.5(~~e~~g).

(2) Pass the registration information document provided by the TRU or TRU gen set OEM under (section 2477.13) or print-out from the OEM's web-based look-up system (under section 2477.13(~~c~~e)(2)(D) or 2477.13(~~c~~e)(3)(D)), or engine rebuilder (under section 2477.16) to the ultimate purchaser upon sale of a new replacement engine, or rebuilt replacement engine that includes the engine information required for registration under section 2477.5(~~e~~g).

(3) If an engine is not supplied by a TRU OEM, the dealer shall provide a registration information document that lists all of the TRU or TRU gen set engine information needed to ~~register in ARBER~~report to CARB under section 2477.~~5(e)(1)(A)~~20(f)(7~~.~~). This information ~~must~~shall be exactly the same as the information on the engine emissions label that is attached to the engine. The registration information document ~~must~~shall include a certification statement by the dealer stating that the engine information provided is exactly the same as listed on the engine emissions label.

~~(4) If a new TRU or TRU gen set is equipped with a flexibility engine, the dealer shall notify the ultimate purchaser of the written disclosures provided by the OEM under section 2477.13(a)(3) prior to sale and shall pass these disclosures to the ultimate purchaser at point of sale of a new TRU or TRU gen set.~~

(b) Dealers that sell TRUs or TRU gen sets from businesses located in California may purchase, receive, or otherwise acquire and have in their possession, TRUs or TRU gen sets that are noncompliant with the ~~in-use performance standards of section 2477.5(a) and the registration~~ requirements of section 2477.5(~~e),~~a), (b), (c), (d), and (g) if the following conditions are met:

(1) The noncompliant TRUs or TRU gen sets are not sold for use in California prior to being brought into compliance with the requirements;

(2) The noncompliant TRU or TRU gen set is sold to a person that would not be reasonably expected to do business in California and a written disclosure to the buyer in the bill of sale is required in accordance with section 2477.18(b)(1);

(3) The noncompliant TRUs or TRU gen sets are not rented or leased prior to being brought into compliance with these requirements;

(4) The noncompliant TRUs or TRU gen sets are not operated at the ~~dealers~~dealer's place of business or on California highways for the purposes of controlling the environment of temperature sensitive products while in California. This condition applies to TRU or TRU gen sets under the dealer's control. This condition does not apply to TRUs or TRU gen sets owned by others that are being repaired by the dealer; and

(5) If a noncompliant TRU or TRU gen set is in transit on California highways:

(A) The TRU or TRU gen set shall not be operating;

(B) The dealer shall be responsible for ensuring that no temperature-sensitive products are transported in the vehicle;

(C) The dealer shall provide the driver with written evidence that the noncompliant TRU or TRU gen set is under the control of the dealer, including the following information:

1. Dealer's business name;

2. Dealer's street address, state, zip code;

3. Dealer contact person's name;

4. Dealer contact person's business phone number;

5. Date(s) transport will take place;

6. Statement of the reason for transporting the noncompliant equipment

7. TRU or TRU gen set serial number

8. Physical address of starting location;

9. Physical address of ending location; and

10. Dealer owner's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."

(D) During transit on California highways, the driver, upon request, must show an inspector that no temperature-sensitive products are being transported and ~~must~~shall present written evidence provided by the dealer that the noncompliant TRU or TRU gen set is under the control of a dealer; and

(E) All circumstances at the time of inspection shall be consistent with the requirements under section 2477.14(b)(5).

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.15. Requirements for Repair Shops Located in California that Work on TRUs or TRU Gen Sets.

(a) Repair shops located in California that sell and/or install new or rebuilt replacement engines into TRUs or TRU gen sets shall:

(1) Pass the registration information document provided by the TRU or TRU gen set OEM (under section 2477.13) or engine rebuilder (under section 2477.16) to the ultimate purchaser upon sale of a new or rebuilt replacement engine that includes the engine information needed to ~~register in ARBER~~report to CARB, as listed in section 2477.~~5(e)(1)(A)~~20(f)(7~~.~~).

(2) Beginning February 12, 2013, if an engine is not supplied by a TRU OEM, the installer shall provide a registration information document that lists all of the TRU or TRU gen set engine information needed to ~~register in ARBER~~report to CARB, as listed in section 2477.~~5(e)(1)(A)~~20(f)(7~~.~~).

(A) This information ~~must~~shall be exactly the same as the information on the engine emissions label that is attached to the engine.

(B) The registration information document shall provide a certification statement by the repair shop responsible official stating that the engine information provided is exactly the same as listed on the engine emissions label.

(3) Beginning February 12, 2013, provide the unit information on the registration information document that is needed to ~~register~~report the unit ~~in ARBER~~to CARB for TRU or TRU gen set that the new or rebuilt replacement engine is installed into. The unit information that is required is listed in section 2477.~~5(e)(1)(A)~~20(f)(4~~.~~).

(A) The repair shop responsible official shall provide a certification statement on the registration information document stating that the unit information provided is exactly the same as listed on the unit label.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.16. Requirements for Engine Rebuilders.

(a) If a TRU engine is being rebuilt to remain in compliance with the in-use standards of section 2477.5(~~a~~c), it must be rebuilt in accordance with the 40 CFR, sections 89.130 and 1068.120, and 13 CCR, section 2423(l), as these sections existed on August 31, 2012, and shall meet the following requirements:

(1) To remain in compliance with the in-use performance standards, the engine must be rebuilt to a configuration of a more stringent emissions standard tier than the original engine;

(2) The engine must be rebuilt to a certified configuration of matched components. "Matched components" means a complete set of components corresponding to the certified emissions configuration (tier) of the engine that is being used as the reference for the rebuilt engine.

(b) Beginning November 14, 2012, engine rebuilders shall provide a supplemental label with each rebuilt engine that includes the following information:

(1) Name of the engine rebuilder;

(2) Engine manufacturer of the original engine

(3) Engine model;

(4) Engine model year:

(A) Prior tier engines. If the rebuilt engine meets a prior-tier emissions standard, then the effective model year is required~~ (see definition of effective model year in section 2477.4);~~;

(B) Current tier engines. It the rebuilt engine meets the tier standard that is currently in effect, then the model year is the year that the rebuild is completed.

(5) Horsepower rating of the certified configuration of the rebuilt engine;

(6) Emissions standard tier met by the certified configuration (e.g~~.~~., Tier 4i); and

(7) Calendar year that the rebuild was completed.

(c) Supplemental labels shall be permanently affixed to the rebuilt engine in an easily accessible place, in accordance with 40 CFR, section 89.110 (for Tier 1 or Tier 2) or 40 CFR, section 1039.135 (for Tier 4). Alternative supplemental label locations and font sizes may be necessary if surface space is not available, subject to Executive Officer approval.

(d) Beginning January 13, 2013, engine rebuilders shall provide the following documentation, within 30 days of request, that demonstrates they have complied with the engine rebuilding practices of 40 CFR, sections 89.130 and 1068.120, and 13 CCR, section 2423(l):

(1) Information that demonstrates there is a reasonable technical basis for knowing that the rebuilt engine is equivalent, from an emissions standpoint, to an engine that complies with the certification standards applicable to the emissions tier standard of the rebuilt engine (i.e~~.~~., tolerances, calibrations, specifications). Such equivalency would exist if the following two conditions are met:

(A) Parts installed (whether the parts are new, used, or rebuilt) are such that a person familiar with the design and function of engines would reasonably believe that the parts perform the same function with respect to emission control as the original parts; and

(B) Any parameter adjustment or design element change is made only in accordance with the original engine manufacturer's instructions or where data or other reasonable technical basis exists that such parameter adjustment or design element change, when performed on the rebuilt engine, is not expected to adversely affect in-use emissions.

(2) The technical demonstration must be signed and stamped by a licensed professional mechanical engineer.

(e) Beginning February 12, 2013, engine rebuilders shall provide a registration information document with the rebuilt engine that includes:

(1) All of the TRU or TRU gen set engine information needed to ~~register in ARBER~~report to CARB pursuant to subparagraph 2477.~~5(e)(1)(A)~~20(f)(7) except that engine family may be omitted for rebuilt engines. This information must be the same as the information on the rebuilt engine's re-label and supplemental emissions label that is attached to the engine. The registration information document would include a certification statement by the engine rebuilder, or third party installer stating that the engine information provided is exactly the same as listed on the engine emissions label.

(2) A separate section of the registration information document shall include entry spaces for all of the TRU or TRU gen set unit information that is required to ~~register~~report the unit ~~in ARBER~~to CARB pursuant to subparagraphs 2477.~~5(e)(1)(A)~~20(f)(4) and (5~~.~~). The registration information document would include a certification statement, with a signature space for the third party installer, stating that the unit information provided is exactly the same as listed on the unit label.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.17. Requirements for Applicable Facility ~~Reporting.~~Owners or Applicable Facility Owner/Operators.

(a) Facility Registration. On or before December 31, 2023, applicable facility owners or applicable facility owner/operators shall register their facility~~All facilities subject to this subsection shall submit a Facility Report to ARB~~ by ~~January 31, 2006, containing~~reporting the following information~~, as of December 31, 2005~~ to CARB:

(1) Company Information

~~(1)~~(A) Company/business name, address, and contact~~Contact~~ information for the ~~facility's~~ responsible official~~.~~ (e.g., title, phone number, email address).

(2) ~~Provide all North American Industrial Classification System codes (NAICS)~~ Indicate who is registering the applicable ~~to the~~ facility~~.~~, either:

(A) The applicable facility owner (or an employee of owner), or

(B) The applicable facility operator

(3) Applicable facility type (specify)

(A) Refrigerated Warehouse or Distribution Center

(B) Grocery Store

(C) Seaport Facility

(D) Intermodal Railyard

(4) Refrigerated Warehouse or Distribution Center or Grocery Store building size in square feet

(5) Rental or lease status. Indicate if the applicable facility is a rental unit (no contract term) or a lease unit (under contract term, typically more than one year).

~~(3)~~(6) The number of loading dock doors serving refrigerated storage space.

~~(4)~~(7) The number of square feet of refrigerated storage space.

~~(5) The number of TRUs or TRU gen sets under facility control by model year and horsepower category.~~

~~(6) The number of refrigerated trucks, trailers, shipping containers, or railcars leased or rented.~~

~~(7) The total annual TRU engine operating hours for all TRUs or TRU gen sets under facility control during 2005 (e.g. total TRU engine operating time for both on-road and off-road operations).~~

~~(8) The average weekly number of inbound refrigerated trucks, trailers, shipping containers, and railcars delivering goods to the facility during 2005, calculated by dividing the annual total inbound refrigerated loads by 52.~~

~~(9) The average weekly number of outbound refrigerated trucks, trailers, shipping containers and railcars delivering goods from the facility during 2005, calculated by dividing the annual total outbound refrigerated loads by 52.~~

~~(10)~~(8) The average total number of hours per week that outbound TRU or TRU gen set engines operate while at the facility during ~~2005~~2022. Average TRU or TRU gen set engine operating time at facility for outbound refrigerated loads may be used if the result is representative of the outbound TRU or TRU gen set operations at facilities, as determined by the Executive Officer. Average values would be determined for outbound loads ~~based on recordkeeping, conducted in accordance with subparagraph (f)(2)(B)2.,~~ and applied to the total annual number of refrigerated outbound loads, and then weekly averages calculated as follows: Average TRU or TRU gen set engine operating time per outbound refrigerated load multiplied by the total annual number of outbound loads, divided by 52 weeks equals the average total number of hours per week that outbound TRU or TRU gen set engines operate while at the facility.

~~(11)~~(9) The average total number of hours per week that inbound TRU or TRU gen set engines operate while at the facility during ~~2005~~2022. Average TRU or TRU gen set engine operating time at facility for inbound refrigerated loads may be used if the result is representative of the inbound TRU or TRU gen set operations at facilities, as determined by the Executive Officer. Average values would be determined for inbound loads ~~based on recordkeeping, conducted in accordance with subparagraph (f)(2)(B)2.,~~ and applied to the total annual number of refrigerated inbound loads, and then weekly averages calculated as follows: Average TRU or TRU gen set engine operating time per inbound refrigerated load multiplied by the total annual number of inbound loads, divided by 52 weeks equals the average total number of hours per week that inbound TRU or TRU gen set engines operate while at the facility.

~~(12)~~(10) The number of refrigerated trailers ~~(as defined)~~ that are used at the facility for cold storage, the total annual number of hours of TRU engine operation associated with these refrigerated trailers, and the total annual number of hours of operation using electric standby associated with these refrigerated trailers.

(11) Zero-emission fuel provided (if any).

(A) If electricity is provided:

1. Location of connectors (e.g., dock door, parking lot, staging area)

2. Number of connectors

3. Type of connectors

(b) If reported information for any applicable facility changes, then the applicable facility owner shall update the information within 30 days of the changes.

(c) If an applicable facility begins operations after December 31, 2023, then the applicable facility owner shall report the information in section 2477.17(a) to CARB within 30 days of the applicable facility beginning operations

(d) Facility Registration Fees. Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of applicable facilities in California to recover the costs to the Executive Officer administering the TRU ATCM as specified in section 2477.21(b).

(e) Facility Reporting. On or before December 31, 2023, applicable facility owners or applicable facility owner/operators shall select the requirements in either section 2477.17(e)(1) or section 2477.17(e)(2). If neither option is selected, the applicable facility owner or applicable facility owner/operator shall automatically be required to comply with section 2477.17(e)(2). An applicable facility owner or applicable facility owner/operator may change the option selected for the following calendar year by notifying CARB by September 30 of the preceding calendar year.

(1) Report all TRU Activity at Facility.

(A) Beginning December 31, 2023, applicable facility owners or applicable facility owner/operators shall collect the information required under section 2477.20(m) for any TRU that operates inside the facility fence line or property boundary.

(B) Beginning April 15, 2024, applicable facility owners or applicable facility owner/operators shall report information required under section 2477.20(m) to CARB quarterly in accordance with the schedule shown in Table 4.

Table 4: Applicable Facility Reporting Schedule

TRU Entry Date	**Date by which information is to be reported to CARB**
January 1 – March 31	April 15
April 1 – June 30	July 15
July 1 – September 30	October 15
October 1 – December 31	January 15

(C) If CARB finds non-reported TRUs operating inside the facility fence line or property boundary, the applicable facility owner or applicable facility owner/operator may be subject to a penalty pursuant to Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410 for each non-reported TRU. An applicable facility owner or applicable facility owner/operator may be subject to increased penalties for each additional non-reported TRU.

(D) An applicable facility owner or applicable facility owner/operator may designate specific report information as confidential or trade secret. CARB shall handle designated information in accordance with Title 17 CCR, section 91000.

(2) Declaration of TRU Compliance.

(A) Applicable facility owners or applicable facility owner/operators shall provide a declaration to CARB, under penalty of perjury, that beginning December 31, 2023, non-compliant TRUs subject to this regulation shall not be permitted to operate inside the facility fence line or property boundary.

1. An applicable facility owner or applicable facility owner/operator may check if a given TRU is compliant by verifying that the TRU has a valid CARB compliance label or by checking identifiable information through CARB's online system.

(B) If CARB finds a non-compliant TRU operating inside the facility fence line or property boundary, the applicable facility owner or applicable facility owner/operator may be subject to a penalty pursuant to Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410 for each non-compliant TRU. An applicable facility owner or applicable facility owner/operator may be subject to increased penalties for each additional non-compliant TRU operating within an applicable facility's fence line or property boundary.

~~(b)~~(f) Recordkeeping.

~~(1) Recordkeeping that substantiates the information reported in the Facility Report shall be maintained and shall be compiled and made available to State inspectors upon request for a minimum of three (3) years.~~

~~(2)~~(1) The Executive Officer may approve alternative recordkeeping and calculation procedures for determining the average weekly hours of TRU engine operation at a facility for inbound and outbound refrigerated loads, provided the Executive Officer finds that the alternative procedures meet the intent of section 2477.17.

~~(c) Facility Report Submittals. Facility Reports shall be submitted by one of the following methods:~~

~~(1) Mail or deliver a physical report to ARB at the address listed immediately below:~~

~~CALIFORNIA AIR RESOURCES BOARD~~
~~STATIONARY SOURCE DIVISION (TRU)~~
~~1001 I STREET~~
~~SACRAMENTO, CA 95814~~

~~(2) Electronically submit by email to: tru@arb.ca.gov~~

~~(d) Failure to Report or Submittal of False Information. Failure to report or submittal of false information is a separate violation of this rule.~~

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.18. Prohibitions.

(a) Except as allowed under section 2477.14(b), no person, including, but not limited to, manufacturers, distributors, dealers, auctioneers, and motor carriers shall intentionally or negligently import, deliver, purchase, receive, or otherwise acquire a new or used TRU or TRU gen set engine that does not meet the ~~performance~~ requirements or alternatives set forth in ~~section~~sections 2477.5(a), (b), (c), and (d) above.

(b) Except as allowed under section 2477.14(b), no person in this State, including, but not limited to, manufacturers, distributors, dealers, auctioneers, and motor carriers shall sell, or offer to sell, to an ultimate purchaser who is a resident of this State or a person that could reasonably be expected to do business in this State a new or used TRU or TRU gen set engine that does not meet the ~~performance~~ requirements or alternatives set forth in ~~section~~sections 2477.5(a), (b), (c), and (d) above.

(1) If a noncompliant TRU or TRU gen set is sold to a person who is a resident outside this State, then the bill of sale shall disclose to the buyer that the TRU or TRU gen set is not compliant for use in California and the TRU or TRU gen set ~~must~~shall meet the ~~in-use performance standards~~requirements of section 2477.5 before operating in the State, and ~~if the TRU is based in the State, then it~~ must be ~~registered in ARBER.~~reported to CARB. The following statement ~~must~~shall be included in the bill of sale of any noncompliant TRU or TRU gen set: "This TRU does not currently meet California's ~~in-use performance standards~~requirements under title 13, California Code of Regulations, section 2477.5, and is therefore not compliant for use in California."

(2) No owner of a TRU that is equipped with an Alternative Technology under section 2477.5(~~a~~c)(3) (e.g~~.~~., hybrid electric or electric standby) shall sell the TRU or TRU gen set, without disclosing in writing that it ~~must~~shall be used in a way that qualifies it as an Alternative Technology in accordance with section 2477.5(~~a~~c)(3) in order to be compliant.

(c) No person in this State, including, but not limited to, manufacturers, distributors, dealers, and carriers shall lease, offer to lease, rent, or offer to rent, in this state any new or used TRU or TRU gen set engine that does not meet the ~~performance~~ requirements or alternatives set forth in ~~section~~sections 2477.5(a), (b), (c), and (d) above.

(d) Operators of affected facilities and operators of affected TRUs and TRU gen sets are prohibited from taking action to divert affected TRUs to alternative staging areas in order to circumvent the requirements of this section.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.19. Non-compliance and Penalties.

(a) All persons, as defined in section 19 of the Health and Safety Code, found to be in violation of title 13, CCR, sections 2477 through 2477.18 may be cited and subject to the penalty provisions set forth in Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410. Where a violation involves multiple TRUs, TRU gen sets, or TRU engines, there is a separate violation for each such unit.

(1) For purposes of enforcement, if a TRU, TRU gen set, or applicable facility is cited for non-compliance with this TRU Regulation and neither the owner nor the operator can produce evidence of the party responsible for compliance with State laws, then the owner of the TRU, TRU gen set, or applicable facility in violation shall be liable for any non-compliance

(b) Failure to keep records, failure to report, or submittal of false information ~~is a violation~~are each separate violations of this ~~rule~~TRU Regulation subject to penalty.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013 ~~and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.20. Reporting

(a) Reporting Method. Submission of information to CARB required under this TRU Regulation, including registration, reporting, and submission of applications, shall be by one of the following methods:

(1) Mail or deliver to CARB at the address listed immediately below:

California Air Resources Board
Transportation and Toxics Division (TRU)
P.O. Box 2815
Sacramento, CA 95812

(2) Electronically submit by email to: arber@arb.ca.gov; or

(3) Electronically submit through CARB's online system.

(b) Recordkeeping. All records required under this TRU Regulation shall be kept for a minimum of three (3) years and shall be compiled and made available to CARB upon request.

(c) Statement of Accuracy. All information submitted to CARB as required under this TRU Regulation shall be accompanied by the following statement, signed by the TRU owner, applicable facility owner, or responsible official: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."

(d) Automated monitoring for electronic tracking systems. For a unit that uses an electronic tracking system, the information collected from that system shall include all of the following for each stationary location lasting more than 300 seconds (5 minutes):

(1) CARB IDN of the unit.

(2) Date.

(3) Address of the stationary location. This record may be the GPS coordinates and a location code for each stationary location, provided the owner or operator also provides a cross-reference of location codes with the corresponding physical addresses.

(4) Time of arrival and departure, and the elapsed time calculated from those readings to show the duration of the stationary position.

(5) Engine hour meter readings taken at arrival and departure and the elapsed time calculated from those readings to show the TRU engine run time while the vehicle is at the stationary location.

(6) Zero-emission system, such as electric motor or cryogenic system, hour meter readings taken at arrival and departure and the elapsed time that the zero-emission system is powering the refrigeration system while the vehicle is at the stationary location.

(7) A report that lists all stationary locations lasting more than 5 minutes where the TRU engine operated for more than 30 minutes, resulting in a violation.

(e) Placement of the CARB IDN. A CARB IDN shall be permanently affixed or painted on the TRU chassis in clear view according to the following specifications:

(1) The CARB IDN shall be preceded by the letters "ARB".

(2) Letters and numbers shall contrast sharply in color with the color of the background surface on which the letters are placed.

(3) The location of the I.D. number shall be as follows:

(A) Truck and trailer TRUs - both sides of TRU chassis housing.

(B) Rail car and shipping container TRUs - both sides of the TRU.

(C) TRU gen sets - both sides of gen set housing.

(4) Letters and numbers shall be readily legible during daylight hours, from a distance of 50 feet (15.24 meters) while unit is stationary.

(5) Markings shall be kept maintained in a manner that retains the legibility required by the subparagraph immediately above.

(6) Owners or owner/operators may use alternative unique equipment identification markings instead of affixing a CARB IDN, provided the following conditions are met:

(A) The owner or owner/operator shall report the TRU to CARB as required in section 2477.5(g) and provide the unique equipment number.

(B) The alternative identification number shall be truly unique. Examples of unique identification numbers include the Reporting Marks that are issued by the American Association of Railroads' contractor, RailInc, for their UMLER system and the BIC Codes issued by Bureau International de Containers. Company equipment numbers that are not truly unique on a worldwide basis do not qualify.

(C) Alternative identification numbers shall be affixed or attached to both sides of the TRU gen set, shipping container (if the TRU is permanently attached), semitrailer, or railcar and meet all of the requirements of subparagraph 2477.20(e).

(f) TRU Reporting Information. For each TRU, the owner or owner/operator shall report to CARB all of the following information:

(1) Company Information

(A) Company/business name, address, and contact information for the responsible official (e.g., title, phone number, email address).

(B) Company/business tax identification number/federal employer identification number (EIN) or equivalent for other country (e.g., Canadian Business Number).

(2) Rental or lease status. Indicate if the unit is a rental unit (no contract term) or a lease unit (under contract term, typically more than one year).

(3) Reporting identity indication. Indicate who is reporting the TRU, either:

(A) The owner (or an employee of owner), or

(B) A third party reporting the TRU under a third party agreement between the owner or lessor and a consultant or lessee.

(4) TRU, TRU gen set, or ZE truck TRU unit information:

(A) Unit Type:

1. Truck TRU;

2. Trailer TRU;

3. Refrigerated railcar TRU;

4. Refrigerated domestic shipping container TRU; or

5. TRU generator set.

(B) Indicate if the unit is ZE

(C) Unit manufacturer,

(D) Unit model,

(E) Unit model year, and

(F) Unit serial number.

(G) Date TRU was purchased, rented, or leased.

(5) Other TRU identifying numbers. Provide all that apply:

(A) If unit is installed on a truck or trailer, provide:

1. Vehicle Identification Number (VIN), and

2. Vehicle license number, country of issuance, and state or province of issuance;

3. Unique Bureau International de Container (BIC) Code, if trailer is multimodal

(B) If unit is installed on refrigerated railcar, provide railcar reporting mark;

(C) If unit is installed on domestic refrigerated shipping container, provide unique BIC Code;

(D) If unit is a TRU gen set, provide unique BIC Code;

(E) Provide company equipment number if company has labeled the equipment.

(6) TRU status information. Indicate if the unit is:

(A) Active (unit is operational);

(B) Removed from service (unit is scrapped or inactive for foreseeable future); or

(C) Sold. If last reported owner sold unit, then they shall provide:

1. Date of sale, and

2. New owner's company name, address, and contact information

(7) TRU engine information. Provide the following:

(A) Engine manufacturer;

(B) Engine model;

(C) Engine model year, or "MY";

(D) Engine serial number;

(E) Engine power rating. Indicate either:

1. Under 25 hp (under 19 kW), or

2. 25 hp or greater (19 Kw or greater);

(F) Engine family; and

(G) Emissions standard tier that engine meets.

(8) Compliance information.

(A) Refrigerant type

1. Indicate if the TRU has a TRU OEM supplied refrigerant label.

(B) If the unit is a ZE truck TRU used to comply with section 2477.5(b), then:

1. Provide the technology type:

a. Battery-electric;

b. Cryogenic temperature controlled system;

c. Cold plate system;

d. Powered by fuel cells; or

e. Other

2. Provide information on zero emission fueling Infrastructure:

a. Physical address of zero-emission fueling infrastructure installed or to be installed.

b. Specify the number of ZE fuel connections, and types of connectors.

c. If storing fuel on site, specify the number of storage tanks and the tank storage capacity.

d. If storing electricity on site, specify the number of batteries and battery capacity, in kilowatt-hours (kWh).

e. If generating fuel on site, specify the quantity of generators and expected power output.

f. For solar generation, specify the number of panels and kilowatt-hour (kWh) rating per panel, as well as expected annual power generation.

g. For hydrogen fuel cells, specify the number of cells and the rated kilowatt (kW) per cells, as well as the expected annual power generation.

(C) If the unit has a VDECS retrofit, then:

1. Provide the following from the VDECS label:

a. VDECS manufacturer name;

b. VDECS family name;

c. VDECS serial number;

d. VDECS manufacture year; and

2. Provide the VDECS installation date.

3. Provide the VDECS installer name

4. Provide the VDECS installer address

5. Provide the VDECS installer phone number

(D) If the engine currently in the unit is a rebuilt replacement engine, then:

1. Provide the emissions standard tier that the engine meets;

2. Provide the rebuild year; and

3. Provide the installation date.

(E) If the engine currently in the unit is a new replacement engine, then:

1. Provide the emissions standard tier that the engine meets; and

2. Provide the installation date.

(F) If the unit uses an Alternative Technology option under section 2477.5(c)(3), then provide:

1. The type used:

a. Electric standby-equipped TRU or hybrid electric TRU;

b. Hybrid cryogenic temperature controlled system;

c. Alternative–fueled engine;

d. Fueled exclusively with pure alternative diesel fuel;

e. Powered by fuel cells; or

f. Other system approved by the Executive Officer.

2. The date the technology was installed or employed.

(9) Indicate what state or province that the TRU is based in:

(A) California; or

(B) Outside of California. If based outside of California identify:

1. U.S. state;

2. Mexican state; or

3. Canadian province.

(10) Certification that the TRU operator is appraised of their obligations under this regulation.

(g) Application for Mobile Catering Service Exemption. Applications for Mobile Catering Service Exemption shall include all of the following information:

(1) Business name.

(2) Business street address, state, zip code.

(3) Business phone number.

(4) Responsible official's name.

(5) Responsible official's mobile phone number.

(6) Federal Tax Identification Number (EIN) and Owner-Operator Number (OON) issued to the owner by CARB.

(7) A list of CARB IDNs issued by CARB for all TRUs that are to be included under the exemption. For TRUs that are not in compliance with the requirements under section 2477(a), (b), (c), or (d) that do not have CARB IDNs, provide the unit serial number instead of the IDN on this list.

(8) A copy of the mobile catering company's contract with the National Interagency Fire Center shall be provided with the application.

(h) Application for Compliance Extension Based on Unavailability of Compliance Technology. An application for a compliance extension based on the unavailability of compliance technology shall do all of the following:

(1) Identify each unit and engine for which the extension is requested.

(2) For each engine identified in (1), provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that no suitable control technologies are available. The description shall include, without limitation, detailed engineering diagrams and calculations that support the applicant's claim that there are no suitable control technologies available.

(3) Demonstrate that all other units covered by this TRU Regulation and subject to the applicant's direct control meet the requirements of this TRU Regulation.

(i) Application for Compliance Extension Based on Delays. An application for a compliance extension based on delays shall:

(1) Explain in detail why a compliance extension is needed and how much additional time is required to comply.

(2) If delivery is the cause for delay, explain the status, and provide documentation from the manufacturer to demonstrate this is true, along with an updated delivery schedule.

(3) If installation is the cause for delay, report the date that compliance technology was delivered, explain the installation status and provide documentation from the installer to demonstrate the facts, along with an updated installation schedule.

(4) If there are other circumstances causing the delay, such as financing, explain the status and provide documentation from the financier or other relevant entity to demonstrate this is true, along with an updated schedule.

(5) If the delay is related to installation of zero-emission fueling infrastructure:

(A) Documentation that the owner ordered the zero-emission fueling infrastructure no later than 3 months before the compliance date.

(B) If requesting an extension for the entire truck TRU fleet, documentation why partial infrastructure installation is not viable.

(C) If an electric service upgrade is needed, a statement from the Utility is required that specifies the type of upgrade (distribution line extensions, new distribution circuits, substation upgrade, new substation, or new subtransmission line) and the estimated number of days for the utility to complete the work.

(D) Efforts taken to mitigate future need for the extension.

(j) Application for a Safe Passage Permit. An application for safe passage shall include all of the following information:

(1) Owner's name.

(2) Business name (if different).

(3) Owner's street address, state, zip code.

(4) Contact person's name.

(5) Contact person's business phone number.

(6) Date(s) transport will take place.

(7) Statement that the reason for transporting the noncompliant equipment on California highways is strictly to take the noncompliant equipment to a dealer or installer to bring the equipment into compliance.

(8) TRU or TRU gen set serial number.

(9) Vehicle Identification Number (VIN), BIC Code (for TRU gen sets and domestic shipping containers), or railcar reporting mark.

(10) Physical address of starting location or point of entry into California.

(11) Dealer's or installer's business name and physical address where compliance technology will be installed.

(k) Third-party Agreement Confirmation Information. For each leased unit, the lessor shall submit all of the following information to CARB:

(1) Unit serial numbers for each TRU or TRU gen set;

(2) Unique company equipment number;

(3) Vehicle license number;

(4) Vehicle Identification Number (VIN);

(5) Lessor company name, address, federal tax ID (EIN), contact person, and contact information;

(6) Lessee company name, address, federal tax I.D (EIN), contact person, and contact information;

(7) Copy of the contract pages of the lease contract with the language highlighted that identifies the lessee as the responsible party for reporting to CARB, paying TRU operating fees, and affixing CARB compliance labels; and

(8) Owner's/lessor's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that TRU or TRU gen set is compliant with applicable California regulations."

(l) Original Equipment Manufacturer Monthly Production Reports. A TRU OEM production report shall include, for the previous calendar month for each TRU or TRU gen set produced for sale in California, North America, Canada, or Mexico:

(1) Unit model name, as it appears on the unit label;

(2) Unit serial number;

(3) Engine manufacturer;

(4) Engine model, as it appears on the engine emissions label;

(5) Engine model, as it appears on the serial number label, if different;

(6) Engine ~~-~~family;

(7) Engine serial number;

(8) Rated horsepower and rated speed; and

(9) Engine emission tier standard met.

(10) If the unit is equipped an OEM VDECS, then provide the following:

(A) VDECS manufacturer name

(B) VDECS family name

(C) VDECS serial number

(11) Indicate if the unit is ZE

(12) Indicate if the unit is electric-standby equipped or hybrid electric

(13) Refrigerant type

(m) TRU Activity at a Facility. A report of TRU activity at a facility shall include all of the following information for each TRU that operates inside the facility fence line or property boundary:

(1) Truck TRU information.

(A) CARB IDN

(B) Entry date and time

(C) TRU operator's (or truck driver's) name

(D) TRU operator's (or truck driver's) driver's license number

(E) Truck license plate number

(2) Trailer TRU or DSC TRU information.

(A) CARB IDN (or if one is used, the alternative unique equipment identification number reported to CARB under section 2477.20(e)(6))

(B) Entry date and time

(C) Trailer or container owner's company name

(D) If unit is a trailer TRU, provide the trailer license plate number

(E) If trailer TRU or DSC TRU entered facility by truck, provide:

1. TRU operator's (or truck driver/tractor driver's) name

2. TRU operator's (or truck driver/tractor driver's) driver's license number

3. Truck owner/tractor owner's company name

4. Truck/tractor license plate number

(3) Railcar TRU information (not required for railcar TRUs that pass through and do not stop at a railyard)

(A) CARB IDN (or if one is used, the alternative unique equipment identification number reported to CARB under section 2477.20(e)(6))

(B) Entry date and time

(4) TRU gen set information.

(A) CARB IDN (or if one is used, the alternative unique equipment identification number reported to CARB under section 2477.20(e)(6))

(B) Entry date and time

(C) TRU gen set owner's company name

(D) If TRU gen set entered facility by truck, provide:

1. TRU operator's (or truck driver/tractor driver's) name

2. TRU operator's (or truck driver/tractor driver's) driver's license number

3. Truck/tractor owner's company name

4. Truck/tractor license plate number

§ 2477.21. Fees

(a) TRU Operating Fees. The term TRU as used in this subsection (a) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of TRUs that operate in California to recover the costs to the Executive Officer administering the TRU ATCM.

(2) Fees shall be due and payable to the Executive Officer upon reporting a TRU in accordance with section 2477.5 (g) and every three (3) years from the date the TRU was originally reported to CARB

(3) A TRU owner or owner/operator shall submit fees to the Executive Officer in accordance with the fee schedule in Table 5.

Table 5: TRU Operating Fee Schedule

Fee Type	Fee Amount (Per TRU)
TRU Operating Fee, paid once every three years	$54

Zero-Emission TRU Operating Fee, paid once every three years	$27

(b) Applicable Facility Registration Fees.

(1) Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of applicable facilities in California to recover the costs to the Executive Officer administering the TRU ATCM.

(2) Fees shall be due and payable to the Executive Officer upon registering an applicable facility in accordance with section 2477.17(a) and every three (3) years from the date of original registration.

(3) An applicable facility owner or owner/operator shall submit fees to the Executive Officer in accordance with the fee schedule in Table 6.

Table 6: Applicable Facility Registration Fee Schedule

Fee Type	**Fee Amount (Per Facility)**
Facility Registration Fee, paid once every three years	$54

§ 2477.22. Relationship to Other Law

Nothing in this section allows TRUs or TRU gen sets to operate in violation of other applicable law, including, but not limited to:

(a) California Vehicle Code.

(b) California Health and Safety Code.

(c) Any applicable ordinance, rule, or requirement as stringent as, or more stringent than, the requirements of this regulation.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.23.~~2477.20~~ Authority to Request Additional Information.

The Executive Officer may request that additional information be submitted as part of the review of any extension application, exemption, or other action that delays or defers a compliance date or action.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013, 43018, and ~~43018~~43019.1, Health and Safety Code.

§ 2477.~~21.~~24. Severability.

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013~~ and~~, 43018, and 43019.1 Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, ~~40717.9,~~ 43013~~ and~~, 43018, and 43019.1, Health and Safety Code.

Appendix A.2

Proposed Regulation Order, Accessible Format

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate.

Note: This version of the Proposed Regulation Order is provided in a tracked changes format to improve the accessibility of the regulatory text. This version is not the authoritative version for this proposed rulemaking. The proposed amendments are incorporated into the current regulatory text for ease of readability only. For the authoritative version that complies with Government Code section 11346.2, subdivision (a)(3), please see Appendix A.1. To review this document in a clean format (no underline or strikeout to show changes), please select "Simple Markup" or "No Markup" in Microsoft Word's Review menu. You can also change the view to the original (current regulatory text prior to proposed amendments) by selecting "Original. Additionally, "Advanced Track Changes Options" will allow for further options regarding color and other markings. Instructions on using/viewing Track Changes can be found here.

Proposed Regulation Order

Amendments to Division 3, Chapter 9, Article 8, Sections 2477, 2477.1, 2477.2, 2477.3, 2477.4, 2477.5, 2477.6, 2477.7, 2477.8, 2477.9, 2477.10, 2477.11, 2477.12, 2477.13, 2477.14, 2477.15, 2477.16, 2477.17, 2477.18, 2477.19, 2477.20, and 2477.21, and Adoption of Division 3, Chapter 9, Article 8, Sections 2477.22, 2477.23, and 2477.24, Title 13, California Code of Regulations, to read as follows:

§ 2477. Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate. [Renumbered]

Sections 2477 through 2477.24 shall be known as the Transport Refrigeration Unit Regulation, or TRU Regulation.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.1. Purpose

Diesel particulate matter (PM) was identified in 1998 as a toxic air contaminant. This regulation implements provisions of the Diesel Risk Reduction Plan, adopted by the California Air Resources Board in October 2000, as mandated by the Health and Safety Code Sections 39650-39675, to reduce emissions of substances that have been determined to be toxic air contaminants. Specifically, this regulation uses a phased approach to reduce diesel PM, oxides of nitrogen (NOx), and greenhouse gas (GHG) emissions from transport refrigeration units (TRUs) and TRU generator (gen) set equipment used to power electrically driven refrigerated shipping containers and trailers that are operated in California.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.2. Applicability.

Except as provided in section 2477.3, this TRU Regulation applies to the following entities:

(a) Owners and operators: Section 2477.5 of this regulation applies to owners and operators of diesel-fueled TRUs and TRU gen sets that operate in the State of California, regardless of where the vehicle is based. This specifically includes California-based and non-California-based TRUs and TRU gen sets that are installed on trucks, trailers, shipping containers, and railcars.

(b) Vehicle Owners: Section 2477.6 applies to vehicle owners of trucks or tractor-trailers that use TRUs or TRU gen sets on California highways.

(c) Drivers: Section 2477.7 applies to drivers that drive trucks or tractor-trailers that use TRUs or TRU gen sets on California highways.

(d) Freight brokers and freight forwarders: Section 2477.8 applies to freight brokers and freight forwarders that arrange, hire, tender contracts for, or dispatch the transport of perishable goods on California highways or railways in trucks, trailers, shipping containers, or railcars that are equipped with TRUs or TRU gen sets.

(e) Carriers: Section 2477.9 applies to motor carriers that use, cause to be used, or dispatch TRU-equipped trucks, trailers, or railcars, or trailer chassis or shipping containers with TRU gen sets that are driven on California highways or railways.

(f) Shippers: Section 2477.10 applies to shippers that arrange, tender contracts for, or dispatch the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in California.

(g) Receivers: Section 2477.11 applies to receivers that arrange, tender contracts for, or dispatch the transport of perishable goods that requires the operation of TRU-equipped or TRU gen set-equipped trucks, trailers, shipping containers, or railcars in California.

(h) Lessors and Lessees: Section 2477.12 applies to any person that rents or leases (lessor) TRUs or TRU gen sets and those persons renting (renter) or leasing (lessee) such equipment that is operated in California or that is based in California.

(i) TRU, TRU gen set, and ZE truck TRU original equipment manufacturers: Section 2477.13 applies to original equipment manufacturers that direct TRU, TRU gen set, or ZE truck TRU sales to the California market.

(j) TRU, TRU gen set, and TRU-equipped truck and trailer dealers located in California: Section 2477.14 applies to TRU, TRU gen set, and TRU-equipped truck and trailer dealers that maintain a business location in California and sell, maintain, or repair new or in-use TRUs, TRU gen sets, or TRU-equipped trucks or trailers.

(k) Repair shops located in California that work on TRUs or TRU gen sets: Section 2477.15 applies to repair shops that maintain a business located in California and install replacement engines in TRUs or TRU gen sets, or retrofit TRUs or TRU gen sets with verified diesel emissions control strategies to comply with this subarticle.

(l) Engine rebuilders: Section 2477.16 applies to TRU or TRU gen set engine rebuilders that sell to the California market.

(m) Applicable facility owners and operators: Section 2477.17 applies to owners and operators of applicable facilities located in California.

(n) To the extent not already covered under subsections (a) through (m), above, section 2477.18 of this regulation shall apply to any person in this State selling to an ultimate purchaser, or renting or leasing new or used TRUs or TRU gen sets, including, but not limited to, manufacturers, distributors, dealers, auctioneers, carriers, private fleets, independent owner-operators, and rental and leasing companies.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.3. Exemptions.

(a) This TRU Regulation does not apply to military tactical support equipment.

(b) Non-operational TRUs or TRU gen sets are exempt, except that the prohibitions in section 2477.18 apply with respect to selling, renting, or leasing to a person that could be reasonably expected to operate the TRU in California.

(c) Transport refrigeration systems that are not driven by an integral diesel internal combustion engine are exempt from the requirements of this subarticle, except for units used to comply with the ZE truck TRU requirements in section 2477.5(b). Examples of exempt equipment include, but are not limited to:

(1) transport refrigeration systems that are driven by gasoline-fueled internal combustion engines;

(2) transport refrigeration systems that are driven by electric motors with no integral diesel engine providing power; or

(3) Pure cryogenic temperature control systems with no diesel engine driven refrigeration system integration.

(d) TRUs used during an emergency are exempt from the requirements of sections 2477.5(a), (b), (c), and (d) of this subarticle, provided the requirements of section 2477.5(l) are met. TRUs operating in California are not exempt from the TRU reporting requirements in section 2477.5(g).

(e) Noncompliant TRUs on refrigerated railcars that are not operated while traveling through California shall be exempted provided the Executive Officer has previously approved a written compliance plan submitted by the railway carrier, as follows:

(1) The written compliance plan shall clearly identify the monitoring, recordkeeping, and reporting procedures that the railway carrier will implement and utilize to ensure that noncompliant TRUs on refrigerated railcars will not operate while in California.

(2) The compliance plan shall establish monitoring, recordkeeping, and reporting procedural requirements that the Executive Officer finds are sufficient to identify non-compliant TRUs being moved on railways in California and to ensure that such TRUs will not operate at any time while they are present within California.

(A) The compliance plan shall include, without limitation: the procedure for tracking and recording routes and dates of travel within California of each noncompliant TRU, information identifying each noncompliant TRU (e.g. the railway carrier's reporting mark followed by the one-to-six-digit number which together uniquely identifies the railcar), a description of the automated monitoring and recordkeeping system for reporting the TRU "engine on" or "engine off" status, and the procedure for expeditiously reporting violations observed and/or discovered by the railway carrier.

(B) The compliance plan shall include a statement, signed by an authorized railroad representative, declaring that the railway carrier agrees to be bound by the compliance plan.

(3) Within 30 days of the submission of a complete compliance plan, the Executive Officer shall approve or disapprove the compliance plan based on the information submitted by a railway carrier as specified in sections 2477.3(e)(1) and (2) above, and based on good engineering judgment. If the compliance plan is disapproved, the Executive Officer shall inform the railway carrier of the reasons for the disapproval. The railway carrier may revise the compliance plan to address the basis for disapproval and resubmit the compliance plan for EO approval or disapproval.

(4) The railway carrier shall maintain records collected pursuant to the approved compliance plan for a period of at least three (3) years and make these records available to CARB upon request.

(f) Railway carriers are exempt from the owner or owner/operator requirements of section 2477.5 for any TRU or TRU gen set that is not owned by the railway carrier, provided:

(1) The TRU or TRU gen set is not leased by the railway carrier, in which case, section 2477.12 applies; or

(2) The railway carrier or its agent is only fueling, monitoring to assure proper operation, keeping in operation, arranging repairs at the request of the owner, or restarting the TRU or TRU gen set engine after an unscheduled shut-down or repair, and is not performing any of the other activities listed under the definition of "operate".

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.4. Definitions.

(a) For purposes of this TRU Regulation, the following definitions apply:

"Alternative Diesel Fuel" means any fuel used in diesel engines that is not commonly or commercially known, sold or represented as No. 1-D or No. 2-D, pursuant to the specification for Diesel Fuel Oils D975-81, and does not require engine or fuel system modifications for the engine to operate, although minor modifications (e.g., recalibration of the engine fuel control) may enhance performance. Examples of alternative diesel fuels include, but are not limited to, biodiesel, Fischer Tropsch fuels, and emulsions of water in diesel fuel. Natural gas is not an alternative diesel fuel. An emission control strategy using a fuel additive will be treated as an alternative diesel fuel based strategy unless:

(1) The additive is supplied to the vehicle or engine fuel by an on-board dosing mechanism, or

(2) The additive is directly mixed into the base fuel inside the fuel tank of the vehicle or engine, or

(3) The additive and base fuel are not mixed until vehicle or engine fueling commences, and no more additive plus base fuel combination is mixed than required for a single fueling of a single engine or vehicle.

"Alternative Fuel" means natural gas, propane, ethanol, methanol, or advanced technologies that do not rely on diesel fuel, except as a pilot ignition source at an average ratio of less than 1 part diesel fuel to 10 parts total fuel on an energy equivalent basis. Alternative fuels also mean any of these fuels used in combination with each other or in combination with other non-diesel fuels. Alternative-fueled engines shall not have the capability of idling or operating solely on diesel fuel at any time.

"Alternative-Fueled Engine" means an engine that is fueled with a fuel meeting the definition of alternative fuel.

"Applicable Facility" is any of the following facilities if one or more TRUs operate within the facility fence line or legal property boundary:

(1) A Refrigerated Warehouse or Distribution Center, with a building size greater than or equal to 20,000 square feet; or

(2) A Grocery Store, with a building size greater than or equal to 15,000 square feet; or

(3) A Seaport Facility; or

(4) An Intermodal Railyard.

"Applicable Facility Operator" means any person who leases, operates, controls, or supervises an applicable facility. An applicable facility may have more than one applicable facility operator.

"Applicable Facility Owner" means the person legally holding title (or its equivalent) to an applicable facility. An applicable facility may have more than one applicable facility owner. An applicable facility owner who leases or rents the applicable facility to another party may delegate the responsibilities in this regulation to the applicable facility operator (e.g., the lessee). The applicable facility owner shall notify CARB and the applicable facility operator in writing of this delegation.

"Applicable Facility Owner/Operator" means a requirement applies to the owner and/or operator of an applicable facility, as determined by agreement or contract between the parties if the two are separate business entities.

"B100 Biodiesel Fuel" means 100% biodiesel fuel derived from vegetable oil or animal fat and complying with American Society for Testing Materials (ASTM) D 6751-02 and commonly or commercially known, sold, or represented as "neat" biodiesel or B100. B100 biodiesel fuel is an alternative diesel fuel.

"B100 Biodiesel-Fueled" (compression-ignition engine) means a compression-ignition engine that is fueled by B100 biodiesel fuel.

"Broker" means a person, other than a motor carrier or an employee or agent of a motor carrier, that as a principal or agent sells, offers for sale, negotiates for, or holds itself out by solicitation, advertisement, or otherwise as selling, providing, or arranging for, transportation by motor carrier for compensation.

"Business" means an entity organized for profit including, but not limited to, an individual, sole proprietorship, partnership, limited liability partnership, corporation, limited liability company, joint venture, association or cooperative; or solely for purposes of the Prompt Payment Act (Government Code 927 et seq.), a duly authorized nonprofit corporation.

"California" means the State of California and does not include Indian Country in California under Indian or federal jurisdiction.

"California-Based TRUs and TRU Gen Sets" means TRUs and TRU gen sets equipped on trucks, trailers, shipping containers, or railcars that a reasonable person would find to be regularly assigned to terminals within California.

"CARB" means the California Air Resources Board.

"CARB Diesel Fuel" means any diesel fuel that is commonly or commercially known, sold, or represented as diesel fuel No. 1-D or No. 2-D, pursuant to the specification for Diesel Fuel Oils D975-81 and meets the specifications defined in *13 CCR 2281, 13 CCR 2282, and 13 CCR 2284*.

"CARB Online System" means a CARB online system that TRU and applicable facility owners or owner/operators shall report information to for the purposes of this regulation. The CARB online system may be found at: https://arber.arb.ca.gov.

"Carbon Monoxide (CO)" means a colorless, odorless gas resulting from the incomplete combustion of hydrocarbon fuels.

"Carrier" means "motor carrier".

"Certification" means the obtaining of an Executive Order for a new off-road compression-ignition engine family that complies with the off-road compression-ignition emission standards and requirements specified in title 13 California Code of Regulations, section 2423. A "certified engine" is an engine that belongs to an engine family that has received a certification Executive Order.

"Certification Data" means the CARB Executive Order number and related exhaust emission data for each test cycle mode used to certify the engine family and obtain the certification level shown in the certification Executive Order. Such data includes modal exhaust emissions data for nitrogen oxides, nonmethane hydrocarbons, carbon monoxide, and particulate matter includes,

as a minimum, torque, engine speed, weighting factor, power, mass emission rate (grams per hour), and certification test fuel.

"Class I Railroad" is a railroad that is defined as Class I by the Surface Transportation Board.

"Compression Ignition (CI) Engine" means an internal combustion engine with operating characteristics significantly similar to the theoretical diesel combustion cycle. The regulation of power by controlling fuel supply in lieu of a throttle is indicative of a compression ignition engine.

"Consignee" (see receiver).

"Consignor" (see shipper).

"Cryogenic Temperature Control System" means a heating and cooling system that uses a cryogen, such as liquid carbon dioxide or liquid nitrogen that is routed through an evaporator coil that cools air blown over the coil. The cryogenic system uses a vapor motor to drive a fan and alternator, and a propane-fired heater superheats the carbon dioxide for heating and defrosting. Electrically driven fans may be used instead of a vapor motor and heating and defrost needs may be met by using electric heaters and/or vehicle engine coolant.

"Delegation" means entrusting by contract another party to act on the owner's behalf without forfeiture of any rights or property.

"Deterioration Factor (DF)" means a factor that is applied to the certification emission test data to represent emissions at the end of the useful life of the engine. Separate DFs apply to each measured pollutant, except that a combined NMHC+NOx DF applies to engines that do not use aftertreatment devices. Decreasing emissions over time would not be allowed to offset increasing emissions of the other pollutant in this combined DF.

"Diesel Fuel" means any fuel that is commonly or commercially known, sold, or represented as diesel fuel, including any mixture of primarily liquid hydrocarbons - organic compounds consisting exclusively of the elements carbon and hydrogen - that is sold or represented as suitable for use in an internal combustion, compression-ignition engine.

"Diesel-Fueled" means fueled by diesel fuel or CARB diesel fuel in whole or in part, except as allowed for a pilot ignition source under the definition for "alternative fuel".

"Diesel Oxidation Catalyst (DOC)" means the use of a catalyst to promote the oxidation processes in diesel exhaust. Usually refers to an emission control device that includes a flow-through substrate where the surfaces that contact

the exhaust flow have been catalyzed to reduce emissions of the organic fraction of diesel particulates, gas-phase hydrocarbons, and carbon monoxide.

"Diesel Particulate Filter (DPF)" means an emission control technology that reduces PM emissions by trapping the particles in a flow filter substrate. Periodically the collected particles are either physically removed or oxidized (burned off) in a process called regeneration.

"Diesel Particulate Matter" means the particles found in the exhaust of diesel-fueled CI engines. Diesel PM may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

"Dispatch" means to coordinate delivery, pickup, and drop-off schedules of vehicles; and monitor the delivery of freight from these vehicles.

"Dispatched driver" means the driver of a truck or tractor-trailer combination that has been dispatched by a motor carrier, freight broker or forwarder, shipper, or receiver.

"Driver" means a person who physically operates a truck or tractor. Drivers may also be an owner or an operator. Drivers are not railroad engineers.

"Dual-Fuel Engine" means an engine designed to operate on a combination of alternative fuel, such as compressed natural gas (CNG) or liquefied petroleum gas (LPG), and conventional fuel, such as diesel or gasoline. These engines have two separate fuel systems, which either inject both fuels simultaneously into the engine combustion chamber or fumigate the gaseous fuel with the intake air and inject the liquid fuel into the combustion chamber.

"Effective model year" or "effective engine model year" is an alternative model-year designation (see definition of "model year") for a new replacement engine, rebuilt replacement engine, or flexibility engine when the engine does not meet, at the time of manufacture, the most stringent emission tier standard for a new engine in effect for the horsepower rating of the engine. When an engine is manufactured to meet a less stringent prior-tier emissions standard than is currently in effect, the effective model year is the last year that the prior-tier emission standard was in effect. Table 1 lists the tier standards that apply to TRUs and TRU gen sets and the corresponding effective model years.

Table 1: Effective Model Year

Prior-Tier Engine Emissions Standard	Tier Standard Effective Years	Effective Model Year
Tier 1, 25-50 Hp (trailer)	1999-2003	2003
Tier 1, under 25 Hp (truck)	2000-2004	2004
Tier 2, 25-50 Hp (trailer)	2004-2007	2007
Tier 2, under 25 Hp (truck)	2005-2007	2007

Tier 4i, 25-50 hp (trailer)	2008-2012	2012[1]

"Electric-Standby-Equipped TRU" means a TRU that is equipped with an integral diesel-fueled internal combustion engine and electric-powered motor and the refrigeration system may be driven by either the diesel-fueled internal combustion engine or the integral electric motor.

"Electronic Tracking System" means a system that meets the following criteria:

(1) The tracking device shall acquire, at a minimum, date, time, TRU engine hour meter reading, and location data at a rate of at least one reading per minute, with no more than 10 minutes data gap.

(2) The tracking device shall be capable of determining if the TRU or TRU gen set location is within California and determining the TRU engine run time in California for each day.

(3) The tracking records shall be collected by an independent entity with no business relationship to the owner or operator of the TRU or TRU gen set being tracked, other than to provide the tracking service. The data shall be stored on a server that is secure from tampering and inaccessible to the TRU or TRU gen set owner or operator, other than to download reports over the Internet. An inspector shall have free access to download reports from this website over the Internet that show the TRU or TRU gen set engine operation in California for each day.

"Emergency" means any of the following times:

(1) A failure or loss of normal power service that is not part of an "interruptible service contract."

(2) A failure of a facility's internal power distribution system, provided the failure is beyond the reasonable control of the operator.

(3) When an affected facility is placed under an involuntary "rotating outage."

(4) When the President of the United States or the Governor of the State of California declares a state of emergency related to any type of disaster where TRU-equipped trucks or trailers provide foodservice to incident responders, including but not limited to, forest fires and earthquakes.

[1] Effective model year applies for this tier only after Tier 4f becomes effective in 2013 for 25 to less than 50 hp engines.

(5) When the National Interagency Fire Center dispatches mobile catering service businesses with TRU-equipped trucks or trailers to provide foodservice to incident responders located in California.

(6) When the Executive Officer has determined that an emergency event arising from sudden and reasonably unforeseen natural disaster such as earthquake, flood, fire, or other unforeseen events that threaten public health and safety has occurred that requires the immediate temporary operation TRUs or TRU gen sets.

"Emissions Control Group" has the same meaning as defined in title 13 CCR, section 2701

"Emission Control Strategy" means any device, system, or strategy employed with a diesel-fueled CI engine that is intended to reduce emissions. Examples of emission control strategies include, but are not limited to, particulate filters, diesel oxidation catalysts, selective catalytic reduction systems, alternative fuels, fuel additives used in combination with particulate filters, alternative diesel fuels, and combinations of the above.

"Emissions Rate" means the weight of a pollutant emitted per unit of time (e.g., grams per second).

"Executive Officer" means the Executive Officer of the California Air Resources Board or his or her delegate.

"Fischer-Tropsch Diesel Fuel" See "ultra-low-aromatic synthetic diesel fuel".

"Fleet" means one or more TRUs or TRU gen sets, owned by a person, business, military installation, or government agency operating in California and subject to this regulation. A fleet does not include TRUs that do not operate in California.

"Freight Broker" means "broker", as defined herein.

"Freight Forwarder" means a person holding itself out to the general public (other than as a pipeline, rail, motor, or water carrier) to provide transportation of property for compensation and in the ordinary course of its business does the following:

(1) Assembles and consolidates, or provides for assembling and consolidating, shipments and performs or provides for break-bulk and distribution operations of the shipments;

(2) Assumes responsibility for the transportation from the place of receipt to the place of destination; and

(3) Uses for any part of the transportation a motor carrier or rail carrier.

“Fuel Additive” means any substance designed to be added to fuel or fuel systems or other engine-related engine systems such that it is present in-cylinder during combustion and has any of the following effects: decreased emissions, improved fuel economy, increased performance of the engine; or assists diesel emission control strategies in decreasing emissions, or improving fuel economy or increasing performance of the engine.

“Generator Set (gen set)” means a CI engine coupled to a generator used as a source of electricity.

“Global Warming Potential (GWP)” means the 100-year GWP value first published by the Intergovernmental Panel on Climate Change (IPCC) in its Fourth Assessment Working Group 1 Report (AR4) (IPCC, 2007); and if not contained in AR4, then the GWP Value means the 100-year GWP value published by the IPCC in its Fifth Assessment Working Group 1 Report (AR5) (IPCC 2013).

"Grocery Store” means a retail facility that sells food products. This includes, but is not limited to establishments commonly known as supermarkets, food stores, grocery stores, food warehouses, and any other food merchandising stores.

“Highway” has the same meaning as defined in California Vehicle Code section 360.

"Hybrid Cryogenic Temperature Control System” means a temperature control system that uses a cryogenic temperature control system in conjunction with a conventional TRU.

“Hybrid electric TRU” means a TRU that is powered by an integral diesel-fueled internal combustion engine coupled to an electric generator that provides electric power to an electric motor-driven refrigeration system and fans within the same housing and is designed to control the environment of temperature sensitive products that are transported in trucks and refrigerated trailers. Hybrid electric TRUs may be capable of both cooling and heating.

“Intermodal Facility” means a facility involved in the movement of goods in one and the same loading unit or vehicle which uses successively several modes of transport without handling of the goods themselves in changing modes. Such a facility is typically involved in loading and unloading refrigerated shipping containers and trailers to and from railcars, trucks, and ocean-going ships.

“Intermodal Railyard” means an intermodal facility owned or operated by a Class I Railroad.

"Interruptible Service Contract" means any arrangement in which a nonresidential electrical customer agrees to reduce or consider reducing its electrical consumption during periods of peak demand or at the request of the System Operator in exchange for compensation, or assurances not to be blacked out or other similar non-monetary assurances.

"In-Use TRU, TRU gen set, or engine" means a TRU, TRU gen set, or engine that is not a "new" TRU, TRU gen set, or engine.

"Manufacturer" means a business as defined in Government Code § 14837(c).

"Military Installation" has the same meaning as defined in title 10 United States Code § 2801(c)(4).

"Military tactical support equipment (TSE)" means equipment or vehicles that meet military specifications, are owned or operated by the U.S. Department of Defense and/or the U.S. military services, and are used in combat, combat support, combat service support, tactical or relief operations, or training for such operations.

"Model Year (MY)" means the following:

(1) The designation used for engines manufactured to meet the emissions tier standard in effect for new engines at time of manufacture (see alternative designation, "effective model year, defined above); and

(2) The diesel-fueled engine manufacturer's annual production period, which includes January 1st of a calendar year, or if the manufacturer has no annual production period, the calendar year.

"Motor Carrier" means a person providing motor vehicle transportation for compensation.

"New TRU, TRU Gen Set, or Engine" means any TRU, TRU gen set, or engine that has never been subject to a retail sale or lease to an "ultimate purchaser."

"Nitrogen Oxide (NOx)" means compounds of nitric oxide (NO), nitrogen dioxide (NO_2), and other oxides of nitrogen. Nitrogen oxides are typically created during combustion processes and are major contributors to smog formation and acid deposition.

"Non-California-Based TRUs and TRU Gen Sets" means TRUs and TRU gen sets that are equipped on or used in trucks, trailers, shipping containers, or railcars that a reasonable person would find to be regularly assigned to terminals outside of California and operate in California from time to time for the purpose of transporting perishable goods into or out of the state.

"Non-methane Hydrocarbons (NMHC)" means the sum of all hydrocarbon air pollutants except methane. NMHCs are precursors to ozone formation.

"Non-operational" means one of the following:

(1) Any TRU that is removed or separated from the truck, trailer, shipping container, or railcar on which it was originally mounted. This does not include TRU gen sets that are not attached to a shipping container or trailer chassis.

(2) Any trailer TRU housing that remains attached to a trailer, but the fuel tank and battery have been removed and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and may be seen from 50 feet during daylight hours when the vehicle is stationary.

(3) Any truck TRU housing that remains attached to a truck, but the positive and negative battery cables, fuel supply and return lines, and condensate drain line have been removed so that there are no visible ancillary connections to the TRU housing and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and may be seen from 50 feet during daylight hours when the vehicle is stationary.

(4) Any TRU that has no engine or fuel injection system installed, making the engine incapable of being started and a label with the word "NONOPERATIONAL" has been affixed or attached to the housing in letters that contrast sharply with the color of the TRU housing and may be seen from 50 feet during daylight hours when the vehicle is stationary.

(5) TRU gen sets that have been quarantined in a designated area that is separated from compliant TRU gen sets by a cordon or barrier with signs that read "NONCOMPLIANT – DO NOT OPERATE IN CALIFORNIA". Bright red tags shall be affixed to the TRU gen set control panel at all times while in California that read: "NONCOMPLIANT – DO NOT OPERATE IN CALIFORNIA". TRU gen sets may be stored in a shipping container in lieu of being quarantined in a cordoned area.

"Nonretail Delivery or Pick-up Point" means wholesale perishable goods distribution facilities or businesses in the supply chain prior to retail facilities or businesses. This includes, but is not limited to, food manufacturing facilities, shipper warehouses, transfer points, distribution centers, cold storage warehouses, and intermodal facilities where perishable goods are loaded or unloaded.

"Operate" means to start, cause to function, program the temperature controller, select an operating program or otherwise control, fuel, monitor to

assure proper operation, or keep in operation. A TRU that is operational (e.g., capable of being operated) shall be considered to operate if it is in California.

"Operator" means any person, party or entity that operates a TRU or TRU gen set for the purposes of transporting perishable goods, excluding an employee driver and third party maintenance and repair service, and including but not limited to a manufacturer, producer, supplier, carrier, shipper, consignor, consignee, receiver, distribution center, or warehouse of perishable goods. An operator may also be the driver if it is also the owner (e.g., independent owner-operator).

"Original equipment manufacturer (OEM)" means any person that originally manufactured new equipment for sale in commerce. This does not include a dealer who receives new equipment for sale in commerce.

"Owner" means, except as modified by paragraphs (1), (2) or (3) below, the person legally holding title (or its equivalent) to the TRU or TRU gen set, or either the person registered as the owner or lessee of a vehicle by the California Department of Motor Vehicles or its equivalent in another state, province, or country, as evidenced on the vehicle registration document carried in the vehicle to which the TRU is attached. An owner may also be a driver or operator.

(1) Banks, other financial lending institutions, or other entities engaged in the act of financing TRUs are not owners, for the purposes of this subarticle unless they otherwise have an obligation to comply with this regulation (e.g., contractually responsible for the maintenance of a TRU under a sales or lease agreement).

(2) For a TRU-equipped truck or trailer, or TRU gen set owned by the federal government and not registered in any state or local jurisdiction, the owner means the department, agency, branch, or other entity of the United States, including the United States Postal Service, to which the vehicles in the fleet are assigned or which have responsibility for maintenance of the vehicles.

(3) For a TRU-equipped truck or trailer, or TRU gen set that is rented or leased:

(A) The owner shall be presumed to be the rental or leasing entity for purposes of compliance with section 2477.5, if:

1. The rental or lease agreement is for a period of less than one year; or

2. The rental or lease agreement is for a period of one year or longer, unless the terms of the rental or lease agreement or other equally reliable evidence identifies the party responsible for compliance with State laws that apply to TRUs to be the renting operator or lessee.

"Owner/Operator" means a requirement applies to the owner and/or operator of a TRU or TRU gen set, as determined by agreement or contract between the parties if the two are separate business entities.

"Particulate Matter (PM)" means the particles found in the exhaust of CI engines, which may agglomerate and adsorb other species to form structures of complex physical and chemical properties.

"Person" means an individual, corporation, business trust, estate, trust, partnership, limited liability company, association, joint venture, government, governmental subdivision, agency, or instrumentality, public corporation, or any other legal or commercial entity.

"Prior-Tier Replacement Engine" means a new replacement engine manufactured under title 40 CFR, section 89.1003 and 1068.240, and title 13 CCR, section 2423(j), as those sections existed on August 31, 2012, that meets a prior tier of the new engine emissions standards than the tier of standards currently in effect at the time of manufacture.

"Rail Carrier" means a person providing common carrier railroad transportation for compensation, but does not include street, suburban, or interurban electric railways not operated as part of the general system of rail transportation.

"Railcar TRU" means a TRU designed to control the environment of temperature sensitive products in a railcar.

"Rated Brake Horsepower" means the power delivered, according to the statement of the engine manufacturer, at the rated speed.

"Receiver" means the person that receives shipped goods, cargo, or commodities.

"Refrigerated Trailer" means a trailer van, railcar, or shipping container equipped with a TRU or TRU gen set. Pursuant to Health and Safety Code section 39618, refrigerated trailers are mobile sources and shall be regulated by CARB on a statewide basis.

"Refrigerated Warehouse or Distribution Center (WHDC)" means a facility with cold storage used for the reception and storage of products. This includes but is not limited to cold storage warehouses, packing houses, cross-dock facilities, and 3rd Party Logistic centers.

“Retail Delivery Point” means facilities or businesses where perishable goods are delivered to retail businesses that sell these goods to end users. This includes, but is not limited to, grocery stores, convenience stores, drug stores, restaurants, and prison or school cafeterias.

“Rotating Outage” means a controlled involuntary curtailment of electrical power service to consumers as ordered by the system operator.

“Seaport Facility” means any non-military independent marine terminal or operational seaport where the seaport functions as a marine terminal operator.

“Semitrailer” means a “Semitrailer” as defined in section 550 of the California Vehicle Code.

“Shipper” means the person, party, or entity who usually owns or supplies the commodities transported by a carrier, or that has possession of freight prior to its transportation. This may include, but is not limited to, food manufacturers, processers, packing plants, temporary cold storage facilities, and distribution centers.

“Statement of Accuracy” means the person responsible for submitting information under the TRU Regulation submits and signs the following statement along with the information provided: “I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete.”

"Square Footage" means for properties owned and operated by one business entity, the total square footage of all buildings on that property, as calculated from the building floor plan(s) or blueprint(s) archived by the local permitting agency or records office. For businesses leasing all or part of a building, the square footage shall be the usable area, as specified in the lease agreement.

“System Operator” means one of the several organizations that control energy in California. System operators include, but are not limited to, the California Independent System Operator, the Los Angeles Department of Water and Power, the Imperial Irrigation District, the Sacramento Municipal Utility District.

“Terminal” means any place where a TRU or TRU gen set equipped truck, trailer, shipping container, railcar or TRU gen set is regularly garaged, maintained, operated, or dispatched from, including a dispatch office, cross-dock facility, maintenance shop, business, or private residence.

“Third Party Agreement Confirmation Information” means the information used to notify CARB that responsibility for reporting a TRU or TRU gen set to CARB has been delegated to the lessee or to a consultant.

"Tier 4 Nonroad/Off-road Emission Standards" means the emission standards and associated procedures promulgated by U.S. Environmental Protection Agency in "Control of Emissions of Air Pollution from Nonroad Diesel Engines and Fuel; Final Rule" (Vol. 69, No. 124 Fed. Reg. pp. 38957-39273 (June 29, 2004).

"Trailer" means a semitrailer.

"Trailer TRU" means a TRU that is mounted on or in a trailer or domestic shipping container (DSC) that can be attached and detached to a tractor, commonly referenced together as a "tractor-trailer."

"Transport Refrigeration Unit (TRU)" means refrigeration systems powered by integral internal combustion engines designed to control the environment of temperature sensitive products that are transported in trucks and refrigerated trailers. TRUs may be capable of both cooling and heating.

"Truck TRU" means a TRU that is mounted on or in a truck cargo box that is permanently attached to a truck, in contrast to a detachable trailer.

"TRU Generator Set (TRU gen set)" means a generator set that is designed and used to provide electric power to electrically driven refrigeration units of any kind. This includes, but is not limited to gen sets that provide electricity to electrically powered refrigeration systems for semi-trailer vans and shipping containers.

"Ultimate Purchaser" means with respect to a new TRU, TRU gen set, or engine, the first person who in good faith purchases a new TRU, TRU gen set, or engine for purposes other than resale.

"Ultra-Low-Aromatic Synthetic Diesel Fuel" means fuel produced from natural gas, coal, or biomass by the Fischer-Tropsch gas-to-liquid chemical conversion process, or similar process that meets the following properties:

Table 2

Property	*ASTM*	*Value*
Sulfur Content (ppmw)	D5453-93	<1
Total Aromatic Content (wt %)	D5186-96	<1.5%
Polynuclear Aromatic Content (wt %)	D5186-96	<0.5%
Natural Cetane Number	D613-84	>74

"Ultra-Low Emission TRU (ULETRU or U)" means a TRU or TRU gen set that meets the performance standards described under subparagraphs 2477.5(c)(1) and 2477.5(c)(2) or that uses an "alternative technology" in accordance with subparagraph 2477.5(c)(3).

"Vehicle Owner" means the person registered as the owner or lessee of a vehicle by the California Department of Motor Vehicles or its equivalent in another state, province, or as evidenced on the vehicle registration document carried in the vehicle to which the TRU is attached. For example, the owner of the truck or tractor pulling a TRU equipped trailer or container.

"Verification Classification Level" means the classification assigned to a Diesel Emission Control Strategy by the Executive Officer as defined in the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emission from Diesel Engines (13 CCR Sections 2700-2710)*. PM reductions correspond as follows: Level 1: ≥25%; Level 2: ≥50%; Level 3: ≥85% or 0.01 g/hp-hr.

"Verified Diesel Emission Control Strategy" (VDECS) means an emission control strategy designed primarily for the reduction of diesel particulate matter emissions that has been verified per the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (13 CCR Sections 2700-2710)*. Examples of diesel retrofit systems that may be verified include, but are not limited to, diesel particulate filters, diesel oxidation catalysts, fuel additives (e.g., fuel-borne catalysts), alternative fuels (e.g., dual fuel), alternative diesel fuels, and combinations of the above.

"Zero-Emission Fueling Infrastructure" means a fueling system that provides the appropriate fuel type to power a ZE truck TRU (e.g., electric charging infrastructure or cryogenic fueling tank and dispenser).

"Zero-Emission Truck TRU" (ZE truck TRU) means a truck refrigeration system whose operation results in zero exhaust emissions of any criteria pollutant (or precursor pollutant) or GHG under any possible operational modes or conditions. The ZE truck TRU may draw power from the truck or stored energy source that is recharged by the truck only if the truck produces zero exhaust emissions while operating. The stored energy source may not be recharged by a CI engine coupled to a generator as a source of electricity. Weight of the stored energy source does not alone qualify as "a decrease in fuel efficiency." For example, a ZE truck TRU on a diesel-powered truck may draw power from a battery that in turn is charged by a solar cell so long as the ZE truck TRU does not also draw power from the truck's internal combustion engine.

(b) The terms "lease," "leased," "lessor," and "lessee" mean the same as "rental agreement," "rented," "owner of rented vehicle," and "renter," respectively.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013 and 43018, 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2,

42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43109.1, Health and Safety Code.

§ 2477.5. Requirements for Owners or Owner/Operators.

(a) Refrigerant Requirements. The term TRU as used in this subsection (a) refers only to truck TRUs, ZE truck TRUs, trailer TRUs, and DSC TRUs. Railcar TRUs and TRU gen sets are exempt from the requirements of this subsection (a).

(1) Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a TRU with a manufacture date after December 31, 2022, unless the TRU uses a refrigerant with a GWP value less than or equal to 2,200, or uses no refrigerant at all.

(2) Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a TRU with a manufacture date after December 31, 2022, with an unreadable or inadequately maintained TRU OEM supplied refrigerant label.

(b) Zero-Emission Truck TRU Requirements. The term TRU as used in this subsection (b) refers only to truck TRUs. Trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets are exempt from the requirements of this subsection (b).

(1) Beginning December 31, 2023, no owner or owner/operator shall operate or cause to be operated in California, any truck TRU in the owner's truck TRU fleet, unless the fleet meets or exceeds the required ZE truck TRU fleet percentages specified in Table 3.

TRU owners shall replace their diesel-powered truck TRUs with ZE truck TRUs in accordance with the fleet percentages and phase-in compliance schedule specified in Table 3. The required number of ZE truck TRUs is based on the truck TRU fleet size reported to CARB on December 31, 2023 or December 31 of each year, whichever reported truck TRU fleet size is greater. A TRU owner may downsize their truck TRU fleet size only if the TRU owner has not purchased additional direct-drive refrigeration units, in which the compressor is powered from the truck's diesel engine, to replace the original diesel-powered units being sold or retired. The required number of ZE truck TRUs for a given year shall be calculated using the following formula:

"Minimum Number of ZE Truck TRUs = Required ZE Truck TRU Fleet % × Total Truck TRU Fleet"; Where:

Minimum Number of ZE Truck TRUs is the required minimum number of ZE truck TRUs in an owner's fleet as of the specified Compliance Date in Table 3.

Required ZE Truck TRU Fleet percentage (%) is listed in the second column of Table 3.

Total Truck TRU Fleet is the maximum of the December 31, 2023 Fleet Size or the Total Current Fleet Size; Where:

Number of Truck TRUs is the sum of all diesel-fueled truck TRUs plus all ZE truck TRUs in the owner's truck TRU fleet.

December 31, 2023 Fleet Size is the number of truck TRUs reported to CARB as of December 31, 2023.

Total Current Fleet Size is the Number of Truck TRUs in the owner's truck TRU fleet as of the applicable Compliance Date in Table 3.

Table 3: Phase-in Compliance Schedule for ZE Truck TRU Fleets

Compliance Date as of December 31	Required ZE Truck TRU Fleet Percentage
2023	15%
2024	30%
2025	45%
2026	60%
2027	75%
2028	90%
2029 and thereafter	100%

(2) Downsizing a fleet. A TRU owner may have a smaller "Total Truck TRU Fleet" than otherwise required for a given Compliance Date if, between January 1 and December 31, inclusive, of the prior Compliance year, the TRU owner has not purchased any additional direct-drive refrigeration units in which the compressor is powered from the truck's diesel engine, to replace the original diesel-powered units being sold or retired.

(A) Prior to the Compliance Date, the TRU owner shall report to CARB their intent to downsize their fleet, the proposed Number of Truck TRUs in the fleet, any TRUs acquired or sold in the prior Compliance Year, and all information required by section 2477.20(f).

(B) The downsized Number of Truck TRUs shall replace the Total Truck TRU Fleet number going forward.

(3) If the calculated 'number of ZE Truck TRUs' is not equal to a whole number, the owner shall round up to a whole number when the fractional part of the required number of ZE truck TRUs is equal to or greater than 0.5, and round down if less than 0.5. For example:

(A) A fleet consisting of one truck TRU that operates in California shall contain one ZE truck TRU by December 31, 2026.

(B) A fleet consisting of two truck TRUs that operate in California shall contain one ZE truck TRU by December 31, 2024 and two ZE truck TRUs by December 31, 2027.

(c) In-Use Performance Standards for MY 2022 and Older TRU and TRU Gen Set Engines. The term TRU as used in this subsection (c) refers only to trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets. Truck TRUs are exempt from the requirements of this subsection (c). In accordance with the schedule set forth below in paragraph (c)(4), no owner or owner/operator shall operate or cause to be operated in California, a MY 2022 and older TRU or TRU gen set engine, unless it meets one of the in-use emission category performance standards set forth in (1) to (3) below.

(1) Use a certified engine that meets the Ultra-Low Emission TRU (ULETRU or U) in-use PM performance standard of 0.02 g/hp-hr[4] or less. The engine shall meet the applicable nonroad/off-road emissions standards for all regulated pollutants and the in-use PM performance standard. Only engines for which certification data and deterioration factors have been provided to CARB shall be considered when determining compliance. The Executive Officer shall consider such submittals, publish, and make available a list of qualifying engines.

(2) Equipping the engine with a Level 3 VDECS.

(3) As an alternative to meeting the ULETRU in-use performance standard in section 2477.5(c)(1) or (2), an owner/operator may operate a MY 2022 and older TRU or TRU gen set in California meeting one of the *Alternative Technology* options listed below. Alternative Technologies qualify to meet the ULETRU in-use performance standard only if the TRU or TRU gen set is operated under the conditions included in the description listed below.

[4] The Engine Certification value for the Ultra-Low Emission TRU category corresponds to the Tier 4 "final" Nonroad/Off-road Emission Standards for greater than 25 horsepower engines.

(A) Hybrid Electric TRU or electric standby-equipped TRU shall qualify as an Alternative Technology, provided all of the following conditions are met:

1. The TRU shall not operate under diesel engine power while at a nonretail facility, except during:

    a. An emergency;

    b. Normal ingress, egress, and yard maneuvering, limited to 5 minutes per movement inside the facility fence line or property boundary; or

    c. Unit/engine pre-trip inspections, troubleshooting diagnostics, and post-repair check-out (however, this exception does not apply to the initial van chill-down before loading);

2. The facility or facilities that a TRU is normally based or frequents to load or unload perishable goods shall be equipped with electric power plugs located in the parking areas and loading spaces and the TRU shall be plugged into these power plugs during initial chill-down and whenever the refrigerated van or container contains perishable products;

3. All nonretail delivery and pick-up points that the E/S-equipped TRU frequents to load or unload goods shall be equipped with electric power plugs if the van load includes perishable goods. Electric power plugs shall be located in the parking areas and loading spaces and the TRU shall be plugged into these power plugs during initial chill-down and whenever the refrigerated van or container contain perishable goods and may need to operate;

4. The TRU engine run time at retail delivery points shall not exceed 30 minutes, otherwise electric power plugs are also required at those retail delivery points and shall be used to prevent engine operations that exceed 30 minutes at the delivery point;

5. The TRU shall be equipped with non-resettable engine hour meters and electric power use hour meters;

6. 100 percent of an owner's hybrid electric or electric standby-equipped TRUs shall be equipped with electronic tracking systems by December 31, 2013; and

7. The TRU shall be reported to CARB in accordance with section 2477.5(g).

(B) Hybrid cryogenic temperature control systems shall qualify as an Alternative Technology, provided all of the following conditions are met:

1. The TRU does not operate under diesel engine power while at a nonretail facility, except during:

a. An emergency;

b. Normal ingress and egress yard maneuvering; or

c. Unit/engine pre-trip inspections, diagnostics, and repair operations;

2. The TRU engine run time at retail delivery points shall not exceed 30 minutes, otherwise purely cryogenic temperature control shall be used at those retail delivery points to prevent engine operations that exceed 30 minutes at the delivery point;

3. The TRU shall be equipped with non-resettable engine hour meter and cryogenic system use hour meter;

4. The TRU shall be equipped with an electronic tracking system; and

5. The TRU shall be reported to CARB in accordance with section 2477.5(g).

(C) Alternative-fueled engines. If the engine is a CI engine, a VDECS is required.

Note: If the engine is not a compression ignition diesel fueled engine, this regulation would not apply, but the engine may have to meet other emission standards (e.g., large spark-ignited engine standards if >25 hp).

(D) Fuel exclusively with an alternative diesel fuel that has been verified as a VDECS, provided it is used in accordance with the requirements of section 2477.5(j)(1) and the alternative diesel fuel contains no conventional diesel or CARB diesel fuel, except in trace amounts.

(E) Power by fuel cells. If a reformer is used with diesel fuel as the source of hydrocarbons, then emissions shall be evaluated and verified through the *Verification Procedure Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines (13CCR section 2700 - 2710)*.

(F) Equip with any other system approved by the Executive Officer to not emit diesel PM or increase public health risk while at a facility.

(4) In-Use Compliance Dates for MY 2022 and Older TRU and TRU Gen Set Engines. In-use compliance dates are based upon the engine model year. Compliance dates may also be extended if the requirements of subparagraphs 2477.5(m) or (n) are met.

(A) Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a MY 2022 and older TRU or TRU gen set engine, unless it meets the in-use performance criteria set forth in section 2477.5(c) for ULETRU on or before December 31st of the seventh year past the engine's model year. For example:

1. No owner or owner/operator shall operate or cause to be operated in California, a MY 2020 TRU or TRU gen set engine, unless it meets ULETRU on or before December 31, 2027.

(B) The manufacture year of the TRU unit may be used instead of the TRU engine model year to determine the TRU ATCM in-use performance standards that must be met and the related compliance dates; however, this exception only applies if the unit manufacture year shown on the TRU unit label is no more than one year later than the engine model year shown on the TRU engine emissions label. If the difference between the engine model year on the engine emissions label and the unit manufacture year is greater than one year, then the engine model year shall be used in accordance with subsection 2477.5(c)(4)(A).

1. If the owner complies with the TRU ATCM in-use performance standard by retrofitting with a VDECS, the engine model year shown on the engine emissions label shall be used to determine engine compatibility with the VDECS, in accordance with the Executive Order for that VDECS.

2. If the owner of a TRU is required to report the TRU to CARB, in accordance with section 2477.5(g), the engine model year that is shown on the engine emissions label shall be provided as the engine model year.

(d) PM Emission Standard for MY 2023 and Newer TRU and TRU Gen Set Engines. The term TRU as used in this subsection (d) refers only to trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets. Truck TRUs are exempt from the requirements of this subsection (d). Beginning December 31, 2022, no owner or owner/operator shall operate or cause to be operated in California, a MY 2023 and newer TRU or TRU gen set engine, unless it meets a PM emission standard of 0.02 g/hp-hr or lower.

(1) For TRU and TRU gen set engines with rated brake horsepower <25 hp, compliance with the PM emission standard shall be achieved by using a certified engine meeting the PM emission standard. Only engines for which certification data and deterioration factors have been provided to CARB shall be considered when determining compliance. The Executive Officer shall consider such submittals, publish, and make available a list of qualifying engines.

(2) For TRU and TRU gen set engines with rated brake horsepower ≥25 hp, compliance with the PM emission standard shall be achieved by using a certified engine meeting the applicable nonroad/off-road emissions standards for all regulated pollutants and the PM emission standard. Only engines for which certification data and deterioration factors have been provided to CARB shall be considered when determining compliance. The Executive Officer shall consider such submittals, publish, and make available a list of qualifying engines.

(e) VDECS Requirements.

(1) VDECS Installation. Before installing a VDECS on a TRU or TRU gen set, the owner or owner/operator shall ensure that:

(A) The VDECS is verified for use on the TRU or TRU gen set engine, as described in the Executive Order for the VDECS.

(B) Use of the TRU or TRU gen set is consistent with the conditions of the Executive Order for the VDECS.

(C) The VDECS is installed in a verified configuration.

(D) The engine to be retrofitted shall be in its original certified configuration, free of excess oil consumption, shall not have malfunctioning fuel delivery systems, or any other mechanical condition that may impair the proper functioning of the VDECS.

(E) The VDECS label is visible after installation.

(2) VDECS Maintenance. If an owner or owner/operator installs a VDECS to meet the requirements of section 2477.5(c), the VDECS shall remain installed until the VDECS fails, is damaged, or is replaced with a similar or higher level VDECS. The owner or owner/operator shall ensure that the VDECS and TRU or TRU gen set engine are properly maintained as recommended by the respective manufacturers.

(3) Failure or Damage of a VDECS. In the event of a failure or damage of a VDECS, the following conditions shall apply:

(A) If a VDECS fails within its warranty period, the owner/operator of the TRU or TRU gen set must replace it with the same VDECS or a higher verification classification level, if available.

(B) If a VDECS fails outside its warranty period and a higher verification classification level VDECS is available, then the owner/operator of the TRU or TRU gen set shall upgrade to the highest level VDECS required under paragraphs 2477.5(c) that is determined to be cost-effective by the Executive Officer.

(f) In-Use Recordkeeping and Reporting. In-use recordkeeping and reporting shall be completed by the owner or operator in accordance with the following:

(1) An owner that has elected to comply by using a verified alternative diesel fuel in accordance with section 2477.5(c)(3)(D), shall comply with the recordkeeping requirements in section 2477.5(j)(1).

(2) An owner that has elected to comply by using a hybrid electric TRU or electric standby-equipped TRU in accordance with section 2477.5(c)(3)(A) or a hybrid cryogenic temperature control system in accordance with section 2477.5(c)(3)(B), shall use an electronic tracking system that meets the recordkeeping requirements of section 2477.20(d).

(g) TRU Reporting Requirements. The term TRU as used in this subsection (g) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) On or before January 31, 2009, owners or owner/operators shall report all California-based TRUs operated by the owner or owner/operator to CARB by providing the information listed in section 2477.20(f) for each TRU.

(2) On or before December 31, 2023, owners or owner/operators shall report all non-California-based TRUs operated in California by the owner or owner/operator to CARB by providing the information listed in section 2477.20(f) for each TRU.

(3) California-based TRUs added to an owner's or owner/operator's operations after January 31, 2009 and non-California based TRUs added to an owner's or owner/operator's operations after December 31, 2023 shall be brought into compliance with section 2477.5(g)(1) and (2) within 30 days of the unit entering the owner or owner/operator's control or beginning operations in California. The owner or owner/operator shall request:

(A) A CARB IDN for a new TRU that was not previously numbered, or

(B) A change in owner or owner/operator for a TRU that already has a CARB IDN number.

(4) If reported information for any TRU changes, then the owner or owner/operator shall update the information within 30 days of those changes.

(5) On or before February 1, 2009, the Executive Officer shall begin issuing identification numbers for each TRU reported to CARB. The number shall include a 2-digit prefix for model year (e.g., 2001 model year would have a prefix 01); a 6-digit serial number and a check digit.

(6) Within 30 days of receipt of the CARB IDN, the owner or owner/operator shall permanently affix or paint the CARB IDN on the TRU chassis housing in clear view according to the specifications in section 2477.20(e). Beginning December 31, 2023, the requirements of this subsection 2477.5(g)(6) shall be superseded by the TRU compliance label requirements in section 2477.5(i).

(h) TRU Operating Fees. The term TRU as used in this subsection (h) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of TRUs that operate in California to recover the costs to the Executive Officer administering the TRU ATCM as specified under section 2477.21(a).

(i) TRU Compliance Labels. The term TRU as used in this subsection (i) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) Beginning December 31, 2023, the TRU compliance label requirements in this subsection (i) shall supersede the IDN labeling requirements in section 2477.5(g)(6).

(2) Beginning December 31, 2023, upon verifying the information reported under section 2477.5(g) and all TRU operating fees have been received in accordance with section 2477.5(h), the Executive Officer shall issue two compliance labels for each TRU.

(3) Within 30 days of receipt of the CARB compliance labels, owners or owner/operators shall affix the labels in clear view, correct side up, un-obstructed; and kept and maintained in a manner that retains legibility. The location of the label shall be as follows:

(A) Truck and trailer TRUs - both sides of TRU chassis housing.

(B) Rail car and shipping container TRUs - both sides of the TRU.

(C) TRU gen sets - both sides of gen set housing.

(4) TRU compliance labels shall be valid for three (3) years from date of issuance.

(5) TRUs with pending enforcement actions shall not be issued a new compliance label until they are settled.

(6) Owners or owner/operators may use alternative unique equipment identification markings instead of affixing the CARB compliance label, provided the requirements of section 2477.20(e)(6) are met.

(j) Fuel Requirements.

(1) Owners or Owner/Operators Choosing to Use Alternative Diesel Fuels. Owners or owner/operators choosing to use alternative diesel fuels in compression ignition TRU and TRU gen set engines to meet the requirements of section 2477.5(c) shall:

(A) Maintain records that document exclusive use of the chosen fuel or additive for each affected engine and hours of engine operation. Appropriate records would be copies of receipts or invoices of appropriate fuel and/or fuel additive and engine hour meter logs.

1. Records shall be kept available for a minimum of three (3) years and shall be compiled and made available to CARB upon request.

(B) Use only fuel that is a VDECS alternative diesel fuel that contains no conventional diesel or CARB diesel fuel in TRUs or TRU gen sets operated in California.

(C) Permanently affix a label in clear view near the fill spout that identifies the proper fuel that is required to be in compliance.

(D) In the event that the owner or owner/operator decides to revert to using conventional diesel or CARB diesel fuel, the owner or owner/operator shall comply with the requirements of section 2477.5(c) within 10 days of discontinuation of alternative diesel fuel use. Within 10 days of discontinuation, the owner or owner/operator shall notify the Executive Officer in writing of this change in fuel use and shall include an update to the compliance information submitted to CARB to comply with section 2477.5(g).

(2) Owners or Owner/Operators that Retrofit TRUs or TRU Gen Sets with a VDECS. Owners or owner/operators that retrofit TRUs or TRU gen sets with a VDECS that requires certain fuel properties to be met in order to achieve the required PM reduction or PM emissions shall only fuel the subject TRU or TRU gen set with fuel that meets these specifications when operating in the state of California. In addition, owners or owner/operators that choose a VDECS that requires certain fuel properties to be met in order to prevent damage to the VDECS or an increase in toxic air contaminants, other harmful compounds, or in the nature of the emitted PM shall only fuel the subject TRU or TRU gen set with fuel that meets these specifications.

(k) Compliance by Replacing Engines.

A new or rebuilt replacement engine shall meet more stringent emissions standards than the original engine. The new or rebuilt replacement engine must subsequently meet the in-use performance standard requirements of section 2477.5(c) by the compliance dates of section 2477.5(c)(4), which are based on the new or rebuilt replacement engine's model year or effective model year.

(1) Current tier new replacement engines. Current tier new replacement engines shall use the engine model year to determine requirements and compliance dates. The engine model year is shown on the engine emissions label if the engine is manufactured when an emissions standard tier is in effect. Emissions label language examples include, but are not limited to:

(A) "THIS ENGINE MEETS 2008 INT. TIER 4 EMISSION REGULATIONS FOR U.S. EPA AND CALIFORNIA NONROAD CI ENGINES." This label language indicates the engine is a current-tier 2008 model year engine for the purposes of in-use requirements and registration.

(B) "THIS ENGINE COMPLIES WITH U.S. EPA AND CALIFORNIA REULATIONS FOR 2009 M.Y. NONROAD AND STATIONARY/OFF-ROAD DIESEL ENGINES." This label language indicates the engine is a current-tier 2009 model year engine for the purposes of in-use requirements and registration.

(2) Prior tier new replacement engines. Prior-tier new replacement engines shall use the effective model year (see definition) to determine requirements and compliance dates. The manufacture year and the installation year of a prior tier replacement engine shall not be used to determine the in-use requirements and the compliance dates. Prior-tier new replacement engine emissions labels typically do not clearly show the effective model year, but provide dates that indicate the prior-tier emissions standard that the engine meets. The year in the first sentence of the replacement engine emission label is the first year of the tier met. The date in the second sentence of the replacement engine label is the first day of the next tier standard. Table 1 in section 2477.4 and the following example of replacement engine emissions label language show how these labels shall be interpreted for this subarticle:

(A) "THIS ENGINE COMPLIES WITH CALIFORNIA OFF-ROAD AND U.S. EPA NONROAD EMISSION REQUIREMENTS FOR 2004 ENGINES UNDER 13 CCR 2423(j) AND 40 CFR 89.1003(b)(7). SELLING OR INSTALLING THIS ENGINE FOR ANY PURPOSE OTHER THAN TO REPLACE AN OFF-ROAD ENGINE BUILT BEFORE JANUARY 1, 2008 MAY BE A VIOLATION OF CALIFORNIA AND FEDERAL LAW SUBJECT TO CIVIL PENALTY." The first sentence includes the year 2004 (the first year of the tier). The second sentence indicates the next tier started on January 1, 2008, so the last year of the tier the engine met would be 2007. The center column of Table 1 shows the effective years 2004 to 2007 matches a Tier 2 engine in the 25-50 hp (trailer) category.

(3) Rebuilt replacement engines. Rebuilt replacement engines must meet the requirements of section 2477.16.

(A) Prior tier rebuilt replacement engines. If the rebuilt engine meets a prior tier emissions standard, then the effective model year (see definition) shall be used to determine the requirements and compliance dates. The rebuild year and the installation year of a prior tier replacement engine shall not be used to determine the in-use requirements and the compliance dates.

(B) Current tier rebuilt replacement engines. It the rebuilt engine meets the tier standard that is currently in effect, then the model year is the year that the rebuild is completed and this year shall be used to determine the requirements and compliance dates.

(l) Mobile Catering Company Exemption Requirements.

(1) The Executive Officer shall grant a one-year exemption to mobile catering companies for TRUs that are not compliant with the requirements under sections 2477.5(a), (b), (c), or (d) if the following conditions are met:

(A) The mobile catering company shall be under contract with the National Interagency Fire Center to provide mobile catering food service to emergency incidents for the year that the exemption would apply.

(B) All TRUs shall comply with the TRU reporting requirements under section 2477.5(g) and have a CARB Identification Number (IDN) affixed to both sides of the TRU housing. All TRUs owned or leased by the mobile catering company that are based outside of California that the owner wants included in the mobile catering company exemption shall be reported to CARB in accordance with section 2477.5(g).

(C) The mobile catering company shall submit an application
(C) for Mobile Catering Service Exemption with the information required under section 2477.20(g). The owner shall update the application information within 30 days of any changes to the information submitted. For example, if the owner buys, sells, or leases TRUs, the IDN and unit serial number list required under section 2477.20(g)(7) shall be amended.

(D) The owner shall provide the driver with a copy of the current Mobile Catering Service Exemption that has been approved by the Executive Officer and the Mobile Food and Shower Service Request Form issued by the National Interagency Fire Center for the incident they are traveling to or from.

(E) During transit on California highways, the driver shall, upon request:

1. Present to the CARB inspector the Mobile Catering Service Exemption that has been approved by the Executive Officer and the Mobile Food and Shower Service Request Form issued by the National Interagency Fire Center, and

2. Allow the CARB inspector to inspect the TRU to confirm the Mobile Catering Service exemption applies to the equipment.

(F) All circumstances at the time of inspection shall be consistent with the Mobile Catering Service Exemption that has been approved by the Executive Officer and the Mobile Food and Shower Service Request Form issued by the National Interagency Fire Center.

(G) Mobile Catering Company Exemptions shall expire on December 31st of each year. Mobile catering companies shall re-apply for this exemption annually.

(m) Compliance Extension Based on Unavailability of Compliance Technology.

(1) If there is no compliance technology available for a specific TRU or TRU gen set within six months of a compliance date, the Executive Officer may grant a one-year extension to the normal compliance date set forth in sections 2477.5 (a), (b), (c), and (d), provided the following conditions are met:

(A) The owner demonstrates the absence of any suitable compliance option that can be used on the specific equipment and the owner cannot otherwise meet the requirements of section 2477.5(a), (b), (c), and (d) by the compliance dates.

(B) The TRU or TRU gen set is reported to CARB as required under section 2477.5(g).

(C) The owner shall submit an application to CARB as required under section 2477.20(h).

(D) The Executive Officer may grant additional one-year extensions provided the same procedures are followed for each extension.

(n) Compliance Extension Based on Delays Due to Private Financing, Equipment Manufacture Delays, or Installer Delays.

(1) The Executive Officer shall grant a one-time, maximum four-month extension to the normal compliance date set forth in sections 2477.5(a), (b), (c), and (d), provided the following conditions are met:

(A) The owner shall have ordered the compliance technology from the manufacturer no later than two months before the compliance date for VDECS retrofit compliance technologies and no later than four months before the compliance date for engine replacements, unit replacements, and trailer replacements, and the purchase order must be consistent with these limits.

(B) The TRU or TRU gen set is reported to CARB as required under section 2477.5(g).

(C) The owner shall submit an application as required under 2477.20(i) prior to the compliance deadline.

(o) Compliance Extension Based on Delays Due to Installation of Zero-Emission Fueling Infrastructure.

(1) The Executive Officer shall grant an annual extension in compliance, up to a maximum of two years, to an owner for the ZE truck TRU requirements specified in section 2477.5(b) due to unforeseen, temporary, or extenuating circumstances outside of the owner's or owner/operator's control that prevents the installation of zero emission fueling Infrastructure at the facility at which the truck TRU fleet is domiciled.

(2) For the purposes of this subsection (o), circumstances beyond the truck TRU owner's control may include:

(A) A delay in the manufacture and shipment of zero-emission fueling infrastructure equipment

(B) A delay in obtaining construction permit(s)

(C) A delay in obtaining power from a utility

(D) A delay due to private financing

(E) A delay in the installation of zero-emission fueling infrastructure

(F) A natural disaster

(G) The discovery of archeological, historical, or tribal cultural resources under the California Environmental Quality Act

(3) The owner shall submit an application as required under section 2477.20(i)(5) at least 12 months prior to the compliance deadline in section 2477.5(b) if the delay is due to a utility infrastructure upgrade, and at least 3 months prior for all other delay types.

(4) The owner may, 60 days prior to the expiration of the extension, apply for an additional one-year extension. In such a case, the truck TRU owner shall once again be required to demonstrate that the conditions set forth in section 2477.20(i)(5) have been met.

(5) The owner may, 60 days prior to the expiration of the second extension, apply for an additional compliance extension beyond the first two annual extensions due to a delay in obtaining power from a utility. In such a case, the owner shall once again be required to demonstrate that the conditions set forth in section 2477.20(i)(5) have been met.

(6) Within 45 days of the submission of a complete application, the Executive Officer
shall approve, modify, or disapprove the application and notify the applicant accordingly. If the application is modified or disapproved, the Executive Officer shall state the reasons for the modification or disapproval in the notification. The notification to the applicant and approved plan, if applicable, shall be made available to the public on CARB's website

(p) Safe Passage for Noncompliant Equipment Traveling in California.

(1) The Executive Officer shall grant a safe passage permit to a TRU or TRU gen set owner to travel on California highways with a specific noncompliant TRU or TRU gen set, provided the following conditions are met:

(A) The purpose of traveling on California highways is to take the noncompliant equipment to a dealer or installer to bring the equipment into compliance.

(B) Only one permit shall be allowed for each TRU or TRU gen set.

(C) The TRU or TRU gen set shall not operate (with the engine running) while in a noncompliant state in California.

(D) Temperature-sensitive products shall not be transported in a vehicle with a noncompliant TRU or TRU gen set.

(E) The owner shall submit an application for a safe passage permit to the Executive Officer
, as required under section 2477.20(j).

(F) The Executive Officer shall provide a decision within 15 days of the application submittal.

(G) The owner shall provide the driver with a copy of the safe passage permit that has been approved by the Executive Officer.

(H) During transit on California highways, the driver shall, upon request:

1. Show an inspector that no temperature-sensitive products are being transported;

2. Present to the inspector the safe passage permit for the noncompliant TRU or TRU gen set that has been approved by the Executive Officer; and

3. Allow the inspector to inspect the TRU or TRU gen set to confirm the permit applies to the noncompliant equipment.

(I) All circumstances at the time of inspection shall be consistent with the safe passage permit.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.6 Requirements for Vehicle Owners.

(a) Beginning December 31, 2022, a vehicle owner shall not operate or cause to be operated in California, a TRU-equipped truck or tractor-trailer equipped with a TRU or TRU gen
(a) set, unless the TRU or TRU gen set complies with sections 2477.5(a), (b), (c), and (d).

(b) Beginning December 31, 2022, a vehicle owner of a TRU-equipped truck or tractor-trailer equipped with a TRU or TRU gen set shall, upon request by CARB enforcement personnel, provide the following:

(1) Driver's license

(2) Truck or tractor registration

(3) Trailer registration

(4) Bill of lading or freight bill with origin and destination of freight being transported, the consignor (shipper) and consignee (receiver);

(5) The company name and contact information of the carrier that dispatched the driver; and

(6) The company name and contact information of the business entity (e.g., shipper, freight broker, freight forwarder, or receiver) that arranged, hired, or contracted for the transport of the perishable goods being hauled, subject to the requirements in sections 2477.8, 2477.9, 2477.10, and 2477.11.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.7. Requirements for Drivers.

(a) Beginning January 1, 2013, a driver shall not operate a TRU-equipped truck or tractor-trailer equipped with a TRU or TRU gen set on a California highway unless the TRU or TRU gen set complies with sections 2477.5(a), (b), (c), and (d).

(b) A driver shall, upon request by CARB enforcement personnel, provide the following:

(1) Driver's license;

(2) Truck or tractor registration;

(3) Trailer registration;

(4) Bill of lading or freight bill with origin and destination of freight being transported, the consignor (shipper) and consignee (receiver);

(5) The company name and contact information of the carrier that dispatched the driver; and

(6) The company name and contact information of the business entity (e.g., shipper, freight broker, freight forwarder, or receiver) that arranged, hired, or contracted for the transport of the perishable goods being hauled, subject to the requirements in sections 2477.8, 2477.9, 2477.10, and 2477.11.

(c) A driver shall allow CARB personnel to conduct a visual inspection of TRU or TRU gen sets to determine whether emission control components have been tampered with, inadequately maintained, or are defective. The driver shall do the following:

(1) Temporarily turn off the TRU or TRU gen set engine

(2) Allow access to the TRU or TRU gen set engine compartment

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43109.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.8. Requirements for Freight Brokers and Freight Forwarders.

(a) Beginning January 1, 2013, freight brokers and freight forwarders that arrange, hire, contract for, or dispatch the transport of perishable goods in TRU-equipped or TRU gen set-equipped trucks, tractor-trailers, shipping containers, or railcars on California highways or railways shall:

(1) Require the carriers they hire or contract with for transport of perishable goods, to only dispatch TRU-equipped trucks, trailers, shipping containers, and railcars or TRU gen sets that comply with sections 2477.5(a), (b), (c), and (d), if they travel on California highways or railways.

(2) Provide the following information to the carrier for their dispatched driver who will be traveling on a California highway or railway:

(A) Freight broker's or freight forwarder's business name;

(B) Freight broker's or freight forwarder's street address, state, zip code;

(C) Freight broker's or freight forwarder's contact person's name; and

(D) Freight broker or freight forwarder contact person's business phone number.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43109.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.9. Requirements for Motor Carriers.

(a) Beginning January 1, 2013, motor carriers that dispatch TRU-equipped trucks, trailers, or shipping containers equipped with a TRU or TRU gen set that travel on a highway within California shall:

(1) Only dispatch TRUs or TRU gen sets that comply with section 2477.5.

(2) Provide the following information to a dispatched driver who will be traveling on a highway within California:

(A) Carrier's business name;

(B) Carrier's street address, state, zip code;

(C) Carrier contact person's name; and

(D) Carrier contact person's business phone number.

(3) Provide the dispatched driver with the business name, address, contact person, and phone number of the business entity (e.g., freight broker, freight forwarder, shipper or receiver) that arranged, hired, contracted for, or dispatched the transport of the perishable goods being hauled.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.10. Requirements for Shippers.

(a) Beginning January 1, 2013, shippers that arrange, hire, contract for, or dispatch the transport of perishable goods in TRU-equipped trucks, trailers, shipping containers, or railcars, or TRU gen sets on California highways or railways shall:

(1) Dispatch TRUs or TRU gen sets that comply with sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; or

(2) Require the carriers they hire or contract with for transport of perishable goods, to only dispatch TRUs or TRU gen sets that comply with sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; and

(3) Provide the following information to the carrier or a dispatched driver who will be traveling on a highway within California:

(A) Shipper's business name and address;

(B) Receiver's business name and address;

(C) Freight broker or forwarder business name and address (if any); and

(D) Contact person's name, and phone number at the shipper, broker, or receiver with knowledge of the transport arrangements.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.11. Requirements for Receivers.

(a) Beginning January 1, 2013, receivers that arrange, hire, contract for, or dispatch the transport of perishable goods in TRU-equipped trucks, trailers, shipping containers, or railcars; or TRU gen sets on California highways or railways shall:

(1) Dispatch TRUs or TRU gen sets that comply with sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; or

(2) Require the carriers they hire or contract with for transport of perishable goods, to only dispatch TRUs or TRU gen sets that comply with sections 2477.5(a), (b), (c), and (d) if they travel on California highways or railways; and

(3) Provide the following information to the carrier or a dispatched driver who will be traveling on a highway within California:

(A) Shipper's business name, address;

(B) Receiver's business name, address;

(C) Freight broker or forwarder business name and address (if any); and

(D) Contact person's name, and phone number at the shipper, broker, or receiver with knowledge of the transport arrangements.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2,

42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.12. Requirements for Lessors and Lessees.

(a) Lessors shall be subject to all of the following:

(1) The lessor is responsible for the owner requirements set forth in section 2477.5. See the definition of "owner" in section 2477.4 for clarification related to banks and financial institutions.

(A) The lessor may delegate the responsibilities under section 2477.5(g), (h), and (i) to the lessee, if the following conditions are met:

1. The lease contract shall show clear delegation of the TRU reporting, operating fee, and compliance label requirements to the lessee;

2. The lessor shall submit third party agreement confirmation information as required under section 2477.20(k) for leased units to CARB at least 10 days prior to the lessee reporting the TRU or TRU gen set to CARB.

3. The lessor shall notify the lessee in writing of this delegation.

(B) The lessor shall not delegate owner requirements for complying with sections 2477.5(a), (b), (c), and (d) to the lessee unless the lessor is a bank or financial institution.

(b) Lessees shall be subject to all of the following:

(1) If delegated by contract and the lessor has submitted third party agreement confirmation information for leased units to CARB under section 2477.12(a)(1)(A) and notified the lessee of delegation under section 2477.12(a)(1)(A)3., the lessee is responsible for the TRU reporting, operating fee, and compliance label requirements of sections 2477.5(g), (h), and (i) and shall complete all of the following:

(A) Report the TRU or TRU gen set to CARB and pay applicable TRU operating fees after at least 10 days of the lessor submitting the third party agreement confirmation information for leased units to CARB, but no more than 30 days after the lessor's notice;

(B) Submit a copy of the TRU Certification to the lessor within 30 days after reporting the TRU or TRU gen set to CARB and a TRU Certification is issued; and

(C) Affix (attach) the IDN to the TRU or TRU gen set housing within 30 days in accordance with subparagraph 2477.5(g)(6).

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.13. Requirements for TRU, TRU Gen Set, and ZE Truck TRU Original Equipment Manufacturers.

(a) Beginning December 31, 2022, TRU OEMs shall not manufacture for sale or use in California, a truck TRU, ZE truck TRU, trailer TRU, or DSC TRU, unless that TRU uses a refrigerant with a GWP value less than or equal to 2,200, or uses no refrigerant at all.

(1) The TRU shall include a refrigerant label that is readily visible and legible, and include the following statement, or its equivalent: "THIS UNIT CONTAINS REFRIGERANT WITH A GWP LESS THAN OR EQUAL TO 2,200 AND IS COMPLIANT FOR USE IN THE STATE OF CALIFORNIA."

(A) Readily visible to the average person means that a label is readable from a distance of 46 centimeters (18 inches) without any obstructions from the TRU or engine parts, except for flexible parts that may be moved out of the way without disconnection.

(b) Beginning December 31, 2023, TRU OEMs shall not manufacture for sale or use in California, a truck TRU, unless it is a ZE truck TRU.

(c) Beginning May 31, 2023, TRU OEMs shall not manufacture for sale or use in California, a trailer TRU, DSC TRU, railcar TRU, or TRU gen set, unless it is equipped with an engine that meets or outperforms the performance standard set forth in section 2477.5 (d).

(d) Original Equipment Manufacturer Reporting

(1) Monthly production reports. Beginning April 6, 2011, TRU OEMs shall provide by the end of the second business day of

(1) each calendar month, a monthly production report to CARB with the information listed in section 2477.20(l) for the previous calendar month for each TRU, TRU gen set, or ZE truck TRU produced for sale in California, North America, Canada, and Mexico.

(2) Confidentiality of production reports. TRU and TRU gen set original equipment manufacturers may designate specific production report information as confidential or trade secret, and CARB shall handle designated information in accordance with title 17 CCR, section 91000.

(e) Beginning February 12, 2013, TRU and TRU gen set original equipment manufacturers (OEM) that sell TRUs, TRU gen sets, ZE truck TRUs, or replacement engines in California shall:

(1) Provide a supplemental label with all new and rebuilt replacement engines that provides the information that is required to report the unit to CARB under section 2477.5(g), if the engine manufacturer's emissions label does not provide this information. If a prior-tier replacement engine is used, the effective model year shall be listed on the supplemental label.

(A) The supplemental label shall be permanently affixed to the replacement engine in an easily accessible place, in accordance with 40 CFR 89.110 (for Tier 1 or Tier 2 engines) or 40 CFR 1039.135 (for Tier 4 engines). Alternative supplemental label locations and font sizes may be necessary if accessible engine surface space is not available, subject to Executive Officer approval.

(2) Provide a registration information document with each new TRU, TRU gen set, and ZE truck TRU that includes:

(A) All of the TRU, TRU gen set, or ZE truck TRU unit information that is needed to report the TRU, TRU gen set to CARB under section 2477.5(g). This information shall be the same as the information on the unit label that is attached to the unit.

(B) All of the TRU or TRU gen set engine information needed to report to CARB under section 2477.5(g). This information shall be the same as the information on the engine labels that are attached to the engine.

(C) The registration information document shall include a certification statement by the TRU OEM stating that the unit registration information provided is exactly the same as listed on the TRU, TRU gen set, or ZE truck TRU unit label and the engine registration information provided is exactly the same as listed on the engine labels.

(D) As an alternative to providing the registration information document, the TRU or TRU gen set original equipment manufacturer may provide a web-based, on-line lookup system for registration information that is at least as effective as section 2477.13(e)(2)(A), (B), and (C), subject to advance Executive Officer approval. In determining whether a specific web-based, on-line lookup system for registration information is at least as effective as section 2477.13(e)(2)(A), (B), and (C), the Executive Officer shall consider information submitted by the manufacturer and shall exercise good scientific and engineering judgment.

(3) Provide a registration information document with each new and rebuilt replacement engine supplied by the OEM that includes:

(A) All of the engine information needed to report to CARB under section 2477.5(g). This information shall be the same as the information on the new replacement engine labels or rebuilt replacement engine supplemental labels (see section 2477.16(b) that are attached to the engine or an alternative location approved by the Executive Officer.

(B) The registration information document shall include a certification statement by the TRU OEM stating that the engine registration information provided is exactly the same as listed on the replacement engine labels.

(C) Include entry spaces and instructions for the dealer or installer to fill in the unit information that is needed to report the unit to CARB pursuant to section 2477.20(f)(4). Include a certification statement for the dealer or installer to sign under, stating that the unit information entered is exactly the same as listed on the unit label that the replacement engine is installed into.

(D) As an alternative to providing the registration document, the TRU or TRU gen set original equipment manufacturer may provide a web-based, on-line lookup system for registration information that is at least as effective as section 2477.13(e)(3)(A), (B), and (C), subject to advance Executive Officer approval. In determining whether a specific web-based, on-line lookup system for registration information is at least as effective as section 2477.13(e)(3)(A), (B), and (C), the Executive Officer shall consider information submitted by the manufacturer and shall exercise good scientific and engineering judgment.

(f) Beginning November 14, 2012, OEMs shall provide written disclose with each prior-tier replacement engine they supply that shall be passed on to interested buyers prior to sale of a prior-tier replacement engine notifying them that the engine was manufactured to meet less stringent emissions standards than are currently required. This notification must also provide the effective model year of the prior-tier replacement engine and the ULETRU compliance deadline.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.14. Requirements for TRU, TRU Gen Set, and TRU-Equipped Truck and Trailer Dealers.

(a) Beginning February 12, 2013, dealers that sell and/or install TRUs, TRU gen sets, ZE truck TRUs, or replacement engines in California shall:

(1) Pass the registration information document provided by the TRU or TRU gen set OEM (under section 2477.13) or print-out from the OEM's web-based look-up system (under section 2477.13(e)(2)(D) or 2477.13(e)(3)(D)) to the ultimate purchaser upon sale of a new TRU, TRU gen set, or ZE truck TRU that includes the TRU, TRU gen set, or ZE truck TRU unit information and the TRU engine information required for registration under section 2477.5(g).

(2) Pass the registration information document provided by the TRU or TRU gen set OEM under (section 2477.13) or print-out from the OEM's web-based look-up system (under section 2477.13(e)(2)(D) or 2477.13(e)(3)(D)), or engine rebuilder (under section 2477.16) to the ultimate purchaser upon sale of a new replacement engine, or rebuilt replacement engine that includes the engine information required for registration under section 2477.5(g).

(3) If an engine is not supplied by a TRU OEM, the dealer shall provide a registration information document that lists all of the TRU or TRU gen set engine information needed to report to CARB under section 2477.20(f)(7). This information shall be exactly the same as the information on the engine emissions label that is attached to the engine. The registration information document shall include a certification statement by the dealer stating that the engine information provided is exactly the same as listed on the engine emissions label.

(b) Dealers that sell TRUs or TRU gen sets from businesses located in California may purchase, receive, or otherwise acquire and have in their possession, TRUs or TRU gen sets that are noncompliant with the requirements of section 2477.5(a), (b), (c), (d), and (g) if the following conditions are met:

(1) The noncompliant TRUs or TRU gen sets are not sold for use in California prior to being brought into compliance with the requirements;

(2) The noncompliant TRU or TRU gen set is sold to a person that would not be reasonably expected to do business in California and a written disclosure to the buyer in the bill of sale is required in accordance with section 2477.18(b)(1);

(3) The noncompliant TRUs or TRU gen sets are not rented or leased prior to being brought into compliance with these requirements;

(4) The noncompliant TRUs or TRU gen sets are not operated at the dealer's place of business or on California highways for the purposes of controlling the environment of temperature sensitive products while in California. This condition applies to TRU or TRU gen sets under the dealer's control. This condition does not apply to TRUs or TRU gen sets owned by others that are being repaired by the dealer; and

(5) If a noncompliant TRU or TRU gen set is in transit on California highways:

(A) The TRU or TRU gen set shall not be operating;

(B) The dealer shall be responsible for ensuring that no temperature-sensitive products are transported in the vehicle;

(C) The dealer shall provide the driver with written evidence that the noncompliant TRU or TRU gen set is under the control of the dealer, including the following information:

1. Dealer's business name;

2. Dealer's street address, state, zip code;

3. Dealer contact person's name;

4. Dealer contact person's business phone number;

5. Date(s) transport will take place;

6. Statement of the reason for transporting the noncompliant equipment

7. TRU or TRU gen set serial number

8. Physical address of starting location;

9. Physical address of ending location; and

10. Dealer owner's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."

(D) During transit on California highways, the driver, upon request, must show an inspector that no temperature-sensitive products are being transported and shall present written evidence provided by the dealer that the noncompliant TRU or TRU gen set is under the control of a dealer; and

(E) All circumstances at the time of inspection shall be consistent with the requirements under section 2477.14(b)(5).

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.15. Requirements for Repair Shops Located in California that Work on TRUs or TRU Gen Sets.

(a) Repair shops located in California that sell and/or install new or rebuilt replacement engines into TRUs or TRU gen sets shall:

(1) Pass the registration information document provided by the TRU or TRU gen set OEM (under section 2477.13) or engine rebuilder (under section 2477.16) to the ultimate purchaser upon sale of a new or rebuilt replacement engine that includes the engine information needed to report to CARB, as listed in section 2477.20(f)(7).

(2) Beginning February 12, 2013, if an engine is not supplied by a TRU OEM, the installer shall provide a registration information document that lists all of the TRU or TRU gen set engine information needed to report to CARB, as listed in section 2477.20(f)(7).

(A) This information shall be exactly the same as the information on the engine emissions label that is attached to the engine.

(B) The registration information document shall provide a certification statement by the repair shop responsible official stating that the engine information provided is exactly the same as listed on the engine emissions label.

(3) Beginning February 12, 2013, provide the unit information on the registration information document that is needed to report the unit to CARB for TRU or TRU gen set that the new or rebuilt replacement engine is installed into. The unit information that is required is listed in section 2477.20(f)(4).

(A) The repair shop responsible official shall provide a certification statement on the registration information document stating that the unit information provided is exactly the same as listed on the unit label.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.16. Requirements for Engine Rebuilders.

(a) If a TRU engine is being rebuilt to remain in compliance with the in-use standards of section 2477.5(c), it must be rebuilt in accordance with the 40 CFR, sections 89.130 and 1068.120, and 13 CCR, section 2423(l), as these sections existed on August 31, 2012, and shall meet the following requirements:

(1) To remain in compliance with the in-use performance standards, the engine must be rebuilt to a configuration of a more stringent emissions standard tier than the original engine;

(2) The engine must be rebuilt to a certified configuration of matched components. “Matched components” means a complete set of components corresponding to the certified emissions configuration (tier) of the engine that is being used as the reference for the rebuilt engine.

(b) Beginning November 14, 2012, engine rebuilders shall provide a supplemental label with each rebuilt engine that includes the following information:

(1) Name of the engine rebuilder;

(2) Engine manufacturer of the original engine

(3) Engine model;

(4) Engine model year:

(A) Prior tier engines. If the rebuilt engine meets a prior-tier emissions standard, then the effective model year is required;

(B) Current tier engines. It the rebuilt engine meets the tier standard that is currently in effect, then the model year is the year that the rebuild is completed.

(5) Horsepower rating of the certified configuration of the rebuilt engine;

(6) Emissions standard tier met by the certified configuration (e.g., Tier 4i); and

(7) Calendar year that the rebuild was completed.

(c) Supplemental labels shall be permanently affixed to the rebuilt engine in an easily accessible place, in accordance with 40 CFR, section 89.110 (for Tier 1 or Tier 2) or 40 CFR, section 1039.135 (for Tier 4). Alternative supplemental label locations and font sizes may be necessary if surface space is not available, subject to Executive Officer approval.

(d) Beginning January 13, 2013, engine rebuilders shall provide the following documentation, within 30 days of request, that demonstrates they have complied with the engine rebuilding practices of 40 CFR, sections 89.130 and 1068.120, and 13 CCR, section 2423(l):

(1) Information that demonstrates there is a reasonable technical basis for knowing that the rebuilt engine is equivalent, from an emissions standpoint, to an engine that complies with the certification standards applicable to the emissions tier standard of the rebuilt engine (i.e., tolerances, calibrations, specifications). Such equivalency would exist if the following two conditions are met:

(A) Parts installed (whether the parts are new, used, or rebuilt) are such that a person familiar with the design and function of engines would reasonably believe that the parts perform the same function with respect to emission control as the original parts; and

(B) Any parameter adjustment or design element change is made only in accordance with the original engine manufacturer's instructions or where data or other reasonable technical basis exists that such parameter adjustment or design element change, when performed on the rebuilt engine, is not expected to adversely affect in-use emissions.

(2) The technical demonstration must be signed and stamped by a licensed professional mechanical engineer.

(e) Beginning February 12, 2013, engine rebuilders shall provide a registration information document with the rebuilt engine that includes:

(1) All of the TRU or TRU gen set engine information needed to report to CARB pursuant to subparagraph 2477.20(f)(7) except that engine family may be omitted for rebuilt engines. This information must be the same as the information on the rebuilt engine's re-label and supplemental emissions label that is attached to the engine. The registration information document would include a certification statement by the engine rebuilder, or third party installer stating that the engine information provided is exactly the same as listed on the engine emissions label.

(2) A separate section of the registration information document shall include entry spaces for all of the TRU or TRU gen set unit information that is required to report the unit to CARB pursuant to subparagraphs 2477.20(f)(4) and (5). The registration information document would include a certification statement, with a signature space for the third party installer, stating that the unit information provided is exactly the same as listed on the unit label.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.17. Requirements for Applicable Facility Owners or Applicable Facility Owner/Operators.

(a) Facility Registration. On or before December 31, 2023, applicable facility owners or applicable facility owner/operators shall register their facility by reporting the following information to CARB:

(1) Company Information

(A) Company/business name, address, and contact information for the responsible official (e.g., title, phone number, email address).

(2) Indicate who is registering the applicable facility, either:

(A) The applicable facility owner (or an employee of owner), or

(B) The applicable facility operator

(3) Applicable facility type (specify)

(A) Refrigerated Warehouse or Distribution Center

(B) Grocery Store

(C) Seaport Facility

(D) Intermodal Railyard

(4) Refrigerated Warehouse or Distribution Center or Grocery Store building size in square feet

(5) Rental or lease status. Indicate if the applicable facility is a rental unit (no contract term) or a lease unit (under contract term, typically more than one year).

(6) The number of loading dock doors serving refrigerated storage space.

(7) The number of square feet of refrigerated storage space.

(8) The average total number of hours per week that outbound TRU or TRU gen set engines operate while at the facility during 2022. Average TRU or TRU gen set engine operating time at facility for outbound refrigerated loads may be used if the result is representative of the outbound TRU or TRU gen set operations at facilities, as determined by the Executive Officer. Average values would be determined for outbound loads and applied to the total annual number of refrigerated outbound loads, and then weekly averages calculated as follows: Average TRU or TRU gen set engine operating time per outbound refrigerated load multiplied by the total annual number of outbound loads, divided by 52 weeks equals the average total number of hours per week that outbound TRU or TRU gen set engines operate while at the facility.

(9) The average total number of hours per week that inbound TRU or TRU gen set engines operate while at the facility during 2022. Average TRU or TRU gen set engine operating time at facility for inbound refrigerated loads may be used if the result is representative of the inbound TRU or TRU gen set operations at facilities, as determined by the Executive Officer. Average values would be determined for inbound loads and applied to the total annual number of refrigerated inbound loads, and then weekly averages calculated as follows: Average TRU or TRU gen set engine operating time per inbound refrigerated load multiplied by the total annual number of inbound loads, divided by 52 weeks equals the average total number of hours per week that inbound TRU or TRU gen set engines operate while at the facility.

(10) The number of refrigerated trailers that are used at the facility for cold storage, the total annual number of hours of TRU engine operation associated with these refrigerated trailers, and the total annual number of hours of operation using electric standby associated with these refrigerated trailers.

(11) Zero-emission fuel provided (if any).

(A) If electricity is provided:

1. Location of connectors (e.g., dock door, parking lot, staging area)

2. Number of connectors

3. Type of connectors

(b) If reported information for any applicable facility changes, then the applicable facility owner shall update the information within 30 days of the changes.

(c) If an applicable facility begins operations after December 31, 2023, then the applicable facility owner shall report the information in section 2477.17(a) to CARB within 30 days of the applicable facility beginning operations

(d) Facility Registration Fees. Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of applicable facilities in California to recover the costs to the Executive Officer administering the TRU ATCM as specified in section 2477.21(b).

(e) Facility Reporting. On or before December 31, 2023, applicable facility owners or applicable facility owner/operators shall select the requirements in either section 2477.17(e)(1) or section 2477.17(e)(2). If neither option is selected, the applicable facility owner or applicable facility owner/operator shall automatically be required to comply with section 2477.17(e)(2). An applicable facility owner or applicable facility owner/operator may change the option selected for the following calendar year by notifying CARB by September 30 of the preceding calendar year.

(1) Report all TRU Activity at Facility.

(A) Beginning December 31, 2023, applicable facility owners or applicable facility owner/operators shall collect the information required under section 2477.20(m) for any TRU that operates inside the facility fence line or property boundary.

(B) Beginning April 15, 2024, applicable facility owners or applicable facility owner/operators shall report information required under section 2477.20(m) to CARB quarterly in accordance with the schedule shown in Table 4.

Table 4: Applicable Facility Reporting Schedule

TRU Entry Date	**Date by which information is to be reported to CARB**
January 1 – March 31	April 15
April 1 – June 30	July 15
July 1 – September 30	October 15
October 1 – December 31	January 15

(C) If CARB finds non-reported TRUs operating inside the facility fence line or property boundary, the applicable facility owner or applicable facility owner/operator may be subject to a penalty pursuant to Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410 for each non-reported TRU. An applicable facility owner or applicable facility owner/operator may be subject to increased penalties for each additional non-reported TRU.

(D) An applicable facility owner or applicable facility owner/operator may designate specific report information as confidential or trade secret. CARB shall handle designated information in accordance with Title 17 CCR, section 91000.

(2) Declaration of TRU Compliance.

(A) Applicable facility owners or applicable facility owner/operators shall provide a declaration to CARB, under penalty of perjury, that beginning December 31, 2023, non-compliant TRUs subject to this regulation shall not be permitted to operate inside the facility fence line or property boundary.

1. An applicable facility owner or applicable facility owner/operator may check if a given TRU is compliant by verifying that the TRU has a valid CARB compliance label or by checking identifiable information through CARB's online system.

(B) If CARB finds a non-compliant TRU operating inside the facility fence line or property boundary, the applicable facility owner or applicable facility owner/operator may be subject to a penalty pursuant to Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410 for each non-compliant TRU. An applicable facility owner or applicable facility owner/operator may be subject to increased penalties for each additional non-compliant TRU operating within an applicable facility's fence line or property boundary.

(f) Recordkeeping.

(1) The Executive Officer may approve alternative recordkeeping and calculation procedures for determining the average weekly hours of TRU engine operation at a facility for inbound and outbound refrigerated loads, provided the Executive Officer finds that the alternative procedures meet the intent of section 2477.17.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.18. Prohibitions.

(a) Except as allowed under section 2477.14(b), no person, including, but not limited to, manufacturers, distributors, dealers, auctioneers, and motor carriers shall intentionally or negligently import, deliver, purchase, receive, or otherwise acquire a new or used TRU or TRU gen set engine that does not meet the requirements or alternatives set forth in sections 2477.5(a), (b), (c), and (d) above.

(b) Except as allowed under section 2477.14(b), no person in this State, including, but not limited to, manufacturers, distributors, dealers, auctioneers, and motor carriers shall sell, or offer to sell, to an ultimate purchaser who is a resident of this State or a person that could reasonably be expected to do business in this State a new or used TRU or TRU gen set engine that does not meet the requirements or alternatives set forth in sections 2477.5(a), (b), (c), and (d) above.

(1) If a noncompliant TRU or TRU gen set is sold to a person who is a resident outside this State, then the bill of sale shall disclose to the buyer that the TRU or TRU gen set is not compliant for use in California and the TRU or TRU gen set shall meet the requirements of section 2477.5 before operating in the State, and must be reported to CARB. The following statement shall be included in the bill of sale of any noncompliant TRU or TRU gen set: "This TRU does not currently meet California's requirements under title 13, California Code of Regulations, section 2477.5, and is therefore not compliant for use in California."

(2) No owner of a TRU that is equipped with an Alternative Technology under section 2477.5(c)(3) (e.g., hybrid electric or electric standby) shall sell the TRU or TRU gen set, without disclosing in writing that it shall be used in a way that qualifies it as an Alternative Technology in accordance with section 2477.5(c)(3) in order to be compliant.

(c) No person in this State, including, but not limited to, manufacturers, distributors, dealers, and carriers shall lease, offer to lease, rent, or offer to rent, in this state any new or used TRU or TRU gen set engine that does not meet the requirements or alternatives set forth in sections 2477.5(a), (b), (c), and (d) above.

(d) Operators of affected facilities and operators of affected TRUs and TRU gen sets are prohibited from taking action to divert affected TRUs to alternative staging areas in order to circumvent the requirements of this section.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2,

42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.19. Non-compliance and Penalties.

(a) All persons, as defined in section 19 of the Health and Safety Code, found to be in violation of title 13, CCR, sections 2477 through 2477.18 may be cited and subject to the penalty provisions set forth in Health and Safety Code sections 39674, 39675, 42400 et seq., 42402 et seq., and 42410. Where a violation involves multiple TRUs, TRU gen sets, or TRU engines, there is a separate violation for each such unit.

(1) For purposes of enforcement, if a TRU, TRU gen set, or applicable facility is cited for non-compliance with this TRU Regulation and neither the owner nor the operator can produce evidence of the party responsible for compliance with State laws, then the owner of the TRU, TRU gen set, or applicable facility in violation shall be liable for any non-compliance

(b) Failure to keep records, failure to report, or submittal of false information are each separate violations of this TRU Regulation subject to penalty.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.20 Reporting

(a) Reporting Method. Submission of information to CARB required under this TRU Regulation, including registration, reporting, and submission of applications, shall be by one of the following methods:

(1) Mail or deliver to CARB at the address listed immediately below:

California Air Resources Board
Transportation and Toxics Division (TRU)
P.O. Box 2815
Sacramento, CA 95812

(2) Electronically submit by email to: arber@arb.ca.gov; or

(3) Electronically submit through CARB's online system.

(b) Recordkeeping. All records required under this TRU Regulation shall be kept for a minimum of three (3) years and shall be compiled and made available to CARB upon request.

(c) Statement of Accuracy. All information submitted to CARB as required under this TRU Regulation shall be accompanied by the following statement, signed by the TRU owner, applicable facility owner, or responsible official: "I certify under penalty of perjury under the laws of the State of California that the information provided is true, accurate, and complete."

(d) Automated monitoring for electronic tracking systems. For a unit that uses an electronic tracking system, the information collected from that system shall include all of the following for each stationary location lasting more than 300 seconds (5 minutes):

(1) CARB IDN of the unit.

(2) Date.

(3) Address of the stationary location. This record may be the GPS coordinates and a location code for each stationary location, provided the owner or operator also provides a cross-reference of location codes with the corresponding physical addresses.

(4) Time of arrival and departure, and the elapsed time calculated from those readings to show the duration of the stationary position.

(5) Engine hour meter readings taken at arrival and departure and the elapsed time calculated from those readings to show the TRU engine run time while the vehicle is at the stationary location.

(6) Zero-emission system, such as electric motor or cryogenic system, hour meter readings taken at arrival and departure and the elapsed time that the zero-emission system is powering the refrigeration system while the vehicle is at the stationary location.

(7) A report that lists all stationary locations lasting more than 5 minutes where the TRU engine operated for more than 30 minutes, resulting in a violation.

(e) Placement of the CARB IDN. A CARB IDN shall be permanently affixed or painted on the TRU chassis in clear view according to the following specifications:

(1) The CARB IDN shall be preceded by the letters "ARB".

(2) Letters and numbers shall contrast sharply in color with the color of the background surface on which the letters are placed.

(3) The location of the I.D. number shall be as follows:

(A) Truck and trailer TRUs - both sides of TRU chassis housing.

(B) Rail car and shipping container TRUs - both sides of the TRU.

(C) TRU gen sets - both sides of gen set housing.

(4) Letters and numbers shall be readily legible during daylight hours, from a distance of 50 feet (15.24 meters) while unit is stationary.

(5) Markings shall be kept maintained in a manner that retains the legibility required by the subparagraph immediately above.

(6) Owners or owner/operators may use alternative unique equipment identification markings instead of affixing a CARB IDN, provided the following conditions are met:

(A) The owner or owner/operator shall report the TRU to CARB as required in section 2477.5(g) and provide the unique equipment number.

(B) The alternative identification number shall be truly unique. Examples of unique identification numbers include the Reporting Marks that are issued by the American Association of Railroads' contractor, RailInc, for their UMLER system and the BIC Codes issued by Bureau International de Containers. Company equipment numbers that are not truly unique on a worldwide basis do not qualify.

(C) Alternative identification numbers shall be affixed or attached to both sides of the TRU gen set, shipping container (if the TRU is permanently attached), semitrailer, or railcar and meet all of the requirements of subparagraph 2477.20(e).

(f) TRU Reporting Information. For each TRU, the owner or owner/operator shall report to CARB all of the following information:

(1) Company Information

(A) Company/business name, address, and contact information for the responsible official (e.g., title, phone number, email address).

(B) Company/business tax identification number/federal employer identification number (EIN) or equivalent for other country (e.g., Canadian Business Number).

(2) Rental or lease status. Indicate if the unit is a rental unit (no contract term) or a lease unit (under contract term, typically more than one year).

(3) Reporting identity indication. Indicate who is reporting the TRU, either:

(A) The owner (or an employee of owner), or

(B) A third party reporting the TRU under a third party agreement between the owner or lessor and a consultant or lessee.

(4) TRU, TRU gen set, or ZE truck TRU unit information:

(A) Unit Type:

1. Truck TRU;

2. Trailer TRU;

3. Refrigerated railcar TRU;

4. Refrigerated domestic shipping container TRU; or

5. TRU generator set.

(B) Indicate if the unit is ZE

(C) Unit manufacturer,

(D) Unit model,

(E) Unit model year, and

(F) Unit serial number.

(G) Date TRU was purchased, rented, or leased.

(5) Other TRU identifying numbers. Provide all that apply:

(A) If unit is installed on a truck or trailer, provide:

1. Vehicle Identification Number (VIN), and

2. Vehicle license number, country of issuance, and state or province of issuance;

3. Unique Bureau International de Container (BIC) Code, if trailer is multimodal

(B) If unit is installed on refrigerated railcar, provide railcar reporting mark;

(C) If unit is installed on domestic refrigerated shipping container, provide unique BIC Code;

(D) If unit is a TRU gen set, provide unique BIC Code;

(E) Provide company equipment number if company has labeled the equipment.

(6) TRU status information. Indicate if the unit is:

(A) Active (unit is operational);

(B) Removed from service (unit is scrapped or inactive for foreseeable future); or

(C) Sold. If last reported owner sold unit, then they shall provide:

1. Date of sale, and

2. New owner's company name, address, and contact information

(7) TRU engine information. Provide the following:

(A) Engine manufacturer;

(B) Engine model;

(C) Engine model year, or "MY";

(D) Engine serial number;

(E) Engine power rating. Indicate either:

1. Under 25 hp (under 19 kW), or

2. 25 hp or greater (19 Kw or greater);

(F) Engine family; and

(G) Emissions standard tier that engine meets.

(8) Compliance information.

(A) Refrigerant type

1. Indicate if the TRU has a TRU OEM supplied refrigerant label.

(B) If the unit is a ZE truck TRU used to comply with section 2477.5(b), then:

1. Provide the technology type:

a. Battery-electric;

b. Cryogenic temperature controlled system;

c. Cold plate system;

d. Powered by fuel cells; or

e. Other

2. Provide information on zero emission fueling Infrastructure:

a. Physical address of zero-emission fueling infrastructure installed or to be installed.

b. Specify the number of ZE fuel connections, and types of connectors.

c. If storing fuel on site, specify the number of storage tanks and the tank storage capacity.

d. If storing electricity on site, specify the number of batteries and battery capacity, in kilowatt-hours (kWh).

e. If generating fuel on site, specify the quantity of generators and expected power output.

f. For solar generation, specify the number of panels and kilowatt-hour (kWh) rating per panel, as well as expected annual power generation.

g. For hydrogen fuel cells, specify the number of cells and the rated kilowatt (kW) per cells, as well as the expected annual power generation.

(C) If the unit has a VDECS retrofit, then:

1. Provide the following from the VDECS label:

    a. VDECS manufacturer name;

    b. VDECS family name;

    c. VDECS serial number;

    d. VDECS manufacture year; and

2. Provide the VDECS installation date.

3. Provide the VDECS installer name

4. Provide the VDECS installer address

5. Provide the VDECS installer phone number

(D) If the engine currently in the unit is a rebuilt replacement engine, then:

1. Provide the emissions standard tier that the engine meets;

2. Provide the rebuild year; and

3. Provide the installation date.

(E) If the engine currently in the unit is a new replacement engine, then:

1. Provide the emissions standard tier that the engine meets; and

2. Provide the installation date.

(F) If the unit uses an Alternative Technology option under section 2477.5(c)(3), then provide:

1. The type used:

    a. Electric standby-equipped TRU or hybrid electric TRU;

    b. Hybrid cryogenic temperature controlled system;

    c. Alternative–fueled engine;

    d. Fueled exclusively with pure alternative diesel fuel;

e. Powered by fuel cells; or

f. Other system approved by the Executive Officer.

2. The date the technology was installed or employed.

(9) Indicate what state or province that the TRU is based in:

(A) California; or

(B) Outside of California. If based outside of California identify:

1. U.S. state;

2. Mexican state; or

3. Canadian province.

(10) Certification that the TRU operator is appraised of their obligations under this regulation.

(g) Application for Mobile Catering Service Exemption. Applications for Mobile Catering Service Exemption shall include all of the following information:

(1) Business name.

(2) Business street address, state, zip code.

(3) Business phone number.

(4) Responsible official's name.

(5) Responsible official's mobile phone number.

(6) Federal Tax Identification Number (EIN) and Owner-Operator Number (OON) issued to the owner by CARB.

(7) A list of CARB IDNs issued by CARB for all TRUs that are to be included under the exemption. For TRUs that are not in compliance with the requirements under section 2477(a), (b), (c), or (d) that do not have CARB IDNs, provide the unit serial number instead of the IDN on this list.

(8) A copy of the mobile catering company's contract with the National Interagency Fire Center shall be provided with the application.

(h) Application for Compliance Extension Based on Unavailability of Compliance Technology. An application for a compliance extension based on the unavailability of compliance technology shall do all of the following:

(1) Identify each unit and engine for which the extension is requested.

(2) For each engine identified in (1), provide a detailed description of the reasons and factors that serve as the basis for the applicant's claim that no suitable control technologies are available. The description shall include, without limitation, detailed engineering diagrams and calculations that support the applicant's claim that there are no suitable control technologies available.

(3) Demonstrate that all other units covered by this TRU Regulation and subject to the applicant's direct control meet the requirements of this TRU Regulation.

(i) Application for Compliance Extension Based on Delays. An application for a compliance extension based on delays shall:

(1) Explain in detail why a compliance extension is needed and how much additional time is required to comply.

(2) If delivery is the cause for delay, explain the status, and provide documentation from the manufacturer to demonstrate this is true, along with an updated delivery schedule.

(3) If installation is the cause for delay, report the date that compliance technology was delivered, explain the installation status and provide documentation from the installer to demonstrate the facts, along with an updated installation schedule.

(4) If there are other circumstances causing the delay, such as financing, explain the status and provide documentation from the financier or other relevant entity to demonstrate this is true, along with an updated schedule.

(5) If the delay is related to installation of zero-emission fueling infrastructure:

(A) Documentation that the owner ordered the zero-emission fueling infrastructure no later than 3 months before the compliance date.

(B) If requesting an extension for the entire truck TRU fleet, documentation why partial infrastructure installation is not viable.

(C) If an electric service upgrade is needed, a statement from the Utility is required that specifies the type of upgrade (distribution line extensions, new distribution circuits, substation upgrade, new substation, or new subtransmission line) and the estimated number of days for the utility to complete the work.

(D) Efforts taken to mitigate future need for the extension.

(j) Application for a Safe Passage Permit. An application for safe passage shall include all of the following information:

(1) Owner's name.

(2) Business name (if different).

(3) Owner's street address, state, zip code.

(4) Contact person's name.

(5) Contact person's business phone number.

(6) Date(s) transport will take place.

(7) Statement that the reason for transporting the noncompliant equipment on California highways is strictly to take the noncompliant equipment to a dealer or installer to bring the equipment into compliance.

(8) TRU or TRU gen set serial number.

(9) Vehicle Identification Number (VIN), BIC Code (for TRU gen sets and domestic shipping containers), or railcar reporting mark.

(10) Physical address of starting location or point of entry into California.

(11) Dealer's or installer's business name and physical address where compliance technology will be installed.

(k) Third-party Agreement Confirmation Information. For each leased unit, the lessor shall submit all of the following information to CARB:

(1) Unit serial numbers for each TRU or TRU gen set;

(2) Unique company equipment number;

(3) Vehicle license number;

(4) Vehicle Identification Number (VIN);

(5) Lessor company name, address, federal tax ID (EIN), contact person, and contact information;

(6) Lessee company name, address, federal tax I.D (EIN), contact person, and contact information;

(7) Copy of the contract pages of the lease contract with the language highlighted that identifies the lessee as the responsible party for reporting to CARB, paying TRU operating fees, and affixing CARB compliance labels; and

(8) Owner's/lessor's or responsible official's signature, after the statement: "I certify under penalty of perjury under the laws of the State of California that TRU or TRU gen set is compliant with applicable California regulations."

(l) Original Equipment Manufacturer Monthly Production Reports. A TRU OEM production report shall include, for the previous calendar month for each TRU or TRU gen set produced for sale in California, North America, Canada, or Mexico:

(1) Unit model name, as it appears on the unit label;

(2) Unit serial number;

(3) Engine manufacturer;

(4) Engine model, as it appears on the engine emissions label;

(5) Engine model, as it appears on the serial number label, if different;

(6) Engine family;

(7) Engine serial number;

(8) Rated horsepower and rated speed; and

(9) Engine emission tier standard met.

(10) If the unit is equipped an OEM VDECS, then provide the following:

(A) VDECS manufacturer name

(B) VDECS family name

(C) VDECS serial number

(11) Indicate if the unit is ZE

(12) Indicate if the unit is electric-standby equipped or hybrid electric

(13) Refrigerant type

(m) TRU Activity at a Facility. A report of TRU activity at a facility shall include all of the following information for each TRU that operates inside the facility fence line or property boundary:

(1) Truck TRU information.

(A) CARB IDN

(B) Entry date and time

(C) TRU operator's (or truck driver's) name

(D) TRU operator's (or truck driver's) driver's license number

(E) Truck license plate number

(2) Trailer TRU or DSC TRU information.

(A) CARB IDN (or if one is used, the alternative unique equipment identification number reported to CARB under section 2477.20(e)(6))

(B) Entry date and time

(C) Trailer or container owner's company name

(D) If unit is a trailer TRU, provide the trailer license plate number

(E) If trailer TRU or DSC TRU entered facility by truck, provide:

1. TRU operator's (or truck driver/tractor driver's) name

2. TRU operator's (or truck driver/tractor driver's) driver's license number

3. Truck owner/tractor owner's company name

4. Truck/tractor license plate number

(3) Railcar TRU information (not required for railcar TRUs that pass through and do not stop at a railyard)

(A) CARB IDN (or if one is used, the alternative unique equipment identification number reported to CARB under section 2477.20(e)(6))

(B) Entry date and time

(4) TRU gen set information.

(A) CARB IDN (or if one is used, the alternative unique equipment identification number reported to CARB under section 2477.20(e)(6))

(B) Entry date and time

(C) TRU gen set owner's company name

(D) If TRU gen set entered facility by truck, provide:

1. TRU operator's (or truck driver/tractor driver's) name

2. TRU operator's (or truck driver/tractor driver's) driver's license number

3. Truck/tractor owner's company name

4. Truck/tractor license plate number

§ 2477.21 Fees

(a) TRU Operating Fees. The term TRU as used in this subsection (a) refers to TRUs and TRU gen sets, as well as ZE truck TRUs used to comply with section 2477.5(b).

(1) Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of TRUs that operate in California to recover the costs to the Executive Officer administering the TRU ATCM.

(2) Fees shall be due and payable to the Executive Officer upon reporting a TRU in accordance with section 2477.5 (g) and every three (3) years from the date the TRU was originally reported to CARB

(3) A TRU owner or owner/operator shall submit fees to the Executive Officer in accordance with the fee schedule in Table 5.

Table 5: TRU Operating Fee Schedule

Fee Type	Fee Amount (Per TRU)
TRU Operating Fee, paid once every three years	$54

Zero-Emission TRU Operating Fee, paid once every three years	$27

(b) Applicable Facility Registration Fees.

(1) Beginning December 31, 2023, the Executive Officer shall assess and collect fees from owners or owner/operators of applicable facilities in California to recover the costs to the Executive Officer administering the TRU ATCM.

(2) Fees shall be due and payable to the Executive Officer upon registering an applicable facility in accordance with section 2477.17(a) and every three (3) years from the date of original registration.

(3) An applicable facility owner or owner/operator shall submit fees to the Executive Officer in accordance with the fee schedule in Table 6.

Table 6: Applicable Facility Registration Fee Schedule

Fee Type	**Fee Amount (Per Facility)**
Facility Registration Fee, paid once every three years	$54

§ 2477.22 Relationship to Other Law

Nothing in this section allows TRUs or TRU gen sets to operate in violation of other applicable law, including, but not limited to:

(a) California Vehicle Code.

(b) California Health and Safety Code.

(c) Any applicable ordinance, rule, or requirement as stringent as, or more stringent than, the requirements of this regulation.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.23 Authority to Request Additional Information.

The Executive Officer may request that additional information be submitted as part of the review of any extension application, exemption, or other action that delays or defers a compliance date or action.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1, Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

§ 2477.24 Severability.

If any subsection, paragraph, subparagraph, sentence, clause, phrase, or portion of this regulation is, for any reason, held invalid, unconstitutional, or unenforceable by any court of competent jurisdiction, such portion shall be deemed as a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of the regulation.

Note: Authority cited: Sections 39600, 39601, 39618, 39658, 39659, 39666, 39667, 43013, 43018, and 43019.1 Health and Safety Code. Reference: Sections 39618, 39650, 39658, 39659, 39666, 39667, 39674, 39675, 42400, 42400.1, 42400.2, 42400.3.5, 42402, 42402.2, 42410, 43013, 43018, and 43019.1, Health and Safety Code.

State of California
Air Resources Board

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities where TRUs Operate

Standardized Regulatory Impact Assessment (SRIA)

Date of Release: May 12, 2021

California Air Resources Board
1001 I Street
Sacramento, California 95814

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A. Introduction

1. Background on Transport Refrigeration Units

Transport refrigeration units (TRU) are refrigeration systems powered by integral (inside the TRU housing) diesel engines designed to control the environment of temperature-sensitive products transported in insulated trucks, trailers, shipping containers, or railcars. TRU generator sets are diesel internal combustion engine-powered generators designed to provide electric power to electrically-driven refrigeration units of any kind. TRUs can be single-temperature or multi-temperature, in which multi-temperature units can maintain multiple temperature zones. TRUs are capable of both cooling and heating.

a. Truck TRUs

Truck TRUs are used to control the environment of temperature-sensitive products transported in straight trucks where the trailer is permanently attached to the truck cab. Truck TRUs are generally used for local and regional delivery, and return to a home base each night. Due to their daily operational characteristics, TRUs installed on trucks are well suited for zero-emission technologies, such as battery-electric. A truck TRU is shown in Figure A1.

Figure A1. Truck TRU

b. Trailer TRUs

Trailer TRUs are used to control the environment of temperature-sensitive products transported in semi-trailers that detach from the truck cab. Trailer TRUs often have longer loading times due to larger cargo capacity. Trailer TRUs are used in long-haul transport, visit other states to deliver or bring in loads, and generally do not return to a home base each night. A trailer TRU is shown in Figure A2.

Figure A2. Trailer TRU

c. Domestic Shipping Container TRUs and Railcar TRUs

Domestic shipping container (DSC) TRUs are used to control the environment of temperature-sensitive products transported in DSCs that move by truck and rail. Similar to trailer TRUs, DSC TRUs are used in long-haul transport, visit other states to deliver or bring in loads, and generally do not return to a home base each night. Railcar TRUs are used to control the environment of temperature-sensitive products transported in railcars. Railcar TRUs are generally unattended during use and trips may exceed a week. A DSC TRU and railcar TRU are shown in Figure A3 and Figure A4, respectively.

Figure A3. DSC TRU

Figure A4. Railcar TRU

d. TRU Generator Sets

TRU generator sets are designed and used to provide electric power to electrically-driven refrigeration units of any kind. This includes, but is not limited to generator sets that provide electricity to electrically-powered refrigeration systems for shipping containers when they are not plugged into ocean-going ship electric power or dock shore power. Refrigerated containers are intermodal in that they can be loaded onto ocean-going vessels for marine transport, then upon arrival at a port they can be transferred to a chassis for over-the-road truck transport, or transferred to a rail stack car or flatcar for rail transport.

There are several types of TRU generator sets, including "pin-on" and "under-slung." Pin-on TRU generator sets are pinned onto the front of refrigerated shipping containers, just above the container's all-electric refrigeration system, which is built into the shipping container. A pin-on TRU generator set is shown in Figure A5.

Figure A5. Pin-on TRU Generator Set

Under-slung TRU generator sets are clamped to the frame rails of a trailer chassis that is designed for the sole purpose of transporting shipping containers on the roadway. This arrangement is also called a "belly mount." An under-slung TRU generator set is shown in Figure A6. Both pin-on and under-slung TRU generator sets are designed to provide electric power for only one refrigerated shipping container.

Figure A6. Under-slung TRU Generator Set

A third type of TRU generator set, called a "powerpack," is designed to provide power for a number of refrigerated shipping containers, in which several diesel generators are installed on a shipping container. These powerpack containers are loaded onto railcars and connected to multiple refrigerated shipping containers on adjacent railcars. A powerpack TRU generator set is shown in Figure A7.

Figure A7. Powerpack TRU Generator Set

2. Regulatory History

The California Air Resources Board (CARB or Board) adopted the Airborne Toxic Control Measure for In-Use Diesel-Fueled TRUs and TRU Generator Sets, and Facilities where TRUs Operate (TRU ATCM; title 13, California Code of Regulations, section 2477) in 2004.[1] The purpose of the TRU ATCM is to reduce diesel particulate matter (diesel PM) from TRUs and TRU generator sets, as well as reduce near-source health risk at facilities where TRUs operate. The TRU ATCM requires that TRU engines that operate in California meet specific in-use performance standards that require diesel PM emissions to be reduced in accordance with a phased compliance schedule. The phased compliance schedule is based on the model year (MY) of the TRU engine and a seven-year operational life for the equipment. At the end of the year in which the engine becomes seven years old, compliance action shall be taken to reduce diesel PM emissions. The TRU ATCM includes two levels of stringency that were phased-in over time. The first phase, beginning in 2008, is the low emission TRU (LETRU) performance standards. The second phase, beginning in 2010, is the ultra-low emission TRU (ULETRU) performance standards. Ultimately, all TRU engines are required to meet the ULETRU performance standards and have 85 percent PM control (compared to an uncontrolled Tier 0 engine) to be fully compliant with the TRU ATCM.

CARB subsequently amended the TRU ATCM in 2010 and 2011. The 2010 amendments included additional recordkeeping and reporting requirements for TRU original equipment manufacturers (OEM) that directly or indirectly sell, or offer for sale, TRUs to the California market, as well as more stringent definitions for compliance. The 2011 amendments extended certain TRU performance standard compliance deadlines from those originally contained in the 2004 regulation and

[1] California Air Resources Board, Public Hearing to Consider the Adoption of the Proposed Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities where TRUs Operate, Staff Report: Initial Statement of Reasons, October 2003. (web link: https://ww3.arb.ca.gov/regact/trude03/isor.pdf)

included provisions to improve enforceability. The TRU ATCM is fully implemented and TRU owners have the following compliance options:

- Use a TRU equipped with an engine that meets the United States Environmental Protection Agency (U.S. EPA) Tier 4 final emission standards for 25-50 horsepower engines (meets ULETRU).
- Retrofit the existing TRU with a Level 3 Verified Diesel Emission Control Strategy (VDECS) with 85 percent PM control (meets ULETRU).
- Use an alternative technology that eliminates TRU diesel engine operation (and emissions) while at a facility. Alternative technologies include electrification, cryogenic refrigeration systems, alternative fuel systems, exclusive use of alternative diesel fuel, fuel cell-powered refrigeration systems, and other technologies that eliminate emissions while at a facility (meets ULETRU).
- Replace the existing unit (engine and refrigeration system) with a new TRU equipped with an engine that meets the U.S. EPA Tier 4 final emission standards for less than 25 horsepower engines, which would be in compliance until the seventh year after the replacement TRU's engine MY (does not meet ULETRU).

3. Proposed Regulatory Action

CARB staff are proposing amendments to the TRU ATCM, hereafter referred to as the "Proposed Amendments." The Proposed Amendments are needed to achieve additional emission reductions by transitioning diesel-powered truck TRUs to zero-emission, as well as requiring newly manufactured TRU engines in the remaining categories to meet a PM emission standard, the use of lower global warming potential (GWP) refrigerant, facility registration and reporting, expanded TRU reporting and labeling, and fees. The Proposed Amendments are designed to begin the transition of TRUs to zero-emission technology, which is part of California's holistic plan to address challenging mandates and needs for public health protection, and to meet air quality standards and climate goals. Key elements of the Proposed Amendments include the following:

By December 31, 2022:

- All newly manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California shall use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all.
- MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines shall meet a PM emission standard of 0.02 grams per brake horsepower-hour (g/hp-hr) or lower.
    - Note: MY 2022 and older trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines would continue to operate under the current TRU ATCM requirements, in which they shall meet ULETRU by December 31st of the seventh year after the engine MY. For example, a trailer TRU equipped with a MY 2020 engine would have to meet ULETRU by December 31, 2027.

By December 31, 2023:

- Applicable Facility[2] owners shall register their facility with CARB, pay registration fees every three years, and report all TRUs that operate at their facility to CARB quarterly, or alternatively attest that only compliant TRUs (have a valid CARB compliance label or determined as compliant on CARB's website) operate at their facility.
- TRU owners shall report All TRUs that operate in California to CARB, regardless of where they are based.
- TRU owners shall pay TRU operating fees and affix CARB compliance labels to their TRU every three years, for each TRU operated in California.
- TRU owners shall turnover at least 15 percent of their truck TRU fleet (defined as truck TRUs operating in California) to zero-emission technology each year (for 7 years). All truck TRUs operating in California shall be zero-emission by December 31, 2029.

4. Statement of the Need of the Proposed Amendments

In the coming years, California needs to continue to build upon its successful efforts to meet critical risk reduction, air quality, and climate goals. Achieving these goals will provide much needed public health protection for the millions of Californians that still breathe unhealthy air, reduce exposure to air toxics, and help to meet current health based ambient air quality standards across California. Additionally, meeting California's greenhouse gas (GHG) emission reduction targets is an essential part of the global action needed to slow global warming and achieve climate stabilization. The Proposed Amendments will achieve PM, nitrogen oxides (NOx), and GHG emission reductions from diesel-powered TRUs and increase the use of zero-emission technology in the off-road sector, which is needed to meet these complementary goals.

a. Need to Reduce Risk

Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions from the diesel engines that power TRUs. There are several occurrences across the State where communities contain "groups" or "clusters" of facilities where TRUs operate. In many cases, these facilities are located in or near communities that are classified as disadvantaged by the California Environmental Protection Agency (CalEPA). CalEPA uses the California Communities Environmental Health Screening Tool (CalEnviroScreen) to rank California communities based on environmental pollution burden and socio-economic

[2] An applicable facility is defined in the Proposed Amendments as a refrigerated warehouse or distribution center with a building size greater than or equal to 20,000 square feet, a grocery store with a building size greater than or equal to 15,000 square feet, a seaport facility, or an intermodal railyard if one or more TRUs operate within the legal property boundary of the facility.

indicators.[3] Exposure to diesel PM is a main contributor to these metrics for many communities ranked in the top 10th percentile statewide on CalEnviroScreen.

CARB staff performed a health risk assessment to evaluate the localized cancer risk impacts attributable to emissions from the diesel engines that power TRUs at cold storage warehouses (CSW) and grocery stores. The health risk assessment estimated the increase in potential cancer risk that would result under a business-as-usual scenario and emphasized the need for further emission reductions from TRUs to provide public health benefits and reduce the cancer risk burden to communities surrounding facilities where they operate. Additional details on the health risk assessment and health benefits of the Proposed Amendments are discussed in Section B.4.a.

b. Need to Reduce PM2.5 and NOx Emissions

Progress has been achieved in reducing PM2.5 and NOx emissions from mobile sources statewide through implementation of CARB's existing programs. These programs are expected to continue to provide further emission reductions, helping the State to meet air quality standards. However, challenges remain in meeting the ambient air quality standards for ozone and PM2.5 in two areas of the State with extreme air quality issues: the South Coast Air Basin and San Joaquin Valley. The near-term targets for these areas are a 2023 deadline for attainment of the 80 parts per billion (ppb) 8-hour ozone standard, 2024 for the 35 microgram per cubic meter (µg/m3) 24-hour PM2.5 standard, and 2025 for the 12 µg/m3 annual PM2.5 standard. There are also mid-term attainment years of 2031 and 2037 for the more recent 8-hour ozone standards of 75 ppb and 70 ppb, respectively.[4] NOx is a precursor to secondary PM2.5 formation. Consequently, reductions in NOx emissions also provide benefits to help meet the PM2.5 standards. Additional PM2.5 and NOx reductions from all freight sources, including TRUs, are essential to meeting these air quality standards.

c. Need to Reduce GHG Emissions

To date, California has made significant progress towards meeting the goals of Senate Bill (SB) 32 (Pavley, Chapter 249, Statutes of 2016).[5] SB 32 requires California to reduce GHG emissions to at least 40 percent below 1990 levels by 2030. Despite the progress made, more needs to be done.

Black carbon (soot) is emitted from burning fuels such as diesel. Hydrofluorocarbons (HFC) are synthetic gases that are used in a variety of applications, including refrigeration. Black carbon and HFCs are short-lived climate pollutants (SLCP) which are powerful climate forcers that remain in the atmosphere for a much shorter period

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[3] Office of Environmental Health Hazard Assessment, CalEnviroScreen 3.0, June 25, 2018. (web link: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)

[4] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)

[5] California Health and Safety Code § 38566, Division 25.5, Senate Bill No. 32, September 8, 2016. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB32)

of time than longer-lived climate pollutants, such as carbon dioxide (CO2), but are more potent when measured in terms of GWP, which can be tens, hundreds, or even thousands of times greater than CO2.[6]

SB 605 (Lara, Chapter 523, Statutes of 2014)[7] requires CARB to develop a plan to reduce emissions of SLCPs, and SB 1383 (Lara, Chapter 395, Statutes of 2016)[8] requires the Board to approve and begin implementing the plan by January 1, 2018. SB 1383 also sets targets for statewide reductions in SLCP emissions of 40 percent below 2013 levels by 2030 for methane and HFCs, and 50 percent below 2013 levels by 2030 for black carbon. Reductions in GHGs, including SLCPs like black carbon and HFC, from TRUs are needed to achieve the State's multiple GHG emission reduction targets and related climate goals.

d. Need to Address Emergence and Growth in the Number of Less than 25 Horsepower Units

The Proposed Amendments are needed to address the emergence and growth in the number of trailer TRUs equipped with engines less than 25 horsepower. The 2019 update to the statewide TRU emission inventory[9] indicates growing sales of units with less than 25 horsepower engines, which is in contrast to previous inventories where all trailer TRU engines were over 25 horsepower. The California and federal PM off-road emission standard for engines less than 25 horsepower is 15 times higher (i.e., less stringent) than the standard for engines greater than 25 horsepower. As a result, diesel PM emissions have not been reduced under the TRU ATCM as expected. Similar trends are also expected for DSC TRUs, railcar TRUs, and TRU generator sets. Based on the TRU emission inventory, the number of TRUs equipped with engines less than 25 horsepower will become responsible for the majority of PM emissions from TRUs in the near future, if current trends continue. The Proposed Amendments address this growth in emissions by requiring all MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines to meet a PM standard that aligns with the U.S. EPA Tier 4 final PM emission standard for engines greater than 25 horsepower.

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[6] California Air Resources Board, Short-Lived Climate Pollutant Reduction Strategy, March 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/2018-12/final_slcp_report%20Final%202017.pdf)
[7] California Health and Safety Code § 39730, Division 26, Senate Bill No. 605, Short-lived climate pollutants, September 21, 2014. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201320140SB605)
[8] California Health and Safety Code § 39730, Division 30, Senate Bill No. 1383, Short-lived climate pollutants: methane emissions: dairy and livestock: organic waste: landfills, September 19, 2016. (web link: http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB1383)
[9] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)

a. Need to Address State Policy and Plans Directing CARB to Achieve Further Reductions from TRUs

The Proposed Amendments are needed to address the State policies and plans summarized below directing CARB to achieve additional diesel emission reductions.

i. Executive Order N-79-20

In September 2020, Governor Newsom issued Executive Order (EO) N-79-20,[10] which directed CARB, in coordination with other State agencies, U.S. EPA, and local air districts, to develop and propose technologically-feasible and cost-effective strategies to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035. The Proposed Amendments support the directive of the EO by transitioning diesel-powered truck TRUs to zero-emission technology.

ii. 2020 Mobile Source Strategy

CARB released the Revised Draft 2020 Mobile Source Strategy (MSS)[11] in April 2021. The strategy document looks at existing and emerging technologies to reduce emissions from California's transportation sector, including cars, trucks, trains, ships, and other on-road and off-road sources. The strategies laid out in the MSS illustrate the technology mixes needed for the State to meet its various clean air goals, including federal ambient air quality standards, community risk reduction, and ambitious mid-and long-term climate change targets. The MSS includes a rapid electrification scenario for TRUs, increasing 10 percent each year beginning in 2024, highlighting the need to transition diesel-powered TRUs to zero-emission.

iii. 2017 State Strategy for the State Implementation Plan

The federal Clean Air Act requires areas that exceed the health-based national ambient air quality standards to develop SIPs that demonstrate how they will attain the standards by specified dates. In March 2017, the Board adopted the State Strategy for the State Implementation Plan (State SIP Strategy), which outlines CARB's comprehensive strategy to reduce emissions from mobile sources to meet critical air quality and climate goals over the next 15 years.[12] The State SIP Strategy includes statewide control measures CARB committed to bring to the Board for adoption to achieve the NOx reductions needed for attainment by 2023 and 2031. The Proposed Amendments are one of the control measures that is committed in the SIP.

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[10] Executive Order N-79-20, State of California Executive Order signed by Governor Gavin Newsom, September 23, 2020. (web link: https://www.gov.ca.gov/wp-content/uploads/2020/09/9.23.20-EO-N-79-20-Climate.pdf)

[11] California Air Resources Board, Revised Draft 2020 Mobile Source Strategy, April 23, 2021. (web link: https://ww2.arb.ca.gov/sites/default/files/2021-04/Revised_Draft_2020_Mobile_Source_Strategy.pdf)

[12] California Air Resources Board, Revised Proposed 2016 State Strategy for the State Implementation Plan, March 7, 2017. (web link: https://www.arb.ca.gov/planning/sip/2016sip/rev2016statesip.pdf)

iv. Assembly Bill 617

The State of California placed additional emphasis on protecting local communities from the harmful effects of air pollution through the passage of Assembly Bill (AB) 617 (Garcia, Chapter 136, Statutes of 2017).[13] AB 617 is a significant piece of air quality legislation that highlights the need for further emission reductions in communities with high exposure burdens. AB 617 requires CARB to pursue new community-focused and community-driven actions to reduce air pollution and improve public health in communities that experience disproportionate burdens from exposure to air pollutants. The Proposed Amendments are expected to reduce diesel TRU emissions and exposure statewide, and will be of particular benefit in disadvantaged communities experiencing disproportionate burdens.

v. California's 2017 Climate Change Scoping Plan

In 2006, Governor Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006 (Núñez, Chapter 488, Statutes of 2006)[14] to address global climate change. AB 32 directed CARB to develop a scoping plan identifying integrated and cost-effective regional, national, and international GHG reduction programs. CARB adopted the AB 32 Scoping Plan in 2008 and subsequent updates in 2013 and 2017. California's 2017 Climate Change Scoping Plan[15] outlines the State's strategy to achieve its 2030 GHG target, and includes control measures for high-GWP refrigerants and diesel-powered TRUs.

vi. Executive Order B-32-15 and Sustainable Freight Action Plan

In July 2015, Governor Brown issued EO B-32-15,[16] which directed the secretaries of the California State Transportation Agency, CalEPA, and California Natural Resources Agency to lead other relevant State departments in developing an integrated action plan by July 2016 that "establishes clear targets to improve freight efficiency, transition to zero-emission technologies, and increase competitiveness of California's freight system." In response to the directive, the California State Transportation Agency, CalEPA, California Natural Resources Agency, CARB, California Department of Transportation, California Energy Commission, and Governor's Office of Business and Economic Development developed the California Sustainable Freight Action

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[13] California Health and Safety Code § 40920.6, 42400, 42402, 39607.1, 40920.8, 42411, 42705.5, and 44391.2, Division 26, Assembly Bill No. 617, Nonvehicular Air Pollution: Criteria Air Pollutants and Toxic Air Contaminants, July 26, 2017. (web link: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB617)

[14] California Health and Safety Code § 38500 - 38599, Division 25.5, Assembly Bill No. 32, California Global Warming Solutions Act of 2006, September 27, 2006. (web link: http://www.leginfo.ca.gov/pub/05- 06/bill/asm/ab_0001-0050/ab_32_bill_20060927_chaptered.pdf)

[15] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/scopingplan/scoping_plan_2017.pdf)

[16] Executive Order B-32-15, State of California Executive Order signed by Governor Edmund G. (Jerry) Brown Jr., July 17, 2015. (web link: https://www.ca.gov/archive/gov39/2015/07/17/news19046/index.html)

Plan.[17] The plan establishes clear targets to improve freight efficiency, transition to zero-emission technologies (deployment of over 100,000 freight vehicles and equipment capable of zero-emission operation and maximize near-zero emission freight vehicles and equipment powered by renewable energy by 2030), and increase competitiveness of California's freight system. The 2016 California Sustainable Freight Action Plan includes a measure to reduce emissions from diesel-powered TRUs as a State agency action to advance the objectives of the EO and the Sustainable Freight Action Plan.

i. Sustainable Freight Pathways to Zero and Near-Zero Discussion Document

In April 2015, CARB released the Sustainable Freight Pathways to Zero and Near-Zero Discussion Document (Discussion Document)[18] in response to Board Resolution 14-2,[19] which directed CARB to identify and prioritize actions to move California toward a sustainable freight transport system. The Discussion Document set out CARB's vision of a clean freight system, and included immediate and potential near-term CARB actions to be developed for future Board consideration. The near-term CARB measures identified in the Discussion Document included the development of a regulation to achieve additional emission reductions from diesel-powered TRUs.

5. Major Regulation Determination

Per Department of Finance regulations (title 1, California Code of Regulations, sections 2000-2004),[20] the Proposed Amendments are a major regulation requiring a SRIA because the economic impact of the regulation is projected to exceed $50 million in a 12-month period. The Proposed Amendments result in direct costs exceeding $50 million each year beginning in 2025. The Proposed Amendments will become effective October 1, 2022 and be fully implemented by December 31, 2030. The SRIA analyzes costs to comply with the Proposed Amendments from 2022 to 2034.

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[17] California Department of Transportation et al., California Sustainable Freight Action Plan, July 2016. (web link: https://dot.ca.gov/-/media/dot-media/programs/transportation-planning/documents/main-document-final-07272016v2.pdf)

[18] California Air Resources Board, Sustainable Freight Pathways to Zero and Near-Zero Emissions Discussion Document, April 23, 2015. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-09/Sustainable%20Freight%20Pathways%20to%20Zero%20and%20Near-Zero%20Emissions%20Discussion%20Document.pdf)

[19] CARB Board Resolution 14-2, Sustainable Freight Strategy Update, January 23, 2014. (web link: https://arb.ca.gov/board/res/2014/res14-2.pdf)

[20] California Code of Regulations § 2000-2004, Division 3, Standardized Regulatory Impact Assessment for Major Regulations. (web link: https://govt.westlaw.com/calregs/Document/IAA1C7210595511E3BFC8D5B3615C797F?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1#co_anchor_IA8F81D2F7A734A449389719B2F838650)

6. Baseline Information

CARB staff estimated the economic impacts of the Proposed Amendments by evaluating the economic and emission impacts of the proposal relative to the baseline (Baseline) each year for the analysis period (from 2022 to 2034). The Baseline for the Proposed Amendments reflects full compliance with existing federal emission standards for off-road diesel engines and diesel fuel, as well as with the current TRU ATCM requirements.

For the SRIA, staff used the statewide TRU emission inventory model to estimate emissions under the Baseline and Proposed Amendments, as well as to forecast the number of TRUs each year from 2022 to 2034 for which there are direct costs or benefits associated with the Proposed Amendments. Detailed information on the data sources and methodology used in the statewide TRU emission inventory are described in CARB's Draft 2019 Update to the Emission Inventory for TRUs (2019 Update).[21] While the emission inventory methodology is the same as described in the 2019 Update, the emission impacts reported in the SRIA reflect full compliance with existing regulations.

The Proposed Amendments would impact approximately 8,800 truck TRUs and 269,000 TRUs in the remaining TRU categories. Approximately 95 percent of truck TRU fleets, and 90 percent of trailer TRU fleets are considered small business, respectively. The Proposed Amendments would also impose requirements on approximately 7,800 applicable facilities. Approximately 96 percent of refrigerated WHDCs, and 90 percent of grocery stores are considered small business, respectively. Impacts to these entities are discussed in detail in the Typical and Small Business sections (Section C.2 and C.3).

Figure A8 and Figure A9 show the Baseline statewide PM2.5 and NOx emissions by TRU category in tons per year from 2022 to 2034, respectively. The slight reduction in emissions during the 2027 to 2028 timeframe is because the SRIA requires an analysis of the Proposed Amendments compared to the Baseline, in which full compliance with existing regulations is assumed. The full compliance assumption causes significant turnover in 2020 to force compliance with the TRU ATCM, creating a population surge, particularly in 23 to 25 horsepower units. This population surge will hit the next compliance deadline in 2027.

[21] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)

Figure A8. Baseline Statewide PM2.5 Emissions by TRU Category from 2022 to 2034

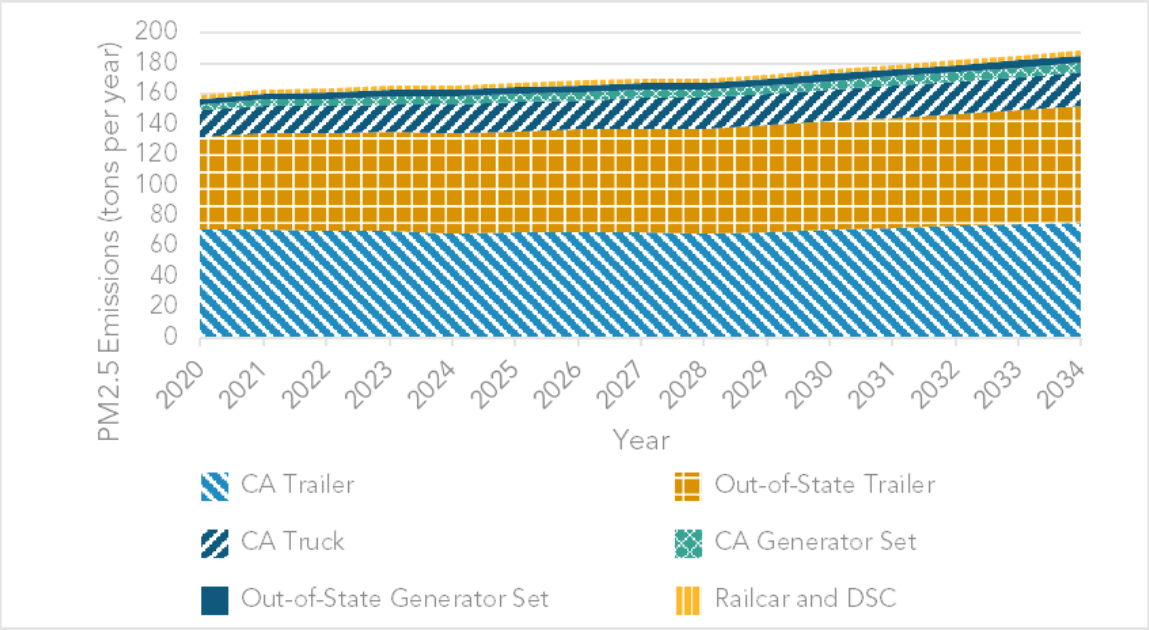
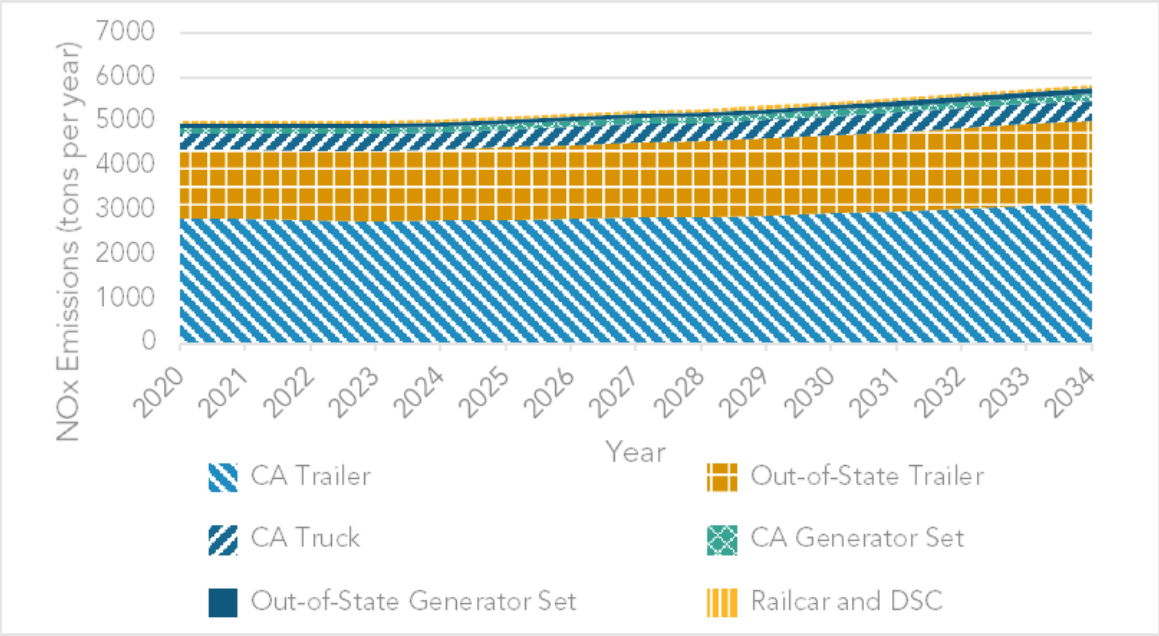


Figure A9. Baseline Statewide NOx Emissions by TRU Category from 2022 to 2034



The current economic situation may have had a slight impact on the refrigerated transport industry and the trajectory of TRU activity, as there have been changes in human activity that resulted in disruptions to the supply chain. In general, consumers shifted food consumption from restaurants to homes. However, while expenditures on food away from home decreased, expenditures on food from grocery stores and other

retail food establishments have increased. In the United States, consumer spending on food and beverages (purchased for off-premises consumption) increased by $84 billion from 2019 to 2020, the largest growth of any sector.[22] Additionally, the national average spot rates for refrigerated freight in December 2020 were at a year-to-date high and well above any level reached in 2019.[23] Staff do not anticipate the economic downturn will have a significant impact on future growth in refrigerated transport, and therefore used historical growth trends for the industry, as described in Section B.1.a.

The first regulatory compliance date that would result in costs to TRU or applicable facility owners to comply with the Proposed Amendments is December 31, 2022. Staff believe this provides adequate time for affected industry to revert to normal economic conditions. In addition, several adjustments were made to the model used to determine the macroeconomic impacts of the Proposed Amendments to reflect the current economic conditions, which are described in Section E.

7. Public Outreach and Input

CARB staff have engaged in an extensive public process since development of the Proposed Amendments began in early 2016. Staff conducted meetings with members of impacted communities, environmental justice advocates, local air districts, industry stakeholders (including TRU owners and operators, TRU dealers and service centers, truck and trailer leasing companies, trade associations, TRU OEMs, electric utilities, freight facility owners and operators, and infrastructure manufacturers), and other interested parties. Meeting formats included public workshops, work group meetings, community meetings, informal meetings, phone calls, and site visits.

a. Public Workshops

CARB staff conducted eight public workshops to solicit stakeholder feedback and discuss regulatory concepts, methodology and data used to develop the emission inventory and conduct a health risk assessment, infrastructure considerations, and compliance and enforcement mechanisms. Staff notified stakeholders of all workshops with the issuance of a public notice at least three weeks prior to their occurrence. Staff posted the notices to the TRU Regulation website[24] and distributed them through

[22] Thomas Mitterling, Nirai Tomass, and Kelsey Wu, "The decline and recovery of consumer spending in the US," December 14, 2020. (web link: https://www.brookings.edu/blog/future-development/2020/12/14/the-decline-and-recovery-of-consumer-spending-in-the-us/)

[23] Freight Waves Passport, "Reefer markets: Ending the year with a bang," December 11, 2020. (web link: https://passport.freightwaves.com/research/reefer-markets-ending-the-year-with-a-bang)

[24] California Air Resources Board, New Transport Refrigeration Unit Regulation in Development Website. (web link: https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit/new-transport-refrigeration-unit-regulation)

several public list serves that include over 17,000 recipients.[25] Each of these workshops was open to all members of the public. Staff posted meeting materials, including agendas, slide presentations, and draft regulatory language, on CARB's TRU Regulation website in advance of the workshops.

Staff held an initial workshop on April 13, 2016 in Sacramento, California. During this workshop, staff discussed concepts to reduce emissions from stationary TRU operations, and solicited stakeholder feedback and suggestions on additional ideas. The workshop was webcast with the ability to submit questions online to ensure all interested parties could access the information and participate in the discussion.

Staff conducted a second set of public workshops on August 16, 2017 in Sacramento, California, and on August 18, 2017 in Riverside, California. During these workshops, staff presented a draft concept to limit the amount of time that diesel-powered TRUs operate while they are stationary, as well as require an overall zero-emission mode operating time. Staff also discussed emission inventory updates, survey results, and information on available incentive funding. During these workshops, staff introduced stationary operating time limit and electronic telematics system requirements. The Sacramento workshop included 37 participants and 80 webcast participants. The Sacramento workshop was webcast with the ability to submit questions online to ensure the opportunity for broader public participation. The Riverside workshop included 21 participants.

Staff held a third set of public workshops on August 28, 2019 in Fontana, California, on September 3, 2019 in Fresno, California, and on September 11, 2019 in Sacramento, California. In response to the high costs associated with the concept presented at the previous workshops, staff presented a revised concept to require truck TRUs to transition to zero-emission technology, trailer TRUs to utilize zero-emission operation while stationary for more than 15 minutes at applicable facilities, and applicable facilities to install infrastructure to support zero-emission operation. During these workshops, staff introduced diesel emission standards and lower GWP refrigerant requirements. Staff also discussed infrastructure considerations, enforcement and compliance mechanisms, funding opportunities, and solicited stakeholder input on the concept as well as alternatives for the SRIA and Environmental Assessment prepared for the Proposed Amendments. These workshops therefore also served as California Environmental Quality Act (CEQA) scoping meetings. The Fontana workshop included 30 participants, the Fresno workshop included 16 participants, and the Sacramento workshop included 35 participants and 101 webcast participants. The Sacramento workshop was webcast with the ability to submit questions online to ensure the opportunity for broader public participation.

[25] Number of subscribers for the following CARB lists as of January 28, 2021: Agricultural Activities, Community Air, Environmental Justice ChERRP, Commerce, Environmental Justice ChERRP, Mira Loma, Environmental Justice ChERRP, Wilmington, Goods Movement Emission Reduction Program, Port Truck, Reduction of GHG Emissions from Refrigerated Shipping Containers, Stationary Equipment Refrigerant Management Program, Sustainable Freight Transport Initiative, and Transport Refrigeration Units.

Staff held a non-regulatory workshop on October 31, 2019 in Sacramento, California, to discuss emission inventory updates and the preliminary health analyses for the draft concept of the Proposed Amendments. At this workshop, staff discussed updates to the statewide TRU emission inventory and presented draft results from these updates. Staff also presented the methodology, data inputs, and results related to the health impacts from TRUs. The workshop included 22 participants. The workshop was webcast with the ability to submit questions online to ensure the opportunity for broader public participation.

Staff conducted a final workshop on March 19, 2020 via teleconference to discuss the updated concept in response to input received on the draft concept presented at workshops in August and September of 2019. During the call, staff discussed refined regulatory concepts, draft regulatory language, and updated health risk and emission inventory estimates. The teleconference included 299 participants. To facilitate the exchange of information, staff created an informal comment submittal form available for stakeholders to submit comments on the draft regulatory language. The teleconference was open to the public and staff encouraged participation by all parties.

b. Work Group Meetings

CARB staff conducted three work group meetings to solicit stakeholder feedback and discuss regulatory concepts, costs, infrastructure considerations, and compliance and enforcement mechanisms.

Staff held a work group meeting on November 3, 2017 in Sacramento, California to discuss costs, fleet operational needs, and technology readiness to successfully deploy and expand the zero-emission TRU market, as well as enforcement and infrastructure issues identified at the August 2017 workshops. Staff invited key stakeholders. Participants included environmental justice advocacy groups, local air districts, TRU owners and operators, TRU dealers, trade associations, TRU OEMs, electric utilities, freight facility owners and operators, infrastructure manufacturers, and electronic telematics system (ETS) suppliers. During the meeting, staff again solicited stakeholder suggestions for regulatory alternatives. The work group meeting included 47 participants.

Staff held a second work group meeting on December 17, 2019 in Sacramento, California, to discuss infrastructure-related issues identified at the workshops held in August and September 2019. Staff invited key stakeholders. Participants included TRU owners and operators, trade associations, TRU OEMs, electric utilities, freight facility owners and operators, and infrastructure manufacturers. During the meeting, staff discussed the proposed timeline for infrastructure, electricity costs, potential inclusion of a plug standard, and infrastructure-related cost data and assumptions. Stakeholders indicated that CARB should not include a plug standard in the Proposed Amendments and allow the market and ongoing industry efforts to develop one. The work group meeting included 22 participants.

Staff held a third work group meeting on July 29, 2020 via webinar to discuss enforcement-related issues identified during the workshops held in August 2019, September 2019, and March 2020. The work group meeting was open to the public. During the meeting, staff outlined potential enforcement strategies for each of the requirements in the Proposed Amendments and solicited stakeholder feedback. The work group meeting included 223 participants.

c. Stakeholder Meetings and Site Visits

As of April 2021, CARB staff have conducted more than 160 informal meetings, phone calls, and site visits with a broad group of stakeholders to develop the Proposed Amendments, discuss regulatory concepts, and gather input. Stakeholders included members of impacted communities, environmental justice advocates, local air districts, TRU owners and operators, trade associations, TRU OEMs, TRU dealers and service centers, truck and trailer dealers, TRU truck and trailer leasing companies, freight brokers, forwarders, shippers, receivers, freight facility owners and operators, and other interested parties.

In addition to meeting with a wide range of stakeholders, staff also conducted targeted outreach to potential applicable facilities. This included mailing over 40,000 postcards to facilities with refrigerated operations potentially affected by the Proposed Amendments to notify them of upcoming workshops and direct them to the TRU Regulation website for more information. Staff also visited several facilities, including refrigerated warehouses, distribution centers, CSWs, port terminals, and railyards to learn more about their business operations and to better understand potential implementation challenges associated with the Proposed Amendments.

Staff also held several meetings with agriculture stakeholders to discuss the Proposed Amendments. In 2017, staff traveled to Fresno to discuss issues regarding freight facilities and TRUs. Staff held conference calls with several agricultural association representatives on August 15, 2018 and March 11, 2019 to brief them on the Proposed Amendments and received several comments regarding the industry's seasonal operations. On September 3, 2019, staff traveled to Fresno to conduct a public workshop on the Proposed Amendments. Staff also provided an update to the San Joaquin Valley Air Pollution Control District Citizens Advisory Committee at their March 3, 2020 meeting and met with stakeholders to discuss the Proposed Amendments.

d. Informational Documents

Staff developed two informational documents that were made available to the public. In August 2020, staff posted a preliminary cost document on the TRU Regulation website for public comment which outlined the cost inputs and assumptions to be used for the economic analysis of the Proposed Amendments. In January 2021, in response to stakeholder questions received, staff posted an informational document on the TRU Regulation website to provide additional clarification on the key elements included in the Proposed Amendments.

B. Benefits

The Proposed Amendments are designed to reduce toxic air contaminant, criteria pollutant, and GHG emissions by transitioning diesel-powered truck TRUs to zero-emission, as well as requiring newly manufactured TRU engines in the remaining categories to meet a PM emission standard, and the use of lower GWP refrigerant. Cumulatively, from 2022 to 2034, the Proposed Amendments are expected to reduce statewide TRU emissions by approximately 1,258 tons of PM2.5, 3,515 tons of NOx, and 1.42 million metric tonnes of carbon dioxide equivalents (MMTCO2e), relative to the Baseline. The total statewide valuation of avoided health outcomes from 2022 to 2034 is approximately $1.75 billion.

1. Emission Benefits

a. Inventory Methodology

CARB estimates TRU emissions in California using the statewide TRU emission inventory model. The data sources and methodology used in the statewide TRU emission inventory model are described in CARB's Draft 2019 Update to Emissions Inventory for TRUs.[26]

TRU populations are based on data reported in the Air Resources Board Equipment Registration (ARBER) System.[27] Under the current TRU ATCM, owners of TRUs based in California are required to report their TRUs to CARB. Owners of TRUs that are based outside California may report their TRUs to CARB to facilitate travel within the State, but are not required to do so. ARBER maintains information for all TRUs reported to CARB. The out-of-state TRU populations are scaled up based on heavy-duty truck populations from the CARB Emission Factor (EMFAC) inventory model.[28,29] Additionally, the ARBER populations are scaled up 3.7 percent to account for non-reported TRUs, which is based on CARB enforcement data.[30]

New sales population estimates also come from the statewide TRU emission inventory and are based on expected turnover and growth.[31] Turnover is dependent on the

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[26] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/cold-storage/documents/hra_emissioninventory2019.pdf)

[27] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)

[28] California Air Resources Board, EMFAC2017 Database. (web link: https://www.arb.ca.gov/emfac/2017/)

[29] Since the TRU inventory update, a new version of EMFAC (EMFAC2021) has been released. However, the in-state versus out-of-state heavy-duty truck populations in EMFAC2021 are not significantly different from those in EMFAC2017.

[30] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/cold-storage/documents/hra_emissioninventory2019.pdf)

[31] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/cold-storage/documents/hra_emissioninventory2019.pdf)

number of units that will likely retire in a given year utilizing a survival curve, which characterizes the retirement behavior for different ages. The annual population growth rate is determined primarily by TRU population trends from Americas Commercial Transportation Research (ACT Research). Based on TRU population data from ACT Research, the annual population growth reflected in the TRU emission inventory is 1.6 percent.[32]

The current inventory uses a 2019 baseline and forecasts emissions for future years for each TRU category and pollutant. The emission inventory for any given year is calculated by combining the TRU population, hours of TRU engine activity, TRU engine horsepower, load factors, emission factors, and fuel correction factors, in the following equation:

$$Emissions = Population \times Activity \times Hp \times LF \times EF \times FCF$$

Where:

Population = Count of equipment population (unit-less)
Activity = Time the engine is running (hours)
Hp = Horsepower of the engine (maximum brake horsepower)
LF = Load factor (unit-less)
EF = Emission factor (grams per kilowatt-hour) specific to horsepower and MY and pollutant, and includes deterioration
FCF = Fuel correction factor based on calendar year (unit-less)

CARB staff estimated PM2.5, NOx, and GHG emissions for the Proposed Amendments compared to the Baseline. Staff quantified emission benefits from 2022 to 2034, which is consistent with the timeframe used for the cost analysis. Table B1 summarizes the assumptions staff used to model the emission reductions for each emission control requirement of the Proposed Amendments.

Table B1. Emission Inventory Modeling Assumptions

Requirement	Modeling Assumption
Zero-emission truck TRUs	Modeled by a linear reduction in the activity, fuel, and emissions from diesel-powered truck TRUs.
Newly manufactured trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines meet PM emission standard	Modeled by reducing PM emissions for new sales of trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets by 85 percent, for those TRUs that do not already meet the 0.02 PM standard.
Newly manufactured truck TRUs, trailer TRUs, and DSC TRUs use lower GWP refrigerant	Modeled by reducing the CO2-equivalent emissions resulting from the use of R-452A refrigerant (GWP=2,141) compared to the current predominantly used R-404A refrigerant (GWP=3,922) for newly manufactured truck TRUs, trailer TRUs, and DSC TRUs.

[32] Americas Commercial Transportation Research Co., LLC, U.S. Reefer Population Growth, Proprietary, 2018. (web link: http://www.actresearch.net)

b. Anticipated Emission Benefits

The Proposed Amendments are expected to reduce PM2.5, NOx, and GHG emissions from TRUs beyond levels that would be achieved under the current TRU ATCM. Staff estimate that from 2022 to 2034, the Proposed Amendments would further reduce cumulative statewide emissions by approximately 1,258 tons of PM2.5, 3,515 tons of NOx, and 1.42 MMTCO2e. PM2.5 emission reductions would begin in 2023 when newly manufactured TRU engines would be required to meet a PM emission standard, NOx emission reductions would begin in 2024 when diesel-powered truck TRUs begin to transition to zero-emission technology, and GHG reductions would begin in 2023 when newly manufactured TRUs would be required to use lower GWP refrigerant. Table B2 shows the estimated annual emission reductions that would result from the Proposed Amendments from 2022 to 2034.

Table B2. Estimated Annual PM2.5, NOx, and GHG Emission Reductions Resulting from the Proposed Amendments from 2022 to 2034

Year	PM2.5 (tons)	NOx (tons)	GHG (MMTCO2e)[33]
2022	0	0	0.00
2023	16	0	0.01
2024	32	59	0.03
2025	48	119	0.05
2026	65	181	0.07
2027	83	246	0.09
2028	115	312	0.12
2029	133	381	0.14
2030	148	430	0.16
2031	151	436	0.17
2032	153	443	0.18
2033	155	451	0.19
2034	158	458	0.20
Total	1,258	3,515	1.42

Figure B1, Figure B2, and Figure B3 show the PM2.5, NOx, and GHG emissions impact of the Proposed Amendments relative to the Baseline from 2022 to 2034.

[33] Includes GHG emission reductions from TRU engine and refrigerant.

Figure B1. Statewide PM2.5 Emissions from TRUs under the Baseline and Proposed Amendments from 2022 to 2034

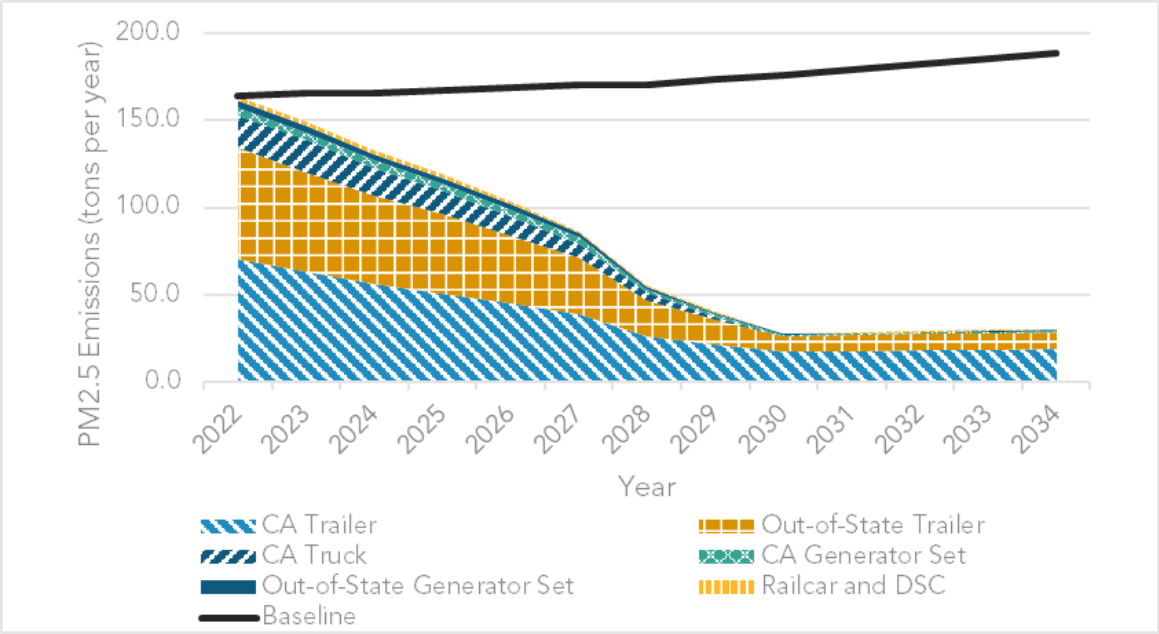


Figure B2. Statewide NOx Emissions from TRUs under the Baseline and Proposed Amendments from 2022 to 2034

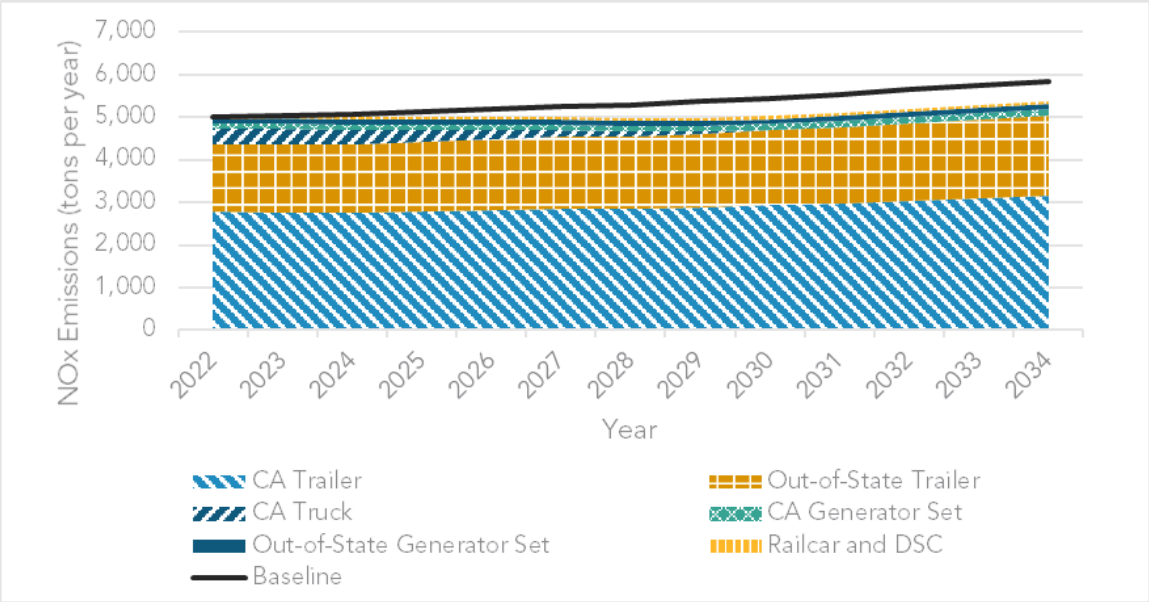
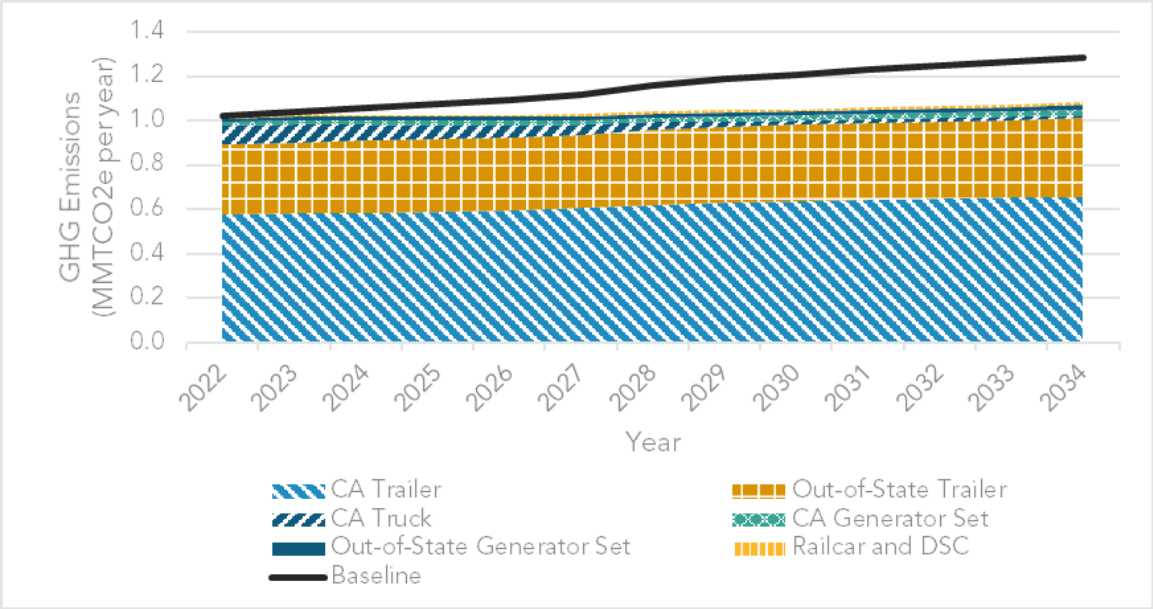


Figure B3. Statewide GHG Emissions from TRUs under the Baseline and Proposed Amendments from 2022 to 2034[34]



2. Benefits to Typical Businesses

The Proposed Amendments will provide opportunities for design, engineering, construction, and project management firms to design new and expanded infrastructure at an estimated 989 truck TRU home base facilities statewide. The increase in electric charging and fueling infrastructure will also benefit suppliers, equipment installers, and electricians. All of the installations will be in California, and some of the infrastructure equipment may be manufactured in California. One manufacturer, ESL Power Systems, has primary operations based in California.[35]

Increased purchases of zero-emission TRUs under the Proposed Amendments will also benefit zero-emission TRU manufacturers, wholesalers, and retailers, as well as various businesses in the zero-emission TRU supply chain, including those involved in battery, fuel cell, cold plate, and solar photovoltaic technology throughout the State. One zero-emission TRU manufacturer, Clean Cold Power, has indicated to staff that equipment will be assembled in California.[36] Individual businesses that own zero-emission TRUs may also be able to lower their total cost of ownership with operational and maintenance cost savings, and credits generated under the Low Carbon Fuel Standard (LCFS) program.

[34] Includes GHG emissions from TRU engine and refrigerant.
[35] ESL Power Systems, Inc. (web link: https://eslpwr.com/, last accessed May 5, 2021)
[36] Phone conversation between Brett Gipe and Michael Britt (Clean Cold Power) and Lea Yamashita (CARB) on December 10, 2020.

3. Benefits to Small Businesses

Electricians, engineering, construction, and project management companies; parts and components businesses; and others involved in designing, installing, and maintaining electric and fueling infrastructure equipment may fall into the small business category. The benefits to zero-emission TRU manufacturers and other related businesses discussed above also apply to small businesses.

4. Benefits to Individuals

The Proposed Amendments will benefit California residents by reducing cancer risk to individual residents and off-site workers near facilities where TRUs operate; reducing non-cancer health impacts by lower direct PM exposure and secondary formation of PM2.5 from NOx; improving air quality and resulting ozone exposure from reductions in NOx; and providing GHG emission reductions needed to combat climate change. Emission reductions will also reduce occupational exposure and benefit on site workers, including, but not limited to TRU operators, drivers, and other individuals who work at facilities where TRUs operate. Staff estimated the statewide value of health benefits from reduced PM2.5 and NOx emissions, as well as the value of GHG emission reductions using the social cost of carbon, as described below.

a. Health Benefits

Exposure to pollution from the diesel engines that power TRUs has both potential cancer and non-cancer health impacts. Staff conducted a health risk assessment to evaluate the benefits of the Proposed Amendments regarding potential cancer risk resulting from direct exposure to diesel PM from TRUs. Staff also estimated the non-cancer health impacts, such as cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and emergency room visits for asthma associated with exposure to ambient levels of directly emitted PM2.5 and secondary PM2.5 formed in the atmosphere from TRU NOx emissions.

Additional information regarding the emission inputs, air dispersion modeling, and the methodology for calculating potential cancer risk can be found in CARB's 2019 Preliminary Health Analyses for the Transport Refrigeration Unit Regulation (Preliminary Health Analyses).[37] The values reported in the Preliminary Health Analyses are based on a previous draft concept for the Proposed Amendments presented at workshops in August and September 2019. While the health analysis methodology is the same as described in the Preliminary Health Analyses, the health risk, impacts, and valuations reported in the SRIA reflect the Proposed Amendments.

i. Reduction in Potential Cancer Risk

Based on staff's analysis, the facility types with the highest estimated contribution of statewide diesel PM emissions from the diesel engines that power TRUs are

[37] California Air Resources Board, Preliminary Health Analyses: Transport Refrigeration Unit Regulation, October 18, 2019. (web link: https://ww2.arb.ca.gov/sites/default/files/classic//cc/cold-storage/documents/hra_healthanalyses2019.pdf)

refrigerated WHDCs (which include CSWs) and grocery stores. Therefore, the health risk assessment evaluated the cancer risk associated with emissions from TRUs operating at CSWs and grocery stores. CSWs range in size depending on the location and type of operation. Due to the variability in size and operation, staff modeled the risk at a generic CSW and a generic grocery store.

Potential cancer risk is expressed as the chance an individual has of developing cancer if a million people were continuously exposed to a toxic air contaminant for a specified duration of exposure. Staff calculated potential cancer risk values for two exposure scenarios: individual residential exposure and off-site worker exposure.

1) Individual Residential Cancer Risk

The cancer risk to an individual resident is based on an assumed 30-year exposure duration. After full implementation of the Proposed Amendments, individual residential cancer risk from TRU operations at CSWs is estimated to be reduced by 58 percent compared to the business-as-usual scenario (BAU). Similarly, after full implementation, individual residential cancer risk from TRU operations at grocery stores is estimated to be reduced by 57 to 72 percent compared to BAU, depending on the operational scenario.

2) Off-Site Worker Cancer Risk

For the evaluation of off-site worker cancer risk, staff assumed that a worker outside a CSW or grocery store is exposed to the emission sources for 25 years, 8 hours per day, and 250 days per year. After full implementation of the Proposed Amendments, off-site worker cancer risk from TRU operations at a CSW is estimated to be reduced by 58 percent compared to BAU. Off-site worker cancer risk from TRU operations at a grocery store is estimated to be reduced by 58 to 71 percent compared to BAU, depending on the operational scenario. Although the health risk assessment only evaluated exposure to individual residents and off-site workers, the Proposed Amendments are also expected to reduce occupational exposure of on-site workers, including, but not limited to TRU operators, drivers, and other individuals who work at facilities where TRUs operate.

ii. Non-Cancer Health Impacts and Valuations

CARB staff evaluated the statewide non-cancer health impacts associated with exposure to PM2.5 and NOx emissions from TRUs. NOx includes nitrogen dioxide, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled.[38] However, the most serious quantifiable impacts of NOx emissions occur through the conversion of NOx to fine particles of ammonium nitrate aerosol through chemical processes in the atmosphere. PM2.5 formed in this manner is termed secondary PM2.5. Both directly emitted PM2.5 and secondary PM2.5 from TRUs is associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for

[38] United States Environmental Protection Agency, Integrated Science Assessment for Oxides of Nitrogen – Health Criteria, EPA/600/R-15/068, January 2016. (web link: http://ofmpub.epa.gov/eims/eimscomm.getfile?p_download_id=526855)

cardiovascular illness and respiratory illness, and emergency room visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these health outcomes.

1) Incidence-Per-Ton Methodology

CARB uses the incidence-per-ton (IPT) methodology to quantify the health benefits of emission reductions in cases where dispersion modeling results are not available. A description of this method is included on CARB's webpage.[39] CARB's IPT methodology is based on the methodology developed by U.S. EPA.[40,41,42]

Under the IPT methodology, changes in emissions are approximately proportional to changes in health outcomes. IPT factors are derived by calculating the number of health outcomes associated with exposure to PM2.5 for a baseline scenario using measured ambient concentrations and dividing by the emissions of PM2.5 or a precursor. The calculation is performed separately for each air basin using the following equation:

$$IPT = \frac{number\ of\ health\ outcomes\ in\ air\ basin}{annual\ emissions\ in\ air\ basin}$$

Multiplying the emission reductions from the Proposed Amendments in an air basin by the IPT factor then yields an estimate of the reduction in health outcomes achieved by the Proposed Amendments. For future years, the number of outcomes is adjusted to account for population growth. CARB's current IPT factors are based on a 2014-2016 baseline scenario, which represents the most recent data available at the time the current IPT factors were computed. IPT factors are computed for the two types of PM2.5: primary PM2.5 and secondary PM2.5 of ammonium nitrate aerosol formed from precursors.

2) Reduction in Adverse Health Impacts

CARB staff evaluated the reduction in adverse health impacts including cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and emergency room visits for asthma. Staff estimates that the total number of

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[39] CARB's Methodology for Estimating the Health Effects of Air Pollution. Retrieved February 9, 2021, from https://ww2.arb.ca.gov/resources/documents/carbs-methodology-estimating-health-effects-air-pollution

[40] Fann N, Fulcher CM, Hubbell BJ., The influence of location, source, and emission type in estimates of the human health benefits of reducing a ton of air pollution, Air Quality, Atmosphere & Health, 2:169-176, 2009. (web link: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2770129/)

[41] Fann N, Baker KR, Fulcher CM., Characterizing the PM2.5-related health benefits of emission reductions for 17 industrial, area and mobile emission sectors across the U.S. Environ Int.; 49:141-51, November 15, 2012. (web link: https://www.sciencedirect.com/science/article/pii/S0160412012001985)

[42] Fann N, Baker K, Chan E, Eyth A, Macpherson A, Miller E, Snyder J., Assessing Human Health PM2.5 and Ozone Impacts from U.S. Oil and Natural Gas Sector Emissions in 2025, Environ. Sci. Technol. 52 (15), pp 8095–8103, 2018. (web link: https://pubs.acs.org/doi/abs/10.1021/acs.est.8b02050)

cases statewide that will be reduced (from 2022 to 2034) from implementation of the Proposed Amendments are as follows:

- 177 premature deaths reduced (138 to 217, 95 percent confidence interval (CI))
- 57 hospital admissions for cardiovascular illness reduced (7 to 106, 95 percent CI)
- 87 emergency room visits reduced (55 to 119, 95 percent CI)

Table B3 shows the estimated reductions in health outcomes resulting from the Proposed Amendments from 2022 to 2034.

Table B3. Estimated Total Reductions in Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034

Air Basin	Cardiopulmonary Mortality	Hospital Admissions	Emergency Room Visits
Great Basin Valleys	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake County	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake Tahoe	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Mojave Desert	2 (2 -3)	1 (0 - 1)	1 (1 - 1)
Mountain Counties	1 (1 - 1)	0 (0 - 0)	0 (0 - 0)
North Central Coast	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Northeast Plateau	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	7 (5 - 8)	2 (0 - 3)	2 (2 - 3)
Salton Sea	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
San Diego County	6 (5 - 7)	2 (0 - 3)	2 (2 - 3)
San Francisco Bay Area	20 (16 - 25)	7 (1 - 12)	11 (7 - 15)
San Joaquin Valley	22 (17 - 27)	5 (1 - 9)	8 (5 - 11)
South Central Coast	2 (1 - 2)	0 (0 - 1)	1 (0 - 1)
South Coast	115 (89 - 140)	40 (5 - 74)	59 (37 - 81)
Total	177 (138 - 217)	57 (7 -106)	87 (55 - 119)

Note: The values in parentheses represent the 95% confidence intervals of the central estimate. Totals may not add due to rounding.

3) Monetization of Health Impacts

In accordance with U.S. EPA practice, CARB staff monetized health outcomes by multiplying incidence by a standard value derived from economic studies.[43] Table B4

[43] National Center for Environmental Economics et al., Appendix B: Mortality Risk Valuation Estimates, Guidelines for Preparing Economic Analyses (EPA 240-R-10-001), December 2010. (web link: https://www.epa.gov/sites/production/files/2017-09/documents/ee-0568-22.pdf)

shows the valuation per incident avoided health outcome in 2019 U.S. Dollars (2019$). The valuation for avoided premature mortality is based on willingness to pay.[44] This value is a statistical construct based on the aggregated dollar amount that a large group of people would be willing to pay for a reduction in their individual risk of dying in a year, such that one death would be avoided in the year across the population. This is not an estimate of how much any single individual would be willing to pay to prevent a certain death of any particular person,[45] nor does it consider any specific costs associated with mortality, such as hospital expenditures.

Unlike premature mortality valuation, the valuation for avoided hospitalizations and emergency room visits is based on a combination of typical costs associated with hospitalization and the willingness of surveyed individuals to pay to avoid adverse outcomes that occur when hospitalized. These include hospital charges, post-hospitalization medical care, out-of-pocket expenses, lost earnings for both individuals and family members, lost recreation value, and lost household protection (e.g., valuation of time-losses from inability to maintain the household or provide childcare). These costs are most closely associated with specific cost savings to individuals and costs to the health care system.

Table B4. Valuation per Incident Avoided Health Outcomes (2019$)

Outcome	Valuation per Incident
Avoided Premature Deaths	$9,864,695
Avoided Cardiovascular Hospitalizations	$58,288
Avoided Acute Respiratory Hospitalizations	$50,842
Avoided Emergency Room Visits	$834

The statewide valuation of health benefits is calculated by multiplying the number of avoided adverse health outcomes by valuation per incident. Staff quantified the annual and total statewide valuation of avoided adverse health outcomes from 2022 to 2034, as shown in Table B5 and Table B6, respectively. The statewide distribution of these benefits follow the distribution of emission reductions and avoided adverse health outcomes; therefore, most benefits to individuals will occur in the South Coast, San Joaquin Valley, and San Francisco Bay Area air basins.

[44] United States Environmental Protection Agency Science Advisory Board (U.S. EPA-SAB), An SAB Report on EPA's White Paper Valuing the Benefits of Fatal Cancer Risk Reduction (EPA-SAB-EEAC-00-013), July 2000. (web link: http://yosemite.epa.gov/sab%5CSABPRODUCT.NSF/41334524148BCCD6852571A700516498/$File/eeacf013.pdf)

[45] United States Environmental Protection Agency, Mortality Risk Valuation – What does it mean the place a value on a life? (web link: https://www.epa.gov/environmental-economics/mortality-risk-valuation#means, last accessed March 2, 2021)

Table B5. Annual Statewide Valuation of Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034 (2019$)

Year	Valuation
2022	$0
2023	$16,729,000
2024	$39,549,000
2025	$61,580,000
2026	$86,590,000
2027	$113,408,000
2028	$155,747,000
2029	$183,967,000
2030	$207,522,000
2031	$213,218,000
2032	$219,004,000
2033	$224,831,000
2034	$230,766,000

Note: Values have been rounded to the nearest thousand.

Table B6. Total Statewide Valuation of Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034 (2019$)

Outcome	Valuation
Avoided Premature Deaths	$1,749,747,000
Avoided Hospitalizations	$3,092,000
Avoided Emergency Room Visits	$73,000
Total	$1,752,912,000

Note: Values have been rounded to the nearest thousand.

In addition to the monetized health impacts, additional health benefits associated with emission reductions will be achieved by the Proposed Amendments. These additional health benefits, including elevated vulnerability and impacts in disadvantaged communities, work loss days, school loss days, brain and lung health, cancer risk, and birth outcomes, currently are not monetized. Staff are developing methodologies that will allow these additional benefits to be quantified in the future.

b. Social Cost of Carbon

The benefit of GHG reductions achieved by the Proposed Amendments can be estimated using the social cost of carbon (SC-CO2), which provides a dollar valuation of the damages caused by one ton of carbon pollution and represents the monetary benefit today of reducing carbon emissions in the future.

The Council of Economic Advisors and the Office of Management and Budget convened an Interagency Working Group on the Social Cost of Greenhouse Gases (IWG) to develop a methodology for estimating the SC-CO2. The methodology relies on a standardized range of assumptions and can be used consistently when estimating

the benefits of regulations across agencies and around the world.[46] Staff utilized the current IWG supported SC-CO2 values to consider the social costs of actions taken to reduce GHG emissions. This is consistent with the approach presented in the Revised 2017 Climate Change Scoping Plan, in line with the Office of Management and Budget Circular A-4 of September 17, 2003, and reflects the best available science in the estimation of the socio-economic impacts of carbon.[47,48]

The IWG describes the social cost of carbon as follows:

"The social cost of carbon (SC-CO2) for a given year is an estimate, in dollars, of the present discounted value of the future damage caused by a 1-metric ton increase in carbon dioxide (CO2) emissions into the atmosphere in that year, or equivalently, the benefits of reducing CO2 emissions by the same amount in that year. The SC-CO2 is intended to provide a comprehensive measure of the net damages – that is, the monetized value of the net impacts – from global climate change that result from an additional ton of CO2.

These damages include, but are not limited to, changes in net agricultural productivity, energy use, human health, property damage from increased flood risk, as well as nonmarket damages, such as the services that natural ecosystems provide to society. Many of these damages from CO2 emissions today will affect economic outcomes throughout the next several centuries."[49]

The SC-CO2 is year-specific, and is highly sensitive to the discount rate used to discount the value of the damages in the future due to CO2. The SC-CO2 increases over time as systems become more stressed from the aggregate impacts of climate change and future emissions cause incrementally larger damages. A higher discount rate decreases the value today of future environmental damages. This analysis uses the IWG standardized range of discount rates from 2.5 to 5 percent to represent varying valuation of future damages. Table B7 shows the range of IWG SC-CO2 values used in California's regulatory assessments.[50,51]

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[46] Additional technical detail on the IWG process is available in the Technical Updates of the Social Cost of Carbon for Regulatory Impact Analysis – Under Executive Order 12866 (by the Interagency Working Group on Social Cost of Greenhouse Gases, United States Government). (web link: https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf, and https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc_tsd_final_clean_8_26_16.pdf)
[47] California Air Resources Board, California's 2017 Climate Change Scoping Plan, November 2017. (web link: https://www.arb.ca.gov/cc/scopingplan/scoping_plan_2017.pdf)
[48] Office of Management and Budgets, Circular A-4. (web link: https://www.transportation.gov/sites/dot.gov/files/docs/OMB%20Circular%20No.%20A-4.pdf)
[49] National Academies of Sciences, Engineering, Medicine, Valuing Climate Damages: Updating Estimation of Carbon Dioxide. (web link: http://www.nap.edu/24651)
[50] The SC-CO2 values are of July 2015 and are available at: Technical Update of the Social Cost of Carbon for Regulatory Impact Analysis - Under Executive Order 12866, revised July 2015. (web link: https://obamawhitehouse.archives.gov/sites/default/files/omb/inforeg/scc-tsd-final-july-2015.pdf)
[51] The IWG SC-CO2 values are provided in 2007 dollars. Staff adjusted from 2007 to 2019 dollars by using the California Department of Finance Consumer Price Index (CPI-U), adjusting from 2007 dollars to 2019 dollars. (web link: https://www.dof.ca.gov/Forecasting/Economics/Indicators/Inflation/documents/CPI_All_Item_CY.xlsx)

Table B7. Social Cost of Carbon (2019$/Metric Ton)

Year	5 Percent Discount Rate	3 Percent Discount Rate	2.5 Percent Discount Rate
2020	$15	$54	$80
2025	$18	$59	$88
2030	$21	$65	$94
2035	$23	$71	$101
2040	$27	$77	$108
2045	$30	$83	$115
2050	$34	$89	$123

If all of the expected emission reductions projected under the Proposed Amendments are achieved and assumed to be equivalent to CO2 reductions, the avoided SC-CO2 in a given year is the total emission reductions (in MTCO2e multiplied by the SC-CO2 (in $/MTCO2e) for that year. The annual emission reductions from the Proposed Amendments and the estimated benefits are shown in Table B8. The total benefits range between $29 million to $134 million from 2022 to 2034, depending on the discount rate.

Table B8. Avoided Social Cost of CO2 from 2022 to 2034 (Million 2019$)

Year	GHG Emission Reductions (MMTCO2e)	5 Percent Discount Rate	3 Percent Discount Rate	2.5 Percent Discount Rate
2022	0.00	$0	$0	$0
2023	0.01	$0	$1	$1
2024	0.03	$1	$2	$3
2025	0.05	$1	$3	$4
2026	0.07	$1	$4	$6
2027	0.09	$2	$6	$8
2028	0.12	$2	$7	$11
2029	0.14	$3	$9	$13
2030	0.16	$3	$10	$15
2031	0.17	$4	$11	$16
2032	0.18	$4	$12	$18
2033	0.19	$4	$13	$19
2034	0.20	$5	$14	$20
Total	1.42	$29	$92	$134

SC-CO2, while intended to be a comprehensive estimate of the damages caused by carbon globally, does not represent the cumulative cost of climate change and air pollution to society. There are additional costs to society outside of the SC-CO2, including costs associated with changes in co-pollutants, the social cost of other GHGs including methane and nitrous oxide, and costs that cannot be included due to modeling and data limitations. The Intergovernmental Panel on Climate Change has

stated that the IWG SC-CO2 estimates are likely underestimated due to the omission of impacts that cannot be accurately monetized, including important physical, ecological, and economic impacts.[52]

c. Other Benefits

i. Establishing Zero-Emission Technology in the Off-Road Sector

The Proposed Amendments will transition truck TRUs to zero-emission technology. Truck TRUs provide a unique opportunity to increase zero-emission technology in the off-road sector. Truck TRUs are generally used for local and regional delivery, and return to a home base each night. Due to their daily operational characteristics and the operating range of current technologies, truck TRUs are well suited for zero-emission. As more fleets use zero-emission truck TRU technologies as a result of the Proposed Amendments, industry acceptance of advanced technologies will improve. The current state of zero-emission TRU technology will progress and expand into extended range applications, as well as other off-road sectors.

ii. Infrastructure

The Proposed Amendments will increase the installation of electric charging and fueling infrastructure needed to support the use of zero-emission truck TRUs. Advanced TRU technologies are underutilized due in part to limited access to supporting infrastructure at the facilities where TRUs operate. Additional installations of electric charging and fueling infrastructure will support the use of these technologies, as well as other advanced technology equipment and vehicles onsite.

The increased use of electric charging infrastructure will also increase the amount of electricity supplied by utility providers and help the State's investor-owned utilities meet the goals of SB 350.[53] SB 350 requires the State's investor-owned utilities to develop programs to accelerate widespread transportation electrification with goals to reduce dependence on petroleum, increase the uptake of zero-emission vehicles, help meet air quality standards, and reduce GHGs. The three large investor-owned utilities in the State, Pacific Gas & Electric, San Diego Gas & Electric, and Southern California Edison, all have programs to install make-ready charging infrastructure for TRUs. In addition, all three large investor-owned utilities have either proposed or have been approved to establish new commercial electricity rate options that make charging more affordable during certain times of the day. Although not required by SB 350, several publicly-owned utilities have taken similar action. For example, Los Angeles Department of Water and Power and Sacramento Municipal Utility District have make ready charging infrastructure programs and new commercial rates for charging. The Proposed Amendments support the utilities' programs and the goals of SB 350 by

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[52] Intergovernmental Panel on Climate Change, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. (web link: https://www.ipcc.ch/site/assets/uploads/2018/03/ar4_wg3_full_report-1.pdf)

[53] California Legislature, Senate Bill No. 350, signed October 7, 2015. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB350)

increasing the number of zero-emission TRUs in the State to make use of these utility investments and rates.

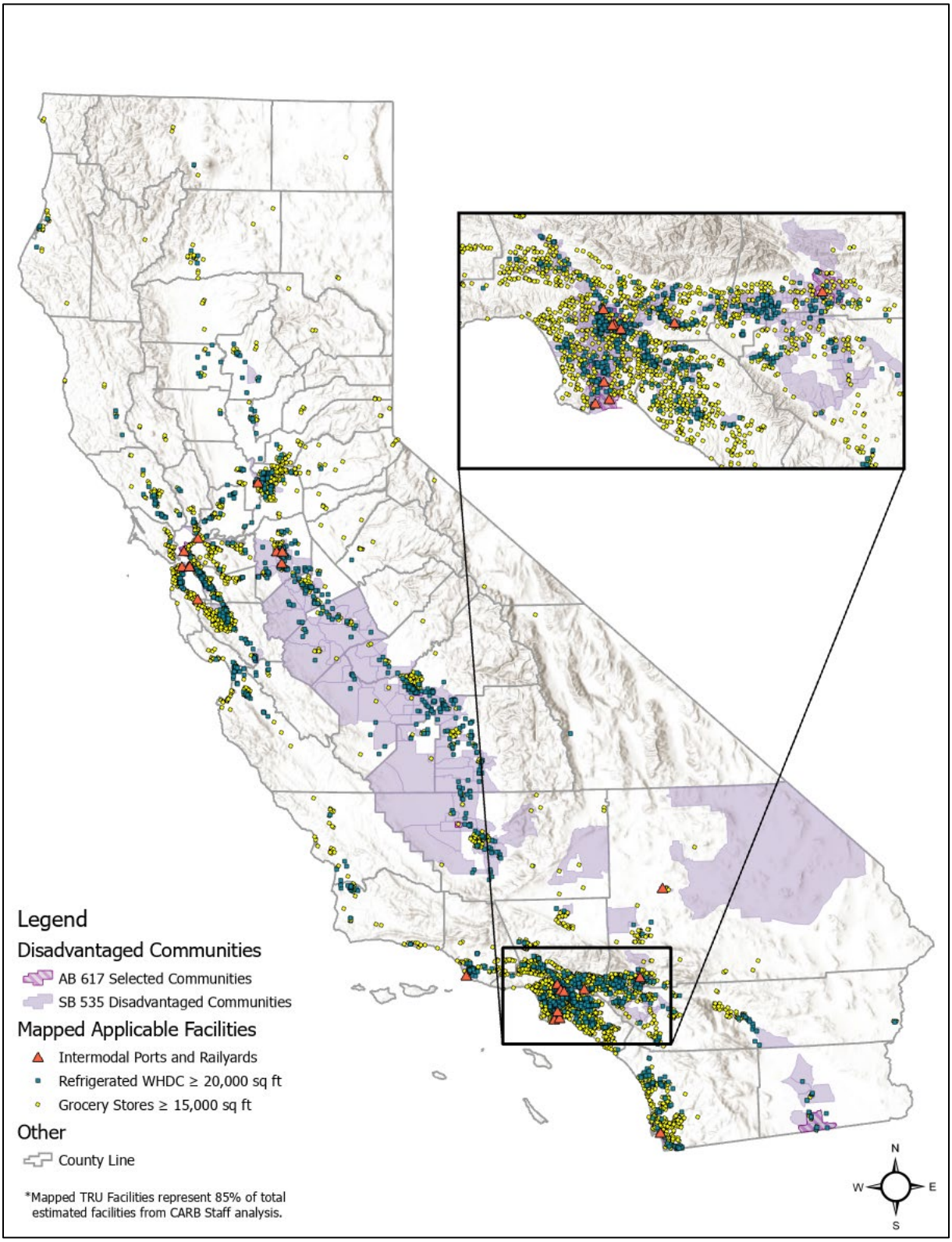
iii. Benefits in Disadvantaged Communities

The Proposed Amendments will reduce PM2.5 and NOx emissions, resulting in health benefits for Californians, including those in disadvantaged and low-income communities. Many of the communities near facilities where TRUs operate bear a disproportionate health burden due to their close proximity to emissions from the diesel engines that power TRUs. Based on staff's analysis, approximately 40 percent of the proposed applicable facilities identified are located in disadvantaged communities as designated by CalEnviroScreen.[54]

The Proposed Amendments require applicable facilities to ensure that only compliant TRUs operate on their properties. To meet this requirement, applicable facilities may collect information on all TRUs that operate at their facilities and report that information to CARB quarterly. Alternatively, facilities may provide a declaration, under penalty of perjury, that non-compliant TRUs will not be allowed to operate on their properties. Facility reporting will help CARB staff better identify non-compliant TRUs operating in California and bring them into compliance. Not allowing non-compliant TRUs to operate at an applicable facility incentivizes TRU owners to comply and achieves immediate emission reductions in impacted communities. Figure B4 shows the statewide distribution of the proposed applicable facilities, including those in disadvantaged communities.

[54] Office of Environmental Health Hazard Assessment, CalEnviroScreen 3.0, June 25, 2018. (web link: https://oehha.ca.gov/calenviroscreen/report/calenviroscreen-30)

Figure B4. Proposed Applicable Facilities (as of January 2021)



iv. Noise Reduction

The Proposed Amendments will provide an additional noise reduction benefit from diesel TRUs. Diesel-powered TRUs can produce a substantial amount of noise, which also results in adverse health impacts. This is of concern when TRUs operate near places where people live, work, and play. Staff have received several noise complaints regarding TRU activity near schools, hospitals, elder care facilities, and residential neighborhoods. The Proposed Amendments will transition diesel truck TRUs to zero-emission technology, which produces little to no noise. This will eliminate the use of diesel truck TRUs and reduce noise levels.

C. Direct Costs

The direct costs of the Proposed Amendments are estimated to be approximately $1.03 billion from 2022 to 2034. The direct costs include capital costs for new zero-emission truck TRUs and supporting infrastructure, TRUs equipped with engines that meet the PM emission standard, lower GWP refrigerant, as well as annual costs for maintenance, diesel and electricity usage, LCFS credit revenue, CARB fees, and administrative costs for registration and reporting. The direct costs in this section include costs to State and local governments, which are also quantified separately in the Fiscal Impacts section (Section D). The assumptions underlying the direct costs are detailed in the sections below.

1. Direct Cost Inputs

a. TRU Populations and New Sales

The Proposed Amendments include different requirements and associated costs for each TRU type. Staff divided the affected TRU population into five categories for this analysis, including truck TRUs, trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets. As described in Section B.1.a, all estimates for annual TRU populations and new sales are from the statewide TRU emission inventory.[55]

i. Truck TRUs

The Proposed Amendments require TRU owners to transition a percentage of their truck TRU fleet to zero-emission technology each year starting in 2023. Table C1 shows the phase-in compliance schedule for zero-emission truck TRU fleets required by the Proposed Amendments.

[55] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)

Table C1. Phase-in Compliance Schedule for Zero-Emission Truck TRU Fleets from 2022 to 2034

Year	Required Zero-Emission Percentage
2022	0%
2023	15%
2024	30%
2025	45%
2026	60%
2027	75%
2028	90%
2029	100%
2030	100%
2031	100%
2032	100%
2033	100%
2034	100%

The required number of zero-emission truck TRUs in a given year is dependent on the number of truck TRUs in an owner's fleet and is calculated using the following equation:

$$Zero\text{-}emission\ truck\ TRUs = Zero\text{-}emission\ \%\ * Truck\ TRU\ fleet\ size$$

Where:

Zero-emission truck TRUs = required number of zero-emission truck TRUs in a given year (unit-less)

Zero-emission % = zero-emission truck TRU fleet from Table C1 for that year (percentage)

Truck TRU fleet size = total number of diesel truck TRUs in owner's fleet that operate in California (unit-less)

If the calculated number of 'zero-emission truck TRUs' is not equal to a whole number, it is rounded up to a whole number when the fractional part of the required number of truck TRUs is equal to or greater than 0.5, and rounded down if less than 0.5. For example, a fleet consisting of one truck TRU that operates in California shall contain one zero-emission truck TRU by 2026 and a fleet consisting of two truck TRUs that operate in California shall contain one zero-emission truck TRU by 2024 and two zero-emission truck TRUs by 2027.

Staff determined the annual number of zero-emission truck TRUs that would result from the Proposed Amendments based on the number of truck TRUs in each fleet

reported in ARBER.[56] Table C2 shows the annual truck TRU population and number of zero-emission truck TRUs that would result from the Proposed Amendments.

Table C2. Annual Truck TRU and Zero-Emission Truck TRU Population from 2022 to 2034

Year	Annual Truck TRU Population	Annual Zero-Emission Truck TRU Population
2022	7,268	0
2023	7,385	960
2024	7,503	2,176
2025	7,623	3,202
2026	7,745	4,802
2027	7,869	6,138
2028	7,995	7,355
2029	8,122	8,122
2030	8,252	8,252
2031	8,384	8,384
2032	8,519	8,519
2033	8,655	8,655
2034	8,793	8,793

ii. Trailer TRUs, DSC TRUs, Railcar TRUs, and TRU Generator Sets

Staff are proposing to require MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines to meet a 0.02 g/hp-hr PM emission standard, or lower. MY 2022 and older units would continue to operate under the current TRU ATCM requirements, in which they are required to meet ULETRU by December 31st of the seventh year after the engine MY.

The TRU emission inventory estimates the number of TRUs in the Baseline that are equipped with a greater than 25 horsepower engine that meets a 0.02 g/hp-hr PM emission standard. This is based on the compliance action of units under the current TRU ATCM, as reported in ARBER from 2011 to 2018.[57] Beginning in 2023, new sales that are not equipped with an engine that meets the PM emission standard would need to take compliance action. Tables C3 and C4 show the annual TRU populations and number of new TRU sales that do not meet the PM emission standard and would need to take compliance action under the Proposed Amendments, respectively.

[56] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[57] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)

Table C3. Annual Trailer TRU, DSC TRU, Railcar TRU, and TRU Generator Set Populations from 2022 to 2034

Year	Trailer TRUs	DSC TRUs	Railcar TRUs	TRU Generator Sets	Total
2022	160,937	411	3,736	30,709	195,792
2023	163,512	417	3,796	31,200	198,925
2024	166,129	424	3,857	31,699	202,108
2025	168,787	431	3,918	32,206	205,342
2026	171,487	437	3,981	32,722	208,627
2027	174,231	444	4,045	33,245	211,965
2028	177,019	452	4,109	33,777	215,357
2029	179,851	459	4,175	34,318	218,802
2030	182,729	466	4,242	34,867	222,303
2031	185,652	474	4,310	35,425	225,860
2032	188,623	481	4,379	35,991	229,474
2033	191,641	489	4,449	36,567	233,145
2034	194,707	497	4,520	37,152	236,876

Table C4. Annual Trailer TRU, DSC TRU, Railcar TRU, and TRU Generator Set New Sales Populations that Would Need to Take Compliance Action to Meet the PM Emission Standard from 2022 to 2034

Year	Trailer TRUs	DSC TRUs	Railcar TRUs	TRU Generator Sets	Total
2022	0	0	0	0	0
2023	15,206	40	366	2,344	17,956
2024	13,450	43	387	1,777	15,657
2025	15,594	66	599	2,707	18,966
2026	16,489	113	1,031	3,965	21,598
2027	29,073	121	1,101	8,715	39,010
2028	17,557	83	752	4,053	22,445
2029	17,265	65	594	3,654	21,578
2030	18,088	62	561	3,210	21,921
2031	17,518	64	579	3,034	21,195
2032	16,542	66	601	2,763	19,972
2033	18,922	77	700	3,529	23,228
2034	20,246	100	400	4,526	25,272

b. TRU Annual Activity and Activity within California

TRU annual activity and activity within California are used to calculate fuel costs, maintenance costs, and LCFS credit revenue. Annual activity values are from the TRU emission inventory and based on 2011 facility survey data and 2018 TRU telematics

reports.[58] The survey covered 54 different facilities that monitored TRU activity and provided information on their annual TRU activity. More information on the results from that survey are described in detail in the 2011 emission inventory update.[59] Staff acquired telematics data from trailer TRUs, detailing total time, time the unit (but not engine) was on, time the engine was on, whether the trailer was stationary or moving, and (in limited cases) fuel use.

The inventory assumes that truck TRUs, which are generally used for local and regional delivery, are captive to California. Therefore, all truck TRU activity is allocated to California. Trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets have activity split between California and other states or countries and are modeled on interstate truck activity patterns from EMFAC2017.[60] Truck activity in EMFAC is distributed for the portion of time spent in-state versus out-of-state based on vehicle miles travelled (VMT) patterns from the International Registration Program for in-state versus out-of-state trucks. Table C5 provides the annual activity and activity within California for each TRU type that staff used for this analysis.

Table C5. Annual Activity and Activity within California by TRU Type

TRU Type	Annual Activity (hours)	Percentage of Activity within CA	Annual Activity within CA (hours)
Truck TRU	1,360	100.0%	1,360
California Trailer TRU	2,201	78.1%	1,719
Out-of-State Trailer TRU	2,201	12.4%	273
DSC and Railcar TRU	1,697	18.9%	321
California Generator Set	1,000	78.1%	781
Out-of-State Generator Set	1,000	12.4%	124

c. Applicable Facility Populations

The Proposed Amendments include refrigerated warehouses or distribution centers (WHDC) with a building size of 20,000 square feet or greater, grocery stores with a building size of 15,000 square feet or greater, seaport facilities, and intermodal railyards. The square feet thresholds are based on the amount of TRU activity and associated health risk relative to facility size; there are no proposed size thresholds for seaport facilities or intermodal railyards because activity is not based on facility size and TRUs operate for longer periods of time at these facility types compared to refrigerated WHDCs and grocery stores. For this analysis, staff further categorized

[58] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)
[59] California Air Resources Board, Public Hearing to Consider Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled TRUs and TRU Generator Sets, and Facilities where TRUs Operate. Staff Report: Initial Statement of Reasons, August 31, 2011. (web link: https://ww3.arb.ca.gov/regact/2011/tru2011/truisor.pdf)
[60] California Air Resources Board, EMFAC 2017 Database. (web link: https://www.arb.ca.gov/emfac/2017/)

refrigerated WHDCs into standard and high-cube and grocery stores into standard and supercenters to better estimate the costs associated with these facility types since they have varying levels of TRU activity.

To determine the number of facilities that would be subject to the applicable facility registration, registration fee, and reporting requirements in the Proposed Amendments, staff developed a refrigerated facility inventory based on datasets from various sources, including CARB, other State departments, contracted businesses, and online refrigerated business sites.[61] Staff identified seven data sources with information on approximately 80,000 facilities with potential TRU activity. To validate the data from each data source, staff reviewed the facilities using Google Maps and Google Earth to determine facility characteristics, including facility type, building size, and number of dock doors. Staff estimated the statewide number of applicable facilities by determining the number of facilities above the proposed size threshold for each facility type in the refrigerated facility inventory. Table C6 provides the estimated statewide applicable facility population by type in 2020. Staff applied a 1.6 percent[62] annual growth rate in future years.

Table C6. Estimated Statewide Applicable Facility Population in 2020

Facility Type	Population
Refrigerated WHDC - (Building size greater than or equal to 20,000)	2,167
Grocery Store - (Building size greater than or equal to 15,000 square feet)	3,918
Seaport Facility (No size threshold)	25
Intermodal Railyard (No size threshold)	9
Total	6,119

d. Equipment Capital Costs to TRU Owners

This section summarizes the equipment capital costs to TRU owners to comply with the Proposed Amendments. This includes the capital cost of new zero-emission truck TRUs and supporting infrastructure; new trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets equipped with engines that meet the PM emission standard; and lower GWP refrigerant.

i. Zero-Emission Truck TRUs

Truck TRU owners may comply with the Proposed Amendments using a combination of battery-electric, cold plate, solar, and cryogenic zero-emission technologies. It is difficult to predict TRU owners' future plans for complying with the Proposed Amendments, especially as battery technologies improve and costs continue to decline. Although cold plate and cryogenic units are less expensive, staff assumed TRU owners would comply with the zero-emission truck TRU requirement by purchasing battery-electric truck TRUs. This is based on stakeholder input, and that many

[61] California Air Resources Board, Transport Refrigeration Unit Applicable Facility Inventory, February 2020.
[62] Americas Commercial Transportation Research Co., LLC, U.S. Reefer Population Growth, Proprietary, 2018. (web link: http://www.actresearch.net)

products require TRUs to both heat and cool in order to maintain a stable temperature while controlling humidity and promoting adequate airflow, which other technologies are not capable of.

Staff estimated the cost of a battery-electric truck TRU by adding electric component, energy storage, and additional labor costs to a conventional diesel-powered TRU. The battery cost is the largest contributing factor associated with the price of a battery-electric TRU. Truck box lengths vary between 12 and 28 feet. The required size of the battery is dependent on the size of the truck, as well as other factors specific to each operation, including the length of the route, product being transported, temperature of the load, number of door openings on the route, and outdoor temperature.

The current average battery capacity for light-duty electric vehicles is 45 kilowatt-hours (kWh),[63] which is comparable in size to current offerings of battery-electric truck TRUs ranging in size from 10 to 60 kWh. Therefore, staff used current price projections for light-duty batteries as shown in Table C7.[64] Battery costs have dropped over 80 percent since 2010 and are projected to continue to decline. Battery costs from 2031 to 2034 were extrapolated, since cost projections are not available past 2030. Staff derived costs for the remaining components, such as the battery management system, power system, controllers, and labor from cost estimates from a small scale manufacturer of battery-electric TRUs.[65] Table C8 shows the breakdown of estimated costs for each component, as well as the total estimated cost of a battery-electric truck TRU based on battery costs in 2023.

Table C7. Projected Light-Duty Battery Costs from 2022 to 2034 (2019$)

Year	Projected Battery Cost per kWh
2022	n/a
2023	$112
2024	$104
2025	$96
2026	$90
2027	$84
2028	$79
2029	$74
2030	$70
2031	$62
2032	$57
2033	$52

[63] Statista, "Estimated average battery capacity in electric vehicles worldwide from 2017 to 2025, by type of vehicle," February 5, 2021. (web link: https://www.statista.com/statistics/309584/battery-capacity-estimates-for-electric-vehicles-worldwide/)

[64] Bloomberg, "QuickTake Better Batteries," October 2019. (web link: https://www.bloomberg.com/quicktake/batteries)

[65] Claimed confidential data obtained from an industry source that requested non-attribution.

Year	Projected Battery Cost per kWh
2034	$46

Table C8. Estimated Cost Breakdown and Total Cost of Battery-Electric Truck TRU, Based on 2023 Battery Cost (2019$)

Battery Size (kWh)	Battery Pack (wiring, components, labor)	Battery Management System	Power System (motor, controller, wiring, cables, labor)	Refrigeration System	Total
10	$16,100	$1,100	$5,400	$13,000	$35,600
20	$17,700	$1,800	$6,800	$13,000	$39,300
40	$20,900	$3,200	$7,500	$13,000	$44,600
50	$22,500	$4,000	$8,100	$13,000	$47,600
60	$24,100	$4,700	$8,800	$13,000	$50,600

The total cost of a battery-electric truck TRU (based on battery costs in 2023) ranges from $35,600 to $50,600 depending on the battery size. For this analysis, staff used the cost of a battery-electric truck TRU with a median battery size of 40 kWh. This is based on the current offerings of battery-electric truck TRUs with batteries ranging in size from 10 to 60 kWh capable of handling an 8 to 12 hour route, depending on the operational needs.[66] Staff determined this operating range to be sufficient for truck TRUs since they are generally only used for local and regional operations.

Table C9 shows the average baseline cost of a diesel truck TRU is $19,300. Table C10 shows the cost of a battery-electric truck TRU assumed over the regulation period, and accounts for the decline in battery costs shown in Table C7. Table C11 provides the incremental cost difference between a battery-electric truck TRU and a diesel truck TRU from 2023 to 2034.

Table C9. Baseline Diesel Truck TRU Cost (2019$)[67]

TRU Type	Cost
Diesel Truck TRU 1	17,690
Diesel Truck TRU 2	18,790
Diesel Truck TRU 3	19,710
Diesel Truck TRU 4	21,030
Average	$19,300

Table C10. Battery-Electric Truck TRU Cost from 2022 to 2034 (2019$)

Year	Average Battery-Electric Truck TRU Cost
2022	n/a
2023	$44,600
2024	$44,160
2025	$43,700

[66] Claimed confidential data obtained from an industry source that requested non-attribution.
[67] Claimed confidential data obtained from industry sources that requested non-attribution.

Year	Average Battery-Electric Truck TRU Cost
2026	$43,360
2027	$43,020
2028	$42,730
2029	$42,450
2030	$42,220
2031	$41,990
2032	$41,820
2033	$41,650
2034	$41,530

Table C11. Battery-Electric Truck TRU Incremental Cost from 2023 to 2034 (2019$)

Year	Incremental Cost Battery-Electric versus Diesel Truck TRU
2022	n/a
2023	$25,300
2024	$24,860
2025	$24,400
2026	$24,060
2027	$23,720
2028	$23,430
2029	$23,150
2030	$22,920
2031	$22,690
2032	$22,520
2033	$22,350
2034	$22,230

The total capital cost to comply with the zero-emission truck TRU requirement in the Proposed Amendments in a given year is calculated using the following equation:

$$Capital\ Cost = [new\ sales \times incremental\ ZE\ cost] + [in\text{-}use\ turnover \times total\ ZE\ cost]$$

Where:

Capital Cost = zero-emission truck TRU capital cost ($)

New sales = annual new zero-emission sales population resulting from natural turnover (number of units)

Incremental ZE cost = incremental cost of zero-emission truck TRU from Table C11 ($)

In-use turnover = number of in-use units replaced with a zero-emission unit to meet the annual zero-emission percentage (number of units)

Total ZE cost = total zero-emission truck TRU cost from Table C10 ($)

Staff amortized the capital cost of new zero-emission truck TRU purchases over a period of 5 years at an interest rate of 5 percent. The amortized costs result in a level cost incurred for every year until the capital cost of the TRU is fully paid and also reflect normal purchasing patterns in which businesses generally do not pay the total capital cost up front. Staff amortized the costs using the following equations:

$$Amortized\ Cost\ of\ Capital\ =\ capital\ expenditures\ \times\ capital\ recovery\ factor\ (CRF)$$

$$CRF\ =\ i\,(1+i)^n\ /\ (1+i)^{\,n}-1$$

Where:

Amortized cost of capital = uniform payment amount over the life of the capital ($)

Capital expenditures = capital cost of the equipment ($)

i = interest rate (assumed to be 5 percent)

n = life of the capital (assumed to be 5 years)

Staff used an interest rate of 5 percent, which reflects the rate of return on an inflation-adjusted 10-year treasury security (about 2 percent in the past five years), plus the CalEPA recommended 3 percent risk premium.[68] Additionally, the 5 percent is the average of what the United States Office of Management and Budget recommends (3 and 7 percent) and what U.S. EPA has used historically for regulatory analyses.[69] The 5-year timeframe reflects approximately half the expected lifetime for a TRU.

Although it was assumed that the capital cost of zero-emission truck TRUs would be amortized, staff also determined the unamortized, upfront, capital cost to TRU owners should they not have access to financing. Table C12 shows the total amortized and unamortized cost of zero-emission truck TRUs from 2022 to 2034 is estimated to be $165.7 million and $107.6 million, respectively. The cost would be incurred by truck TRU owners. The amortized and unamortized costs to truck TRU owners would be negative beginning in 2032 and 2030, respectively, since they would no longer need to take compliance action every seven years.

Table C12. Estimated Annual Zero-Emission Truck TRU Capital Costs from 2022 to 2034 (2019$)

Year	Zero-Emission Truck TRU Capital Cost (Amortized)	Zero-Emission Truck TRU Capital Cost (Unamortized)
2022	$0	$0
2023	$5,600,000	$24,300,000

[68] California Air Resources Board, Economic Evaluation Supplement
Climate Change Draft Scoping Plan Pursuant to AB 32 The California Global Warming Solutions Act of 2006, Appendix I: Modeling Assumptions for Economic Analysis of the Draft Scoping Plan, September 2008. (web link: https://ww3.arb.ca.gov/cc/scopingplan/document/economic_appendix1.pdf)
[69] United States Environmental Protection Agency, Guidelines for Preparing Economic Analyses, December 2010. (web link: https://www.epa.gov/environmental-economics/guidelines-preparing-economic-analyses)

Year	Zero-Emission Truck TRU Capital Cost (Amortized)	Zero-Emission Truck TRU Capital Cost (Unamortized)
2024	$13,700,000	$35,700,000
2025	$19,100,000	$24,500,000
2026	$31,700,000	$55,400,000
2027	$38,300,000	$30,500,000
2028	$39,600,000	$29,700,000
2029	$33,800,000	$10,300,000
2030	$23,400,000	(-$20,700,000)
2031	$6,300,000	(-$19,700,000)
2032	(-$5,200,000)	(-$20,300,000)
2033	(-$16,900,000)	(-$21,900,000)
2034	(-$23,800,000)	(-$20,400,000)
Total	$165,700,000	$107,600,000

ii. Zero-Emission Truck TRU Infrastructure

The Proposed Amendments do not include a specific infrastructure requirement. However, staff accounted for the capital cost of infrastructure needed to support operation of battery-electric truck TRUs purchased to comply with the zero-emission truck TRU requirement. Staff assumed truck TRU home base facility owners would install infrastructure on the same schedule as the truck TRUs transition to zero-emission technology to accommodate changing fleet sizes and minimize capital and maintenance costs for unused chargers.

The most common infrastructure for a battery-electric truck TRU is a vehicle charger or an electrical vehicle supply equipment (EVSE) at the Level 2 power level that requires a 208- or 240-volt wall outlet using a J1772 connector. Level 2 EVSE are already installed and operational throughout the State, primarily powering light- and medium-duty vehicles. As of May 2021, there are approximately 27,000 Level 2 charging outlets located at over 13,000 stations statewide.[70] Additional stations are in the planning, design, and construction phase and will soon be operational as part of California's Zero-Emission Vehicle Action Plan.[71] However, as a conservative cost assumption and to ensure truck TRUs are sufficiently charged after their daily operations, staff assumed truck TRU owners would not rely on publicly accessible charging infrastructure. Staff assumed that truck TRU owners would install one single-port Level 2 charger per truck TRU at their home base facility. This would allow truck TRUs to complete their daily operations and return home to their home base facility to charge overnight. Nighttime charging at the home base facility during

[70] U.S. Department of Energy, Energy Efficiency and Renewable Energy Alternative Fuels Data Center, Alternative Fueling Station Counts by State. (web link: https://afdc.energy.gov/stations/states, last accessed May 12, 2021)

[71] California Governor's Office of Business and Economic Development, 2018 ZEV Action Plan Priorities Update, September 2018. (web link: https://static.business.ca.gov/wp-content/uploads/2019/12/2018-ZEV-Action-Plan-Priorities-Update.pdf)

off-peak times would also avoid time-of-use electricity charges. Therefore, the number of chargers needed to support operation of the approximately 8,800 battery-electric truck TRUs that would be purchased to meet the zero-emission truck TRU requirements from 2022 to 2034 is 8,800.

To estimate the number of truck TRU home base facilities, staff queried the ARBER database to determine the number of unique addresses for truck TRU fleets. For this analysis, staff assumed that each unique address represented one home base facility. Based on this information, staff estimate there are 989 truck TRU home base facilities that would need to install infrastructure to support operation of the battery-electric truck TRUs purchased to comply with the Proposed Amendments.[72]

Level 2 chargers have a variety of power outputs from 16 to 48 amps at 208- or 240-volts. The higher power output results in faster charging and meets the specifications of existing zero-emission truck TRUs. Level 2 chargers available on the market today have a variety of different features and power ratings resulting in cost variability. Given a lack of data on individual needs relative to power, and wall or pedestal mounted chargers, all types of charging units are assumed available to truck TRU home base facility owners based on individual purchase decisions. Table C13 shows the cost of a single-port Level 2 charger ranges from $608 to $2,004. This includes the Level 2 charger, the necessary outlet, and power cord. For this analysis, staff used an average cost of $1,154 per charger, which represents the average of units with power output ranging from 7.2 to 11.5 kWh, as well as wall mount and pedestal installations.

Table C13. Capital Cost of Commercial Level 2 Charger[73]

Manufacturer	Model	Installation Type	Output (kW)	Cost
ClipperCreek[74]	HCS-50 40	Wall	9.6	$608
Phillips and Temro[75]	EVSE	Wall	7.2	$621
Phillips and Temro[76]	EVSE	Wall	7.2	$669
ClipperCreek[77]	HCS-60 48	Wall	11.5	$860

[72] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[73] Level 2 charger cost estimates were provided in 2021 dollars. Staff adjusted from 2021 to 2019 dollars by using the California Department of Finance Consumer Price Index (CPI-U). A factor of 0.96 is used to adjust from 2021 dollars to 2019 dollars. (web link: https://www.dof.ca.gov/Forecasting/Economics/Indicators/Inflation/documents/CPI_All_Item_CY.xlsx)
[74] Clipper Creek, HCS-50, 40A, L2 EVSE, 240V, w/25 ft cable. (web link: https://store.clippercreek.com/hcs-50-hcs-50P-40-amp-ev-charging-station, last accessed January 29, 2021)
[75] Email from Hector Cruz (Phillips and Temro) to Lea Yamashita (CARB) dated January 21, 2021.
[76] Email from Hector Cruz (Phillips and Temro) to Lea Yamashita (CARB) dated January 21, 2021.
[77] Clipper Creek, ClipperCreek HCS-60, 48 Amp, Level 2 EVSE, 240V, with 25 ft cable. (web link: https://store.clippercreek.com/hcs-60-48-amp-ev-charging-station, last accessed February 11, 2021)

Manufacturer	Model	Installation Type	Output (kW)	Cost
ClipperCreek[78,79]	HCS-50 40	Pedestal	9.6	$1,295
ClipperCreek[80,81]	HCS-60 48	Pedestal	11.5	$1,548
Phillips and Temro[82]	EVSE	Pedestal	7.7	$1,625
PowerCharge[83]	P20SP	Pedestal	7.2	$2,004

Installation costs also vary due to site-specific factors, such as the existing electric panel capacity, installation location, and regional labor costs. Based on a report by the International Council on Clean Transportation (ICCT), per-charger costs decline as more chargers are installed. Level 2 charger installation costs range from $2,840 for more than six chargers to $4,150 for a single charger.[84] These costs are based on installations in Southern California and include labor, materials, permits, taxes, and utility upgrades, which may or may not include costs associated with the need to bring additional power to the site. As previously discussed, staff assumed truck TRU infrastructure would be installed on the same schedule that truck TRUs are required to transition to zero-emission technology, adding enough chargers to accommodate the battery-electric truck TRU population each year to accommodate changing fleet sizes and minimize capital and maintenance costs for unused chargers.

Based on the annual zero-emission truck TRU fleet percentages in the Proposed Amendments, only fleets with more than 10 truck TRUs would be required to purchase more than one zero-emission truck TRU requiring the installation of multiple charger installations in a given year. Fleet information from ARBER indicates that less than 8 percent of truck TRU fleets have more than 10 truck TRUs.[85] Therefore, staff used the installation cost for a single charger. The ICCT report also recommends a 10 percent reduction for work place charging, which is the most similar to the truck TRU

[78] Clipper Creek, HCS-50, 40A, L2 EVSE, 240V, w/25 ft cable. (web link: https://store.clippercreek.com/hcs-50-hcs-50P-40-amp-ev-charging-station, last accessed January 29, 2021)
[79] Clipper Creek, Pedestal for ClipperCreek HCS EV Charging Station, Single Mount. (web link: https://store.clippercreek.com/mounting-solutions/ev-charging-station-mounting-equipment-hcs-pedestal, last accessed February 11, 2021)
[80] Clipper Creek, ClipperCreek HCS-60, 48 Amp, Level 2 EVSE, 240V, with 25 ft cable. (web link: https://store.clippercreek.com/hcs-60-48-amp-ev-charging-station, last accessed February 11, 2021)
[81] Clipper Creek, Pedestal for ClipperCreek HCS EV Charging Station, Single Mount. (web link: https://store.clippercreek.com/mounting-solutions/ev-charging-station-mounting-equipment-hcs-pedestal, last accessed February 11, 2021)
[82] Email from Hector Cruz (Phillips and Temro) to Lea Yamashita (CARB) dated January 21, 2021.
[83] EV Charge Solutions, PowerCharge P20SP Commercial EV Charger. (web link: https://www.evchargesolutions.com/PowerCharge-P20SP-Commercial-EV-Charger-p/p20sp.htm, last accessed January 29, 2021)
[84] The International Council on Clean Transportation, Estimating Electric Vehicle Charging Infrastructure Costs Across Major U.S. Metropolitan Areas, August 2019. (web link: https://theicct.org/sites/default/files/publications/ICCT_EV_Charging_Cost_20190813.pdf, last accessed January 20, 2021)
[85] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)

application. Therefore, for this analysis, staff assumed an average installation cost of $3,733 per charger. Table C14 shows the zero-emission truck TRU infrastructure capital cost inputs used for the SRIA.

Table C14. Zero-Emission Truck TRU Infrastructure Capital Cost Inputs

	Cost (per unit)
Level 2 Charger	$1,154
Installation	$3,733

Staff determined the amortized capital cost (including installation) of charging infrastructure at truck home base facilities over a period of 5 years at an interest rate of 5 percent[86] using the same methodology used for truck TRU capital costs described in Section C.1.d.i.[87] Table C15 shows the total amortized and unamortized capital cost (including installation) of charging infrastructure at truck TRU home base facilities from 2022 to 2034 is estimated to be $48.1 million and $42.9 million, respectively. The cost would be incurred by truck TRU home base facility owners.

Table C15. Estimated Annual Zero-Emission Truck TRU Infrastructure Capital Costs from 2022 to 2034 (2019$)

Year	Truck TRU Infrastructure Cost (Amortized)	Truck TRU Infrastructure Cost (Unamortized)
2022	$0	$0
2023	$1,100,000	$4,700,000
2024	$2,500,000	$5,900,000
2025	$3,600,000	$5,000,000
2026	$5,400,000	$7,800,000
2027	$6,900,000	$6,500,000
2028	$7,200,000	$5,900,000
2029	$6,700,000	$3,800,000
2030	$5,700,000	$600,000
2031	$4,000,000	$600,000
2032	$2,700,000	$700,000
2033	$1,500,000	$700,000
2034	$800,000	$700,000
Total	$48,100,000	$42,900,000

iii. PM Emission Standard

The Proposed Amendments require MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines to meet a 0.02 g/hp-hr PM emission standard, or lower. MY 2013 and newer TRU engines in the 25 to less than 50 horsepower category

[86] Infrastructure costs were amortized over a period of 5 years at an interest rate of 5 percent, to reflect approximately half the expected lifetime for charging equipment.
[87] United States Department of Energy, Costs Associated with Non-Residential Electric Vehicle Supply Equipment, November 2015. (web link: https://afdc.energy.gov/files/u/publication/evse_cost_report_2015.pdf)

are certified to the Tier 4 final off-road engine standards and meet the 0.02 g/hp-hr PM emission standard. The baseline cost of a diesel trailer TRU, DSC TRU, railcar TRU, and TRU generator set is based on the average cost estimate for units with engines less than 25 horsepower shown in Table C16. The capital cost of a trailer TRU, DSC TRU, railcar TRU, and TRU generator set equipped with an engine that meets the PM emission standard is based on the average cost estimate for units with engines greater than 25 horsepower shown in Table C17.

Table C16. Baseline Cost of Trailer TRU, DSC TRU, Railcar TRU, and TRU Generator Set (2019$)

TRU Type	Cost
Diesel Trailer TRU/DSC TRU/Railcar TRU 1	$24,290[88]
Diesel Trailer TRU/DSC TRU/Railcar TRU 2	$25,280[89]
Diesel Trailer TRU/DSC TRU/Railcar TRU 3	$25,850[90]
Diesel Trailer TRU/DSC TRU/Railcar TRU 4	$26,000[91]
Diesel Trailer TRU/DSC TRU/Railcar TRU 5	$26,250[92]
TRU Generator Set 1	$16,710[93]
TRU Generator Set 2	$17,250[94]
TRU Generator Set 3	$17,940[95]

Table C17. Cost of Trailer TRU, DSC TRU, Railcar TRU, and TRU Generator Set Equipped with an Engine that Meets the PM Emission Standard (2019$)

TRU Type	Cost
Diesel Trailer TRU/DSC TRU/Railcar TRU 1	$27,320[96]
Diesel Trailer TRU/DSC TRU/Railcar TRU 2	$28,000[97]
Diesel Trailer TRU/DSC TRU/Railcar TRU 3	$28,830[98]

[88] Truckpaper, Carrier X4 7300 for Sale in Manheim, PA. (web link: https://www.truckpaper.com/listings/trailers/for-sale/155984105/2020-carrier-x4-7300?gtmlt=1&keeponsite=true&_ga=2.265625679.1948851531.1611953426-92742101.1593111444, last accessed January 29, 2021)
[89] Claimed confidential data obtained from an industry source that requested non-attribution.
[90] Email from Luis Chavez (Carrier) to Renee Coad (CARB) dated September 18, 2018.
[91] Claimed confidential data obtained from an industry source that requested non-attribution.
[92] Claimed confidential data obtained from an industry source that requested non-attribution.
[93] Claimed confidential data obtained from an industry source that requested non-attribution.
[94] Generator Joe, Thermo King Model SGUM 4000 Under Mount. (web link: https://www.generatorjoe.net/container-reefer-clipon-diesel-generators/containner-cllipon-thermoking/1009/, last accessed January 29, 2021)
[95] Generator Joe, Thermo King Model SGCO 4000 Clip-On. (web link: https://www.generatorjoe.net/container-reefer-clipon-diesel-generators/containner-cllipon-thermoking/1007/, last accessed January 29, 2021)
[96] Claimed confidential data obtained from an industry source that requested non-attribution.
[97] Claimed confidential data obtained from an industry source that requested non-attribution.
[98] Claimed confidential data obtained from an industry source that requested non-attribution.

TRU Type	Cost
Diesel Trailer TRU/DSC TRU/Railcar TRU 4	$29,400[99]
TRU Generator Set	$19,900[100]

The capital cost for new TRUs equipped with an engine that meets the PM emission standard in a given year is calculated by multiplying the annual new sales population that does not meet the PM emission standard (see Table C4) times the incremental cost for each TRU category shown in Table C18.

Table C18. Trailer TRU, DSC TRU, Railcar TRU, and TRU Generator Set Capital Costs (2019$)

Equipment Type	Baseline Cost	Proposed Cost	Incremental Cost
Diesel Trailer TRU/DSC TRU/Railcar TRU	$25,530	$28,390	$2,860
TRU Generator Set	$17,300	$19,900	$2,600

Staff determined the amortized capital cost of new TRUs equipped with an engine that meets the PM emission standard over a period of 5 years at an interest rate of 5 percent using the same methodology used for truck TRU capital costs described in Section C.1.d.i. Table C19 shows the total amortized and unamortized capital cost to comply with the PM emission standard from 2022 to 2034 is estimated to be $720.4 million and $754 million, respectively. The cost would be incurred by TRU owners.

Table C19. Estimated Annual PM Emission Standard Capital Costs from 2022 to 2034 (2019$)

Year	PM Emission Standard Capital Cost (Amortized)	PM Emission Standard Capital Cost (Unamortized)
2022	$0	$0
2023	$11,600,000	$50,400,000
2024	$21,800,000	$44,000,000
2025	$34,100,000	$53,300,000
2026	$48,100,000	$60,600,000
2027	$73,300,000	$109,200,000
2028	$76,200,000	$62,900,000
2029	$80,000,000	$60,500,000
2030	$81,900,000	$61,600,000
2031	$81,700,000	$59,500,000
2032	$69,400,000	$56,100,000
2033	$70,000,000	$65,200,000
2034	$72,300,000	$70,700,000
Total	$720,400,000	$754,000,000

[99] Marketbook, Thermo King Precedent S600 for Sale in Miami, Florida. (web link: https://www.marketbook.ca/listings/trailers/for-sale/155646185/2020-thermo-king-precedent-s600, last accessed January 17, 2020)
[100] Claimed confidential data obtained from an industry source that requested non-attribution.

iv. Lower GWP Refrigerant

Refrigerant capital costs would be incurred by TRU OEMs and TRU dealers to manufacture and sell new TRUs with lower GWP refrigerant as required by the Proposed Amendments, since initial refrigerant charge[101] may be done by the OEM or the dealer during final installation (particularly common for multi-temperature units). For the purpose of this analysis, staff assumed that TRU dealers would purchase refrigerant at aftermarket cost, which is usually higher than the cost to TRU OEMs. Although staff assumed refrigerant costs would be passed on to TRU owners and reflected in a higher capital cost for compliant TRUs compared to what would have been purchased in the Baseline, refrigerant capital costs were analyzed separately and are discussed below.

The incremental cost to switch to lower-GWP refrigerants would be due to the higher cost for alternative refrigerants to comply with the Proposed Amendments. Staff estimated that approximately 10 percent of new units currently use HFC-134a (GWP = 1,430). HFC-134a is generally used for medium low temperature applications, and is not suitable for very low temperatures. HFC-134a would continue to be allowed under the Proposed Amendments because its GWP value is less than the proposed threshold of 2,200. Therefore, staff assumed that 10 percent of new units would continue to use HFC-134a.

The remaining 90 percent of new units currently use R-404A. For the purpose of this analysis, staff assumed this portion of the new units would switch to R-452A (GWP = 2,141) to comply with the Proposed Amendments, since it is a "design-compatible" replacement for R-404A, suitable for both very low and medium low temperatures, commercialized in the European markets and is already being offered as an optional alternative by manufacturers in the North American markets.[102,103]

The aftermarket cost for R-404A is estimated to be $5.9 per pound, based on online vendor pricing.[104] The aftermarket cost for R-452A is not readily available in the public domain because it is not yet in wide use in the U.S. Therefore, staff calculated the online price differential between R-404A and R-452A from a European-based

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[101] Refrigerant charge or recharge is the initial filling or refilling of a TRU with refrigerant.

[102] Carrier Press Release, "Carrier Transicold Strengthens Sustainability Initiatives with Lower GWP for North America Truck and Trailer Systems," December 15, 2020. (web link: https://www.carrier.com/truck-trailer/en/north-america/news/news-article/carrier_transicold_strengthens_sustainability_initiatives_with_lower_gwp_refrigerant_for_north_america_truck_and_trailer_systems.html)

[103] Fleet Owner, "Thermo King offers products to help reduce emissions," July 28, 2017 (web link: https://www.fleetowner.com/running-green/emissions/article/21696418/thermo-king-offers-products-to-help-reduce-emissions)

[104] Refrigerant Guys, Price of R-404A in 24-lb disposable cylinder. (web link: https://www.refrigerantguys.com/R404a-24lb-p/111026.htm, last accessed September 4, 2020).

vendor.[105,106] Staff assumed that the same price differential would apply to the U.S. due to market demand as a result of the Proposed Amendments. Therefore, the aftermarket cost of R-452A is estimated to be $14.8 per pound.

The OEM cost for R-404A and R-452A is also not publicly available. Therefore, staff first determined the OEM cost to aftermarket cost ratios for HFC-134a and for HFO-1234yf, using publicly available information. HFC-134a is the most ubiquitous single-compound refrigerant in use, and HFO-1234yf is a leading low-GWP alternative in vehicle air conditioning and a component for R-452A and other refrigerant blends. Staff applied the average OEM cost to aftermarket cost ratios for HFC-134a and for HFO-1234yf to the aftermarket costs for R-404A and R-452A described above. The resulting OEM cost for R-404A and R-452A is estimated to be $3.7 per pound and $9.3 per pound, respectively.[107]

Based on staff communication with an OEM, about 10 percent of truck TRUs and 20 percent of trailer TRUs and DSC TRUs undergo final assembly at installation and their initial refrigerant charges are conducted by the installing dealers.[108] Aftermarket refrigerant costs are assumed to apply to these situations. The remaining TRUs are assumed to be initially charged by OEMs. Staff used the breakouts of initial refrigerant charge venues to weight-average the initial charge costs for truck TRUs, trailer TRUs, and DSC TRUs. Based on manufacturer specifications for commercially available truck TRUs, trailer TRUs, and DSC TRUs from the two main TRU OEMs, staff used a refrigerant capacity of 6.5 pounds[109,110] for truck TRUs and 16 pounds[111,112] for trailer TRUs and DSC TRUs. Therefore, an initial charge with R-452A, on average, is estimated to cost $38 more for a truck TRU and $100 more for a trailer TRU or DSC

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[105] Refrigerant Boys, Price of R-404A in 30-kg refillable cylinders for EU market. (web link: https://www.refrigerantboys.com/en/buy/r404a-fluids/r404a-cylinder-30-kg/, last accessed September 4, 2020)

[106] Refrigerant Boys, Price of R-452A in 30-kg refillable cylinders for EU market. (web link: https://www.refrigerantboys.com/en/buy/refrigerant-fluids/r452a-fluids/r452a-bottle-with-30-kg-of-gas-21-7-x-1-1-4-valve/, last accessed September 4, 2020)

[107] The aftermarket prices of HFC-134a and HFO-1234yf are estimated to be $4.8/lb and $59.9/lb, based on two vendors' online pricing (Refrigerant Guys, 2020b; Refrigerant Depot, 2020). The OEM prices of HFC-134a and HFO-1234yf are estimated to be $3.2/lb and $35.2/lb, respectively, using the midpoints of the vehicle manufacturer price ranges reported in Sherry et al. (2017). Therefore, the aftermarket cost to OEM cost ratio is 1.50 for HFC-134a and 1.70 for HFO-1234yf. Staff used the average, 1.60, and applied it to the aftermarket costs for R-404A and R-452A.

[108] Claimed confidential data obtained from an industry source that requested non-attribution.

[109] Carrier Transicold, Supra S8 Performance Specifications, December 2020. (web link: https://www.shareddocs.com/hvac/docs/2000/Public/05/62-12105.pdf)

[110] Thermo King, T-690 and T-690 Max Specifications, February 2020. (web link: https://2v0usj4e6l6t2qrqk1maqr81-wpengine.netdna-ssl.com/wp-content/uploads/2019/12/T-690-Spec-Sheet.pdf)

[111] Carrier Transicold, X4 7300 Performance Specifications, February 6, 2020. (web link: https://www.shareddocs.com/hvac/docs/2000/Public/0C/62-11663.pdf)

[112] Thermo King, Precedent S-610DE Specification Sheet, April 2017. (web link: https://2v0usj4e6l6t2qrqk1maqr81-wpengine.netdna-ssl.com/wp-content/uploads/2015/04/2020-Precedent-S-610DE-Spec-Sheet.pdf)

TRU as compared with an initial charge with R-404A. Table C20 shows the refrigerant capital costs used in the SRIA.

Table C20. Refrigerant Capital Costs (2019$)

Equipment Type	Baseline Cost	Proposed Cost	Incremental Cost
Truck TRU	$25	$64	$38
Trailer TRU and DSC TRU	$66	$166	$100

The refrigerant capital costs in a given year are calculated by multiplying the annual new sales population times the incremental cost for each TRU category shown in Table C19. Since staff assumed that refrigerant costs would be passed on to TRU owners and reflected in a higher capital cost for compliant TRUs, staff determined the amortized refrigerant capital costs over a period of 5 years at an interest rate of 5 percent using the same methodology used for truck TRU capital costs described in Section C.1.d.i. Table C21 shows the amortized and unamortized capital cost to comply with the refrigerant requirement from 2022 to 2034 is estimated to be $29.8 million and $31.2 million, respectively. The cost would be incurred by TRU owners.

Table C21. Estimated Annual Refrigerant Capital Costs from 2022 to 2034 (2019$)

Year	Refrigerant Capital Cost (Amortized)	Refrigerant Capital Cost (Unamortized)
2022	$0	$0
2023	$500,000	$2,200,000
2024	$1,000,000	$2,000,000
2025	$1,500,000	$2,300,000
2026	$2,100,000	$2,400,000
2027	$3,000,000	$4,200,000
2028	$3,100,000	$2,600,000
2029	$3,200,000	$2,500,000
2030	$3,300,000	$2,600,000
2031	$3,300,000	$2,500,000
2032	$2,900,000	$2,300,000
2033	$2,900,000	$2,700,000
2034	$3,000,000	$2,900,000
Total	$29,800,000	$31,200,000

There are likely additional OEM capital investments in manufacturing infrastructure to properly handle the new refrigerant, update labeling, operation and servicing manuals, and obtain pertinent certification, as well as additional aftermarket sector costs to purchase equipment to handle new refrigerants, and to train technicians to properly handle the new refrigerant. However, OEMs have already started the lower-GWP refrigerant transition and offer R-452A truck and trailer TRUs as an optional alternative

for the North American markets.[113,114] Therefore, staff assumed OEMs and dealers have already made needed investments and did not account for additional costs to TRU OEMs or dealers as a result of the Proposed Amendments.

v. Total Equipment Capital Costs

Tables C22 and C23 summarize the total equipment capital costs by requirement and the total equipment capital costs by TRU category relative to the Baseline from 2022 to 2034, respectively.

Table C22. Annual Equipment Capital Costs from 2022 to 2034 (2019$)

Year	Zero-Emission Truck TRUs	Zero-Emission Truck TRU Infrastructure	PM Emission Standard	Refrigerant
2022	$0	$0	$0	$0
2023	$5,600,000	$1,100,000	$11,600,000	$500,000
2024	$13,700,000	$2,500,000	$21,800,000	$1,000,000
2025	$19,100,000	$3,600,000	$34,100,000	$1,500,000
2026	$31,700,000	$5,400,000	$48,100,000	$2,100,000
2027	$38,300,000	$6,900,000	$73,300,000	$3,000,000
2028	$39,600,000	$7,200,000	$76,200,000	$3,100,000
2029	$33,800,000	$6,700,000	$80,000,000	$3,200,000
2030	$23,400,000	$5,700,000	$81,900,000	$3,300,000
2031	$6,300,000	$4,000,000	$81,700,000	$3,300,000
2032	(-$5,200,000)	$2,700,000	$69,400,000	$2,900,000
2033	(-$16,900,000)	$1,500,000	$70,000,000	$2,900,000
2034	(-$23,800,000)	$800,000	$72,300,000	$3,000,000
Total	$165,600,000	$48,100,000	$720,400,000	$29,800,000

Table C23. Annual Equipment Capital Costs by TRU Category from 2022 to 2034 (2019$)

Year	Truck TRU	Trailer TRU	DSC TRU	Railcar TRU	TRU Generator Set
2022	$0	$0	$0	$0	$0
2023	$6,700,000	$9,900,000	$0	$300,000	$1,400,000
2024	$16,200,000	$18,700,000	$100,000	$500,000	$2,500,000
2025	$22,800,000	$28,800,000	$100,000	$900,000	$4,200,000
2026	$37,100,000	$39,600,000	$200,000	$1,700,000	$6,700,000
2027	$45,200,000	$58,500,000	$300,000	$2,400,000	$12,100,000

[113] Carrier Press Release, Carrier Transicold Strengthens Sustainability Initiatives with Lower GWP Refrigerant for North America Truck and Trailer Systems, December 15, 2020. (web link: https://www.carrier.com/truck-trailer/en/north-america/news/news-article/carrier_transicold_strengthens_sustainability_initiatives_with_lower_gwp_refrigerant_for_north_america_truck_and_trailer_systems.html)

[114] Fleet Owner, Thermo King offers products to help reduce emissions, July 28, 2017. (web link: https://www.fleetowner.com/running-green/emissions/article/21696418/thermo-king-offers-products-to-help-reduce-emissions)

Year	Truck TRU	Trailer TRU	DSC TRU	Railcar TRU	TRU Generator Set
2028	$46,800,000	$60,100,000	$300,000	$2,700,000	$13,100,000
2029	$40,500,000	$62,600,000	$300,000	$2,900,000	$14,300,000
2030	$29,100,000	$64,200,000	$300,000	$2,800,000	$14,600,000
2031	$10,400,000	$64,900,000	$300,000	$2,500,000	$14,000,000
2032	(-$2,500,000)	$56,700,000	$200,000	$2,200,000	$10,300,000
2033	(-$15,400,000)	$57,600,000	$200,000	$2,100,000	$10,000,000
2034	(-$23,000,000)	$59,500,000	$300,000	$2,000,000	$10,500,000
Total	$213,900,000	$581,100,000	$2,600,000	$23,000,000	$113,700,000

e. Sales Tax

Sales tax is an additional cost levied on the purchase of a TRU. Since sales tax is based on the purchase price of the TRU, they are higher for units that would be purchased to comply with the Proposed Amendments due to their higher capital costs. TRUs purchased in California incur a sales tax on top of the purchase price. The sales tax varies across the State from a minimum of 7.25 percent up to 10.5 percent in some municipalities. For this analysis, staff used a value of 8.6 percent, which is a weighted average based on county-level output.[115, 116] Staff applied the additional sales tax cost to the capital cost for TRUs based in California. This results in higher costs for California-based TRU owners and higher revenue for local and State government (discussed in Section D.1 and D.2).

f. Maintenance and Operational Costs

i. TRU Maintenance Costs

TRU maintenance costs reflect the cost of labor and parts for routine maintenance, preventative maintenance, and repairing broken components. Maintenance costs for battery-electric truck TRUs are generally lower than diesel-powered TRUs in part due to fewer moving components. The maintenance cost for a diesel TRU is estimated at $0.95 per hour of operation, whereas the maintenance cost for a battery-electric truck TRU is estimated at $0.50 per hour of operation.[117] Annual TRU maintenance costs are calculated by multiplying the TRU maintenance rate by the annual activity within California per TRU (see Table C5) and the total TRU population per calendar year.

For trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets, staff assumed the TRU maintenance costs would be the same in the Baseline and the Proposed Amendments since TRUs equipped with an engine that meets the proposed PM

[115] County-level output derived from Regional Economic Models, Inc. (REMI) Policy Insight Plus Version 2.4.1. Output is defined as the amount of production, including all intermediate goods purchased as well as value added (compensation and profit). Can also be thought of as sales or supply. The components of Output are Self Supply and Exports (Multiregions, Rest of Nation, and Rest of World).

[116] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

[117] Claimed confidential data obtained from industry sources that requested non-attribution.

emission standard would incur the same maintenance cost as those equipped with engines that do not.

TRU refrigerant maintenance costs reflect the labor and material cost for a service technician to recharge the refrigerant in a TRU. The estimated annual maintenance cost for R-404A refrigerant is $6 per truck TRU and $14 per trailer TRU and DSC TRU. Under the Proposed Amendments, newly manufactured truck TRUs, trailer TRUs, and DSC TRUs would use the lower-GWP R-452A refrigerant, with an estimated annual maintenance cost of $14 per truck TRU and $35 per trailer TRU and DSC TRU. This is based on an assumed leak rate of 15 percent per year[118] (for all refrigerants) and the refrigerant capacity for truck TRUs, trailer TRUs, and DSC TRUs discussed previously. Table C24 shows the total estimated annual TRU and refrigerant maintenance costs from 2022 to 2034.

Table C24. Annual TRU and Refrigerant Maintenance Costs from 2022 to 2034 (2019$)

Year	Truck TRU	Trailer TRU	DSC TRU	Railcar TRU	TRU Generator Set
2022	$0	$0	$0	$0	$0
2023	$20,000	$900,000	$2,000	$0	$0
2024	(-$600,000)	$1,400,000	$2,000	$0	$0
2025	(-$1,300,000)	$1,700,000	$3,000	$0	$0
2026	(-$1,900,000)	$2,200,000	$5,000	$0	$0
2027	(-$2,900,000)	$2,600,000	$7,000	$0	$0
2028	(-$3,700,000)	$3,400,000	$9,000	$0	$0
2029	(-$4,400,000)	$3,800,000	$10,000	$0	$0
2030	(-$4,900,000)	$3,900,000	$10,000	$0	$0
2031	(-$5,000,000)	$4,000,000	$10,000	$0	$0
2032	(-$5,100,000)	$4,000,000	$10,000	$0	$0
2033	(-$5,100,000)	$4,100,000	$10,000	$0	$0
2034	(-$5,200,000)	$4,200,000	$11,000	$0	$0
Total	(-$40,100,000)	$36,200,000	$89,000	$0	$0

ii. Zero-Emission Truck TRU Infrastructure Maintenance Costs

Level 2 charger maintenance costs include the cost to replace charger heads, connectors, and other components, as well as labor costs for regular inspections. Annual maintenance costs are estimated to be $92.50 per unit.[119] Maintenance costs are calculated by multiplying the annual maintenance cost by the number of chargers.

[118] California Air Resources Board, California's High Global Warming Potential Gases Emission Inventory Methodology and Technical Support Document, April 2016. (web link: https://ww3.arb.ca.gov/cc/inventory/slcp/doc/hfc_inventory_tsd_20160411.pdf)
[119] Avista Corp, Electric Vehicle Supply Equipment Pilot Final Report, October 18, 2019. (web link: https://smartenergycc.org/wp-content/uploads/2019/10/Avista-EVSE-Pilot-Project-Review.pdf)

These costs also incorporate a 1.6 percent annual industry growth rate.[120] Table C25 shows the estimated infrastructure maintenance costs for zero-emission truck TRU infrastructure from 2022 to 2034.

Table C25. Estimated Annual Zero-Emission Truck TRU Infrastructure Maintenance Costs from 2022 to 2034 (2019$)

Year	Zero-Emission Truck TRU Infrastructure Maintenance Cost
2022	$0
2023	$0
2024	$200,000
2025	$400,000
2026	$600,000
2027	$900,000
2028	$1,100,000
2029	$1,400,000
2030	$1,500,000
2031	$1,500,000
2032	$1,600,000
2033	$1,600,000
2034	$1,600,000
Total	$12,400,000

iii. Diesel Fuel and Electricity Costs

Diesel fuel and electricity costs for truck TRUs are calculated using total fuel used per year and the cost of fuel per unit. For diesel units, fuel consumption is rated in gallons per hour (gal/hr). Staff used a fuel consumption rate of 0.55 gal/hr for diesel truck TRUs, which staff derived from the statewide TRU inventory model.[121] Annual electricity usage is based on the truck TRU battery size, number of operating days, and the total zero-emission truck TRU population per calendar year. Electricity usage also accounts for a 10 percent battery charging loss factor.[122] Table C26 shows the truck TRU diesel and electricity inputs used for the SRIA.

[120] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)

[121] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)

[122] Eudy, Leslie, and Matthew Jeffers. Foothill Transit Battery Electric Bus Demonstration Results: Second Report, National Renewable Energy Laboratory, June 2017. (web link: https://www.nrel.gov/docs/fy17osti/67698.pdf)

Table C26. Truck TRU Diesel Fuel and Electricity Cost Inputs

Input	Value
Baseline Diesel Truck TRU Fuel Consumption	0.55 gal/hr[123]
Zero-Emission Truck TRU Battery Size	40 kWh[124]

Truck TRUs generally operate 6 days a week during the early morning to afternoon, making deliveries along a fixed route, and return to a home base facility at the end of their day.[125] Since TRU operation varies widely, staff assumed that each truck TRU would deplete the battery after their daily operation and fully recharge their battery each night. Staff encourage truck TRU owners to work with TRU manufacturers to determine the adequate size battery for their specific operations to avoid the need to recharge during times that would incur additional time-of-use charges and ensure they can utilize nighttime charging during off-peak times.

The California Energy Commission (CEC) provides diesel fuel and electricity price forecasts as part of the Integrated Energy Policy Report (IEPR) process. The forecast includes three demand cases designed to capture a reasonable range of demand outcomes over the next 10 years. The "high-energy demand case" incorporates relatively high economic/demographic growth, relatively low electricity and natural gas rates, and relatively low committed efficiency program, self-generation, and climate change impacts. The "low-energy demand case" includes lower economic/demographic growth, higher assumed rates, and higher committed efficiency program and self-generation impacts. The "mid" case uses input assumptions at levels between the "high" and "low" cases.[126]

For this analysis, staff used diesel fuel and electricity prices to 2031 from CEC's Transportation Energy Demand Forecast 2020 IEPR Update.[127] Staff used diesel price projections from the mid-case scenario in the 2020 IEPR update and electricity price projections from the commercial electricity prices in the mid-case scenario in the 2020 IEPR update. Staff calculated fuel prices past 2031 by using the Energy

[123] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)

[124] As discussed in Section C.1.d.i, staff assumed a median battery size of 40 kWh based on the current offerings of battery-electric truck TRUs with batteries ranging in size from 10 to 60 kilowatt-hours capable of 8 to 12 hours of operation. This operating range was determined to be sufficient for truck TRUs since they are generally only used for local and regional operations and do not operate outside of California.

[125] McCormack, E., Chilan, T., Bassok, A., Fishkin, E., TransNow, Truck Trip Generation by Grocery Stores. Washington, DC: United States Department of Transportation, 2010. (web link: https://ntlrepository.blob.core.windows.net/lib/33000/33900/33993/TNW2010-04.pdf)

[126] California Energy Commission, Final 2019 Integrated Energy Policy Report, February 2020. (web link: https://efiling.energy.ca.gov/getdocument.aspx?tn=232922)

[127] California Energy Commission, Transportation Energy Demand Forecast 2020 IEPR Update, December 3, 2020. (web link: https://efiling.energy.ca.gov/GetDocument.aspx?tn=235841&DocumentContentId=68785)

Information Administration's (EIA) 2020 Annual Energy Outlook for the Pacific region.[128] Staff applied the annual percentage change in EIA diesel fuel and electricity prices past 2031 to the 2031 CEC diesel and electricity prices to estimate price changes past 2031.

Staff adjusted the CEC diesel fuel prices because TRUs are considered to be off-road equipment and are not subject to certain taxes included in the CEC values. Staff subtracted the federal excise tax rate equal to $0.385 per gallon,[129] as well as State diesel tax and local district tax estimated to be 13 percent and 1.36 percent,[130] respectively. When used off-road, diesel is taxed at the combined statewide sales tax rate, plus applicable district taxes. Therefore, staff applied the combined State and local sales tax rate used in this analysis of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[131] going towards State sales tax and 4.67 percent[132] going towards local sales tax. The projected cost of diesel and electricity used in this analysis are outlined in Table C27.

Table C27. Diesel and Electricity Price Projections from 2022 to 2034 (2019$)

Year	Diesel Price per Gallon	Electricity Price per kWh
2022	$2.40	$0.19
2023	$2.38	$0.19
2024	$2.38	$0.19
2025	$2.35	$0.19
2026	$2.34	$0.20
2027	$2.28	$0.20
2028	$2.25	$0.20
2029	$2.19	$0.21
2030	$2.15	$0.21
2031	$2.15	$0.21
2032	$2.16	$0.21
2033	$2.20	$0.21
2034	$2.21	$0.21

[128] Energy Information Administration, Annual Energy Outlook, 2020. (web link: https://www.eia.gov/outlooks/aeo/data/browser/#/?id=3-AEO2020&region=1-9&cases=ref2020&start=2018&end=2050&f=A&linechart=ref2020-d112119a.3-3-AEO2020.1-9&map=ref2020-d112119a.4-3-AEO2020.1-9&sourcekey=0%00)

[129] California Department of Tax and Fee Administration, Tax Rates for Motor Vehicles and Diesel Fuels, May 2020. (web link: https://cdtfa.ca.gov/formspubs/L739.pdf)

[130] California Department of Tax and Fee Administration, Sales Tax Rates for Fuels. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-tax-rates-for-fuels.htm, last accessed May 24, 2021)

[131] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)

[132] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

The diesel fuel and electricity costs for truck TRUs in a given year are calculated using the following equations:

$$Diesel\ Cost = population \times activity \times fuel\ consumption\ rate \times cost\ of\ diesel$$

Where:

Diesel cost = annual diesel usage cost ($)

Population = annual diesel truck TRU population (number of units)

Activity = truck TRU activity in California (1,360 hours per unit)

Fuel consumption rate = 0.55 gallon/hour

Cost of diesel = statewide average diesel cost from Table C27 ($/gallon)

$$Electricity\ Cost = population \times battery\ size \times operating\ days \times cost\ of\ electricity$$

Where:

Electricity cost = annual electricity usage cost ($)

Population = annual zero-emission truck TRU population (number of units)

Battery size = average zero-emission truck TRU battery size (40kW)

Operating days = number of days per year truck TRUs operate (312 days/year)

Cost of electricity = statewide average electricity cost from Table C27 ($/kWh)

Table C28 outlines the total estimated annual diesel and electricity usage costs for truck TRUs.

Table C28. Estimated Annual Truck TRU Diesel Fuel and Electricity Costs from 2022 to 2034 (2019$)

Year	Annual Truck TRU Diesel Fuel Cost	Annual Truck TRU Electricity Cost
2022	$0	$0
2023	$0	$0
2024	(-$1,700,000)	$2,400,000
2025	(-$3,800,000)	$5,700,000
2026	(-$5,600,000)	$8,600,000
2027	(-$8,200,000)	$13,100,000
2028	(-$10,300,000)	$17,000,000
2029	(-$12,100,000)	$20,800,000
2030	(-$13,100,000)	$23,300,000
2031	(-$13,200,000)	$24,200,000
2032	(-$13,600,000)	$24,500,000
2033	(-$14,000,000)	$24,900,000
2034	(-$14,300,000)	$25,300,000
Total	(-$109,900,000)	$189,800,000

For trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets, staff assumed diesel fuel costs would be the same in the Baseline and the Proposed Amendments. In general, an engine operating at higher power levels uses more fuel. Therefore, it would be expected that the purchase of units with greater than 25 horsepower engines to comply with the PM emission standard would result in higher diesel fuel costs. However, one of the two major TRU OEMs indicated that they plan to offer units equipped with a less than 25 horsepower engine that meets the 0.02 g/hp-hr PM emission standard.[133] Therefore, staff assumed the population mix of less than 25 horsepower and greater than 25 horsepower engines and resulting diesel fuel usage would remain the same.

iv. Low Carbon Fuel Standard Revenue

The LCFS Regulation is designed to reduce GHG emissions by requiring fuel producers to reduce the carbon intensity in fuel or purchase credits from those who supply low carbon fuel. The regulation incentivizes the use of low carbon fuels, including electricity, hydrogen, natural gas, and biofuels.[134] TRU owners who use electricity as a power source to charge their zero-emission truck TRUs can generate credits based on the amount of energy they use. Staff expect that all parties eligible to generate LCFS credits will take advantage of the incentive provided by LCFS. Staff determined credit values for different fuel types using the LCFS Credit Price Calculator.[135] LCFS credit revenue is projected to drop slightly over time as program standards tighten and maintain upward pressure on the credit price. Table C29 outlines the projected LCFS credit values and revenue from 2022 to 2034. These values are based on a credit price of $200 and a California grid average Carbon Intensity of 81.49 grams of carbon dioxide equivalent emissions per megajoule of fuel energy.[136]

Table C1. Projected LCFS Credit Values and Revenue from 2022 to 2034

Year	Projected LCFS Credit Value per kWh	Projected LCFS Credit Revenue
2022	$0.16	$0
2023	$0.16	$0
2024	$0.16	(-$1,900,000)
2025	$0.15	(-$4,100,000)
2026	$0.15	(-$6,000,000)
2027	$0.15	(-$9,000,000)
2028	$0.14	(-$10,700,000)
2029	$0.14	(-$12,900,000)
2030	$0.14	(-$14,200,000)

[133] Claimed confidential data obtained from an industry source that requested non-attribution.

[134] California Air Resources Board, Unofficial Electronic Version of the Low Carbon Fuel Standard Regulation, July 2020. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-07/2020_lcfs_fro_oal-approved_unofficial_06302020.pdf)

[135] California Air Resources Board, LCFS Credit Price Calculator. (web link: https://www.arb.ca.gov/fuels/lcfs/dashboard/creditpricecalculator.xlsx, last accessed May 2021)

[136] LCFS staff analysis dated March 9, 2020. Values for 2031-2033 are extrapolated.

Year	Projected LCFS Credit Value per kWh	Projected LCFS Credit Revenue
2031	$0.14	(-$14,100,000)
2032	$0.13	(-$14,100,000)
2033	$0.13	(-$14,000,000)
2034	$0.13	(-$13,900,000)
Total	n/a	(-$114,900,000)

The total estimated LCFS credit revenue for truck TRU owners is estimated to be $114.9 million from 2022 to 2034. The cost savings would be incurred by TRU owners.

g. Administrative Costs

TRU owners and applicable facility owners would incur registration and reporting costs to comply with the Proposed Amendments. These costs are detailed below.

i. Registration and Reporting

1) TRUs

The Proposed Amendments require TRU owners to report all TRUs that operate in California beginning in 2023, regardless of the state they are based in. The current TRU ATCM requires that owners report California-based TRUs to CARB. Although a number of out-of-state fleets already voluntarily report to CARB, staff accounted for the costs associated with the time it would take to report out-of-state based TRUs since it is not currently a requirement in the TRU ATCM. Based on the amount of information TRU owners would be required to report, staff estimated that it would take on average 10 minutes to report each TRU at an estimated rate of $50 per hour for staffing and lost revenue from the employee assigned to pull and submit the information. The total cost to report approximately 459,000 out-of-state based TRUs to CARB from 2023 to 2034 is estimated to be $3.5 million and the costs would be incurred by TRU owners.

2) Applicable Facilities

The Proposed Amendments require applicable facility owners to register their facilities with CARB in 2023. Based on the amount of information facilities would be required to report, staff estimated that it would take on average one hour per facility to do this at a rate of $50 per hour for staffing and lost revenue from the employee assigned to pull and submit the information. The total cost to register approximately 7,800 applicable facilities with CARB from 2023 to 2034 is estimated to be $388,150 and the costs would be incurred by the facility owners.

ii. CARB Fees

The Proposed Amendments include TRU operating fees and applicable facility registration fees that would impose a direct, on-going cost to owners. The proposed fees will result in revenue to the State to offset costs needed to implement and enforce the Proposed Amendments. Reported and compliant TRUs will receive a CARB issued compliance label to facilitate quick identification of compliance status for

CARB staff and applicable facilities. TRU compliance labels will be valid for three years. Reporting every three years would help to ensure that reported information is accurate and kept up to date. Staff determined that compliance monitoring and enforcement activities related to zero-emission TRUs will be less resource intensive, and therefore have a lower operating fee. Table C30 shows the fee amounts under the Proposed Amendments. The fiscal impacts to State government are described in the Fiscal Impacts section (Section D.2).

Table C30. Fee Amounts

Type	Fee Amount per TRU or Facility
TRU Operating Fee, paid once every three years	$43
Zero-Emission TRU Operating Fee, paid once every three years	$22
Facility Registration Fee, paid once every three years	$43

The total fees from 2022 to 2034 are estimated to be $48 million. The cost would be incurred by TRU and applicable facility owners.

iii. Applicable Facility Reporting Costs

The Proposed Amendments require applicable facility owners to ensure that TRUs operating on their property are compliant. Owners may choose one of the following options:

- Reporting Option 1: Report all TRUs that operate on applicable facility property to CARB
- Reporting Option 2: Provide a declaration to CARB, under penalty of perjury, that non-compliant TRUs subject to this regulation would not be permitted to operate on applicable facility property.

1) Refrigerated WHDCs

Based on the initial compliance path chosen by facilities under CARB's Drayage Truck Regulation,[137] which includes reporting requirements for terminal operators regarding the drayage trucks that enter their facility, staff estimated that 10 percent of refrigerated WHDCs would collect and report all TRU activity to CARB (Reporting Option 1) and 90 percent would not allow non-compliant TRUs to operate (Reporting Option 2).

To estimate reporting costs, staff further categorized refrigerated WHDCs into standard refrigerated WHDCs with a building size between 20,000 and 199,999 square feet and refrigerated high-cube WHDCs (HCWHDC) with a building size greater than 200,000 square feet since the number of estimated TRU visits correlate with the building square footage. Staff applied TRU visit metrics from the 2016 South Coast Air

[137] California Air Resources Board, Public Hearing to Consider Proposed Amendments to the In-Use On-Road Diesel-Fueled Heavy-Duty Drayage Truck Regulation. Staff Report: Initial Statement of Reasons, October 2007. (web link: https://ww3.arb.ca.gov/regact/2007/drayage07/drayage07.htm)

Quality Management District and Institute of Transportation Engineers Warehouse Vehicle Trip Generation Analysis[138] to the average building square footage for a standard refrigerated WHDC and refrigerated HCHWDC to determine annual TRU activity as shown in Table C31.

Table C31. Estimated Annual Number of TRUs at Refrigerated WHDCs

Facility Type	TRUs Per Year
Refrigerated WHDC – Standard	2,496
Refrigerated HCWHDC	43,992

Collect and Report TRU Information to CARB

According to the United States Bureau of Labor Statistics, the median wage for Transportation, Storage, and Distribution Workers in California in May 2019 was $15.89 per hour[139] and the benefits amounted to $6.81 (70.3 percent of the hourly wage).[140] Benefits include insurance, which includes life, health, and short- and long-term disability, Social Security, Medicare, unemployment insurance (both state and federal), workers' compensation, as well as costs for paid vacation, holiday, sick, and personal leave. Staff used the fully-burdened labor rate of $22.70 for refrigerated WHDC workers to collect TRU information. Staff estimated it would take two minutes to collect information for each TRU. Therefore, the cost to collect TRU information at a standard WHDC and refrigerated HCWHDC is estimated to be $1,899 and $33,287 per year, respectively.

Based on the number of TRU visits and the amount of information facilities would be required to report, staff assumed it would take two hours for standard refrigerated WHDCs and four hours for HCWHDCs to retrieve, review, and report the information to CARB on a quarterly basis at a rate of $50 per hour for staffing and lost revenue from the employee assigned to submit the information. The cost to a standard refrigerated WHDC and HCWHDC to report information to CARB is estimated to be $400 and $1,000 per year, respectively. Therefore, the total cost to a standard refrigerated WHDC and HCWHDC to collect and report TRU information to CARB (Reporting Option 1), is estimated to be $2,299 and $34,287 per year, respectively.

Check for Compliance Onsite

Staff assumed 10 percent of standard refrigerated WHDCs and HCWHDCs would check for TRU compliance onsite and that it would take one minute to ensure the TRU had a valid CARB compliance label. Staff assumed the same type of workers that

[138] Institute of Transportation Engineers, High-Cube Warehouse Vehicle Trip Generation Analysis, October 2016. (web link: https://www.ite.org/pub/?id=a3e6679a%2De3a8%2Dbf38%2D7f29%2D2961becdd498)
[139] United States Bureau of Labor Statistics, State Occupational Employment and Wage Estimates California, May 2019. (web link: https://www.bls.gov/oes/current/oes_ca.htm#53-0000)
[140] United States Bureau of Labor Statistics, Employer Costs for Employee Compensation for the Regions – September 2020. (web link: https://www.bls.gov/regions/southwest/news-release/employercostsforemployeecompensation_regions.htm)

would collect and report TRU information would check for compliance and used the fully-burdened labor rate of $22.70 per hour[141] for refrigerated WHDC and refrigerated HCWHDC workers described above. Therefore, the cost to a standard WHDC and refrigerated HCWHDC to check for compliance onsite and turn non-compliant TRUs away (Reporting Option 2) is estimated to be $944 and $16,649 per year, respectively.

Only Doing Business with California-Compliant Companies

Based on the initial compliance path chosen by facilities under CARB's Drayage Truck Regulation, staff assumed that most facilities would choose the lowest cost option of only doing business with California compliant companies. Staff estimated that 80 percent of refrigerated WHDCs would require the use of compliant TRU units in their contracts and only do business with companies that are on CARB's 100 percent compliant list.[142] This would not incur any additional costs.

2) Grocery Stores

Similar to refrigerated WHDCs, based on the initial compliance path chosen by facilities under CARB's Drayage Truck Regulation, staff estimated that 10 percent of grocery stores would collect and report all TRU activity to CARB (Reporting Option 1) and 90 percent would not allow non-compliant TRUs to operate (Reporting Option 2).

Staff further categorized grocery stores into standard grocery stores with a building size between 15,000 and 89,999 square feet and supercenters with a building size greater than or equal to 90,000 square feet. Unlike refrigerated WHDCs, vehicle trip metrics for grocery stores are based on the type of store and not on the size of the building. This varies for each store depending on factors such as store hours, labor force, consumer demand, and travel time from distribution centers. However, based on environmental planning documents for various grocery stores in the State, staff assumed the average number of TRU deliveries is two per day at grocery stores and four per day at supercenters, six days per week.[143,144,145,146]

Collect and Report TRU Information to CARB

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[141] United States Bureau of Labor Statistics, State Occupational Employment and Wage Estimates California, May 2019. (web link: https://www.bls.gov/oes/current/oes_ca.htm#53-0000)

[142] California Air Resources Board, 100 Percent TRU ATCM Compliant Carrier List Search Page. (web link: https://arber.arb.ca.gov/publicTCCReports.arb)

[143] City of Malibu, Whole Foods and the Park Shopping Center Draft Environmental Impact Report, February 2015. (web link: https://www.malibucity.org/DocumentCenter/View/11516/WHOLE-FOODS-AND-THE-PARK-EIR----Consolidated-Draft-EIR?bidId=)

[144] City of Oakland, Safeway Redevelopment Project Broadway at Pleasant Valley Avenue Draft Environmental Impact Report, January 2013. (web link: http://www2.oaklandnet.com/oakca1/groups/ceda/documents/report/oak039284.pdf)

[145] City of Clearlake, Clearlake Walmart Center Expansion Draft Environmental Impact Report, March 2017. (web link: https://www.clearlake.ca.us/DocumentCenter/View/668/1_Clearlake-Walmart-Center-Expansion-Draft-EIR-Volume-I-Chapters-1-410.pdf)

[146] City of Oakland, Safeway Shopping Center – College and Claremont Avenues, July 2012. (web link: http://www2.oaklandnet.com/oakca1/groups/ceda/documents/agenda/oak036885.pdf)

Staff assumed 10 percent of standard grocery stores and supercenters would check for TRU compliance onsite. Because no California specific median wage for grocery workers was available, staff used the same wage for refrigerated WHDC and refrigerated HCWHDC workers described above. Therefore, staff assumed the fully-burdened labor rate for standard grocery store and supercenter workers to collect TRU information is $22.70 per hour. Staff estimated it would take two minutes to collect information for each TRU. Therefore, the cost to collect TRU information at a standard grocery store and supercenter is estimated to be $472 and $944 per year, respectively.

Based on the number of TRU visits and the amount of information required to report, staff assumed it would take two hours for standard grocery stores and four hours for supercenters to report the information to CARB on a quarterly basis at a rate of $50 per hour for staffing and lost revenue from the employee assigned to submit the information. The cost to a standard grocery store and supercenter to report information to CARB is estimated to be $400 and $1,000 per year, respectively. Therefore, the total cost to a standard grocery store and supercenter to collect and report TRU information to CARB (Reporting Option 1), is estimated to be $872 and $1,944 per year, respectively.

Check for Compliance Onsite

Staff assumed 10 percent of standard grocery stores and supercenters would check for TRU compliance onsite and it would take one minute to ensure the TRU had a valid CARB compliance label. The same type of workers that would collect and report TRU information would check for compliance and used the fully-burdened labor rate of $22.70 per hour. Therefore, the cost to a standard grocery store and supercenter to check TRU compliance onsite and turn non-compliant TRUs away (Reporting Option 2) is estimated to be $236 and $472 per year, respectively.

Only Doing Business with California-Compliant Companies

Similar to refrigerated WHDCs, staff assumed 80 percent of grocery stores would only do business with companies that are compliant and on CARB's list. This would not incur any additional costs.

3) Seaport Facilities and Intermodal Railyards

Because seaport facilities and railyards already collect information for incoming refrigerated containers, staff assumed these facilities would collect and report all TRU activity to CARB. There are already systems in place to perform the task of gathering the required information. Therefore, the cost of submitting this information to CARB would be the cost of reviewing information and generating a report to submit to CARB. Based on annual number of TRU visits and the amount of information facilities would be required to report, staff estimated it would take one hour per week. According to the United States Bureau of Labor Statistics, the median wage for Rail Transportation Workers in California in May 2019 was $25.17 per hour and the

benefits amounted to $10.79 (70.3 percent of the hourly wage).[147] Because no California-specific median wage for seaport workers was available, staff used the same wage for workers at both facility types. Therefore, staff used the fully-burdened labor rate of $35.96 per hour for seaport and railyard workers to check collected TRU information. The cost for seaport facilities and railyards to collect TRU information is estimated to be $1,870 per year.

Based on the number of TRU visits and the amount of information required to report, staff assumed it would take four hours for seaport facilities and railyards to report the information to CARB on a quarterly basis at a rate of $50 per hour for staffing and lost revenue from the employee assigned to submit the information. The cost to a seaport facility and railyard to report information to CARB is estimated to be $1,000 per year. Therefore, the total cost to a seaport facility and railyard to collect and report TRU information to CARB (Reporting Option 1) is estimated to be $2,870 per year. Table C32 shows the reporting costs by option chosen for each of the applicable facility types.

Table C32. Estimated Reporting Costs by Applicable Facility Type and Option Chosen

Facility Type	Cost to Collect and Report TRU Information to CARB (Reporting Option 1)	Cost to Check Compliance Onsite/Turn Non-Compliant TRUs Away (Reporting Option 2)	Cost to Only do Business with Compliant Companies (Reporting Option 2)
Standard Refrigerated WHDC	$2,299	$1,899	$0
Refrigerated HCWHDC	$34,287	$33,287	$0
Grocery Store	$872	$472	$0
Supercenter	$1,944	$944	$0
Seaport Facility or Railyard	$2,870	n/a	n/a

Table C33 shows the total reporting cost to applicable facility owners from 2022 to 2034 is estimated to be $36.8 million.

Table C33. Estimated Applicable Facility Reporting Costs from 2022 to 2034 (2019$)

Year	Applicable Facility Reporting Cost
2022	$0
2023	$0
2024	$3,100,000
2025	$3,100,000
2026	$3,200,000

[147] United States Bureau of Labor Statistics, State Occupational Employment and Wage Estimates California, May 2019. (web link: https://www.bls.gov/oes/current/oes_ca.htm#53-0000)

Year	Applicable Facility Reporting Cost
2027	$3,200,000
2028	$3,300,000
2029	$3,300,000
2030	$3,400,000
2031	$3,500,000
2032	$3,500,000
2033	$3,600,000
2034	$3,600,000
Total	$36,800,000

iv. Truck TRU Owner Extension Costs

Staff have worked closely with TRU OEMs and electric utilities to ensure the regulatory compliance dates and annual zero-emission truck TRU percentages that would be required by the Proposed Amendments are feasible. Staff do not anticipate delays to the availability of zero-emission truck TRUs or the installation of charging or fueling infrastructure needed to support zero-emission truck TRUs. The costs and emission reductions presented in this analysis reflect full compliance with the Proposed Amendments. However, to be conservative, staff quantified the costs that truck TRU owners would incur to apply for an extension to the zero-emission truck TRU requirement due to unavailability of zero-emission truck TRUs or infrastructure-related delays. Truck TRU owners may apply for an extension if compliance technology is not available due to a TRU OEM delay or if infrastructure cannot be installed on time due to any of the following:

- A delay in the manufacture and shipment of infrastructure equipment
- A delay in obtaining construction permit(s)
- A delay in obtaining power from a utility
- A delay due to private financing
- A delay in the installation of infrastructure
- A natural disaster
- The discovery of archeological, historical, or tribal cultural resources under CEQA

Table C34 shows the estimated number of truck TRU extensions each year from 2022 to 2034. The TRU OEM extension estimate is based on historical data on the number of OEM related extension applications received for the current TRU ATCM. The infrastructure extension estimates are based on analysis of truck TRU home base facilities, including the number of facilities, their location, as well as the estimated number of truck TRUs and subsequent amount of infrastructure staff expect to be installed at each truck TRU home base facility.

Table C34. Estimated Number of Truck TRU Extensions from 2022 to 2034

Year	TRU OEM Delay	Infrastructure Manufacture/ Shipment Delay	Permit Delay	Utility Upgrade Delay	Utility Connection Delay	Private Financing Delay	Installation Delay	Natural Disaster, CEQA, Historical, Tribal Discovery
2022	0	0	0	0	0	0	0	0
2023	12	6	4	6	5	7	7	2
2024	23	6	4	6	5	7	7	2
2025	11	6	4	6	5	7	7	2
2026	38	6	4	6	5	7	7	2
2027	21	6	4	6	5	7	7	2
2028	15	6	4	6	5	7	7	2
2029	8	6	4	6	5	7	7	2
2030	5	1	2	2	1	1	1	1
2031	5	1	2	2	1	1	1	1
2032	5	1	2	2	1	1	1	1
2033	5	1	2	2	1	1	1	1
2034	5	1	2	2	1	1	1	1
Total	153	47	38	52	40	54	54	19

Table C35 shows the estimated time to apply for an extension depending on the type. The hourly cost is assumed to be $100 per hour.

Table C35. Estimated Time and Cost to Complete Extension Application

Extension Type	Time to Complete Each Extension Application (hours)	Cost to TRU Owner to Complete Each Extension
TRU OEM Delay	2	$200
Infrastructure Manufacture/Shipment Delay	2	$200
Permitting Delay	2	$200
Utility Infrastructure Upgrade	4	$400
Utility Connection Delay	2	$200
Financial Delay	2	$200
Installation Delay	2	$200
Natural Disaster, CEQA, Historical, Tribal Discovery	10	$1000

Table C36 shows the total cost to truck TRU owners to apply for an extension from 2022 to 2034 is estimated to be $117,000.

Table C36. Estimated Truck TRU Extension Costs from 2022 to 2034

Year	Truck TRU Extension Cost
2022	$0
2023	$12,600
2024	$14,800

Year	Truck TRU Extension Cost
2025	$12,400
2026	$17,800
2027	$14,400
2028	$13,200
2029	$11,800
2030	$4,000
2031	$4,000
2032	$4,000
2033	$4,000
2034	$4,000
Total	$117,000

h. Total Net Costs

Table C37, Table C38, and Table C39 show the total net costs, total direct costs (without netting), and total cost savings of the Proposed Amendments from 2022 to 2034, respectively. Direct costs include all capital costs, TRU refrigerant maintenance costs, truck TRU infrastructure maintenance costs, electricity usage, CARB fees, and administrative costs for registration and reporting. Cost savings include truck TRU capital costs, truck TRU maintenance cost savings, truck TRU diesel fuel savings, and LCFS credit revenue.

Table C37. Total Net Costs of the Proposed Amendments from 2022 to 2034 (2019M$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0	$0.0
2023	$17.7	$0.9	$1.1	$0.0	$0.0	$0.0	$0.0	$10.8	$30.5
2024	$36.5	$0.8	$2.5	$0.2	(-$1.7)	$2.4	(-$1.9)	$4.3	$43.1
2025	$54.7	$0.4	$3.6	$0.4	(-$3.8)	$5.7	(-$4.1)	$4.3	$61.3
2026	$81.8	$0.3	$5.4	$0.6	(-$5.6)	$8.6	(-$6.0)	$11.0	$96.0
2027	$114.7	(-$0.2)	$6.9	$0.9	(-$8.2)	$13.1	(-$9.0)	$5.9	$124.0
2028	$118.9	(-$0.3)	$7.2	$1.1	(-$10.3)	$17.0	(-$10.7)	$6.7	$129.7
2029	$117.0	(-$0.6)	$6.7	$1.4	(-$12.1)	$20.8	(-$12.9)	$8.1	$128.5
2030	$108.6	(-$1.0)	$5.7	$1.5	(-$13.1)	$23.3	(-$14.2)	$7.0	$118.0
2031	$91.3	(-$1.0)	$4.0	$1.5	(-$13.3)	$24.2	(-$14.1)	$8.0	$100.6
2032	$67.1	(-$1.0)	$2.7	$1.6	(-$13.6)	$24.5	(-$14.1)	$7.5	$74.8
2033	$56.0	(-$1.0)	$1.5	$1.6	(-$14.0)	$24.9	(-$14.0)	$7.3	$62.2
2034	$51.5	(-$1.0)	$0.8	$1.6	(-$14.3)	$25.3	(-$13.9)	$8.5	$58.3
Total	$916.0	(-$3.7)	$48.1	$12.3	(-$109.9)	$189.8	(-$114.9)	$89.4	$1,027.0

Table C38. Total Direct Costs of the Proposed Amendments from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	TRU Refrigerant Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Electricity Costs	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0
2023	$17,700,000	$900,000	$1,100,000	$0	$0	$10,800,000	$30,500,000
2024	$36,500,000	$1,400,000	$2,500,000	$200,000	$2,400,000	$4,300,000	$47,300,000
2025	$54,700,000	$1,700,000	$3,600,000	$400,000	$5,700,000	$4,300,000	$70,400,000
2026	$81,800,000	$2,200,000	$5,400,000	$600,000	$8,600,000	$11,000,000	$109,600,000
2027	$114,700,000	$2,600,000	$6,900,000	$900,000	$13,100,000	$5,900,000	$144,100,000
2028	$118,900,000	$3,400,000	$7,200,000	$1,100,000	$17,000,000	$6,700,000	$154,300,000
2029	$117,000,000	$3,900,000	$6,700,000	$1,400,000	$20,800,000	$8,100,000	$157,900,000
2030	$108,600,000	$3,900,000	$5,700,000	$1,500,000	$23,300,000	$7,000,000	$150,000,000
2031	$91,300,000	$4,000,000	$4,000,000	$1,500,000	$24,200,000	$8,000,000	$133,000,000
2032	$72,300,000	$4,000,000	$2,700,000	$1,600,000	$24,500,000	$7,500,000	$112,600,000
2033	$72,900,000	$4,100,000	$1,500,000	$1,600,000	$24,900,000	$7,300,000	$112,300,000
2034	$75,300,000	$4,200,000	$800,000	$1,600,000	$25,300,000	$8,500,000	$115,700,000
Total	$961,700,000	$36,300,000	$48,100,000	$12,400,000	$189,800,000	$89,400,000	$1,337,700,000

Table C39. Total Cost Savings of the Proposed Amendments from 2022 to 2034 (2019$)

Year	Truck TRU Capital Cost Savings	Truck TRU Diesel Fuel Cost Savings	Truck TRU Maintenance Cost Savings	LCFS Credit Revenue	Total
2022	$0	$0	$0	$0	$0
2023	$0	$0	$0	$0	$0
2024	$0	(-$600,000)	(-$1,700,000)	(-$1,900,000)	(-$4,200,000)
2025	$0	(-$1,300,000)	(-$3,800,000)	(-$4,100,000)	(-$9,200,000)
2026	$0	(-$1,900,000)	(-$5,600,000)	(-$6,000,000)	(-$13,500,000)
2027	$0	(-$2,900,000)	(-$8,200,000)	(-$9,000,000)	(-$20,100,000)
2028	$0	(-$3,700,000)	(-$10,300,000)	(-$10,700,000)	(-$24,700,000)
2029	$0	(-$4,400,000)	(-$12,100,000)	(-$12,900,000)	(-$29,400,000)
2030	$0	(-$4,900,000)	(-$13,100,000)	(-$14,200,000)	(-$32,200,000)
2031	$0	(-$5,000,000)	(-$13,200,000)	(-$14,100,000)	(-$32,300,000)
2032	(-$5,200,000)	(-$5,100,000)	(-$13,600,000)	(-$14,100,000)	(-$38,000,000)
2033	(-$16,900,000)	(-$5,100,000)	(-$14,000,000)	(-$14,000,000)	(-$50,000,000)
2034	(-$23,800,000)	(-$5,200,000)	(-$14,300,000)	(-$13,900,000)	(-$57,200,000)
Total	(-$45,900,000)	(-$40,100,000)	(-$109,900,000)	(-$114,900,000)	(-$310,800,000)

2. Direct Costs on Typical Businesses

For the purposes of the Proposed Amendments, typical businesses are defined as all affected establishments in the State that are not small businesses. The estimated costs to TRU and applicable facility owners considered to be a typical business to comply with the Proposed Amendments are discussed below.

a. TRU Owners

Truck and trailer TRUs make up approximately 83 percent of the TRU population that operates in California. For this analysis, staff calculated the cost for a typical California-based truck TRU fleet and a typical California-based trailer TRU fleet to comply with the Proposed Amendments as compared to the Baseline.

i. Truck TRU Owner

Based on CARB's ARBER[148] and Dun and Bradstreet[149] databases, the average number of truck TRUs owned by companies with more than 100 employees is 8. Therefore, to illustrate the costs to a typical business, staff considered an average fleet with eight truck TRUs. All cost assumptions are the same as discussed in previous sub-sections for truck TRUs. An owner of a fleet consisting of eight truck TRUs would be required to purchase zero-emission truck TRUs beginning in 2023, as shown in Table C40.

Table C40. Annual Number of Zero-Emission Truck TRU Purchases Required by the Proposed Amendments for a Typical Business Owning Truck TRUs from 2022 to 2034

Year	Number of Zero-Emission Truck TRUs Purchased
2022	0
2023	1
2024	1
2025	2
2026	1
2027	1
2028	1
2029	1
2030	0
2031	0
2032	0
2033	0
2034	0
Total	8

[148] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[149] Dun and Bradstreet Database, Employee data for companies that own truck TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

To assess the costs to a typical business owning truck TRUs, staff assumed the truck TRU owner also owns the truck TRU home base facility where charging infrastructure would be installed to support operation of the battery-electric truck TRUs purchased to comply with the zero-emission truck TRU requirement. As discussed in Section C.1.d.ii, staff assumed owners would install infrastructure on the same schedule as the truck TRUs transition to zero-emission technology, adding enough chargers to accommodate the battery-electric truck TRU population each year.

Table C41 shows the annual amortized cost for a typical business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from -$7,600 to $65,200. The total amortized cost for a typical business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $352,100. To show the feasibility of compliance for a typical business owning truck TRUs, staff compared the maximum amortized annual cost of $65,200 to the annual revenue of a typical business in the truck transportation industry, which is $36.5 million.[150] The maximum amortized annual cost for a typical business owning truck TRUs to comply with the Proposed Amendments is less than one percent of their annual revenue.

Table C42 shows the annual unamortized cost for a typical business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from -$11,600 to $102,100. The total unamortized cost for a typical business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $293,900. To show the feasibility of compliance for a typical business owning truck TRUs, staff compared the maximum unamortized annual cost of $102,100 to the annual revenue of a typical business in the truck transportation industry, which is $36.5 million.[151] The maximum unamortized annual cost for a typical business owning truck TRUs to comply with the Proposed Amendments is less than one percent of their annual revenue.

[150] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)
[151] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)

Table C41. Estimated Annual Cost to a Typical Business Owning Truck TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Costs	Electricity Costs	LCFS Credits	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$11,200	$0	$1,100	$0	$0	$0	$0	$320	$12,600
2024	(-$8,300)	(-$600)	$2,300	$200	(-$1,800)	$2,600	(-$2,000)	$20	(-$7,600)
2025	$34,600	(-$1,200)	$4,500	$400	(-$3,500)	$5,200	(-$3,700)	$40	$36,300
2026	$45,500	(-$2,400)	$5,600	$700	(-$7,000)	$10,700	(-$7,500)	$170	$45,800
2027	$56,300	(-$3,000)	$6,800	$900	(-$8,500)	$13,600	(-$9,400)	$40	$56,700
2028	$55,800	(-$3,600)	$6,800	$1,100	(-$10,100)	$16,600	(-$10,500)	$70	$56,200
2029	$65,100	(-$4,200)	$6,800	$1,300	(-$11,500)	$19,800	(-$12,200)	$70	$65,200
2030	$43,100	(-$4,800)	$4,500	$1,500	(-$12,900)	$23,000	(-$14,000)	$40	$40,400
2031	$32,200	(-$4,800)	$3,400	$1,500	(-$12,800)	$23,400	(-$13,700)	$70	$29,300
2032	$21,400	(-$4,800)	$2,300	$1,500	(-$12,900)	$23,400	(-$13,400)	$70	$17,600
2033	$10,700	(-$4,800)	$1,100	$1,500	(-$13,100)	$23,400	(-$13,200)	$40	$5,600
2034	$0	(-$4,800)	$0	$1,500	(-$13,300)	$23,400	(-$12,900)	$70	(-$6,000)
Total	$367,600	(-$39,000)	$45,200	$12,100	(-$107,400)	$185,100	(-$112,500)	$1,020	$352,100

Table C42. Estimated Unamortized Cost to a Typical Business Owning Truck TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Costs	Electricity Costs	LCFS Credits	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$48,500	$0	$4,900	$0	$0	$0	$0	$320	$53,700
2024	(-$14,900)	(-$600)	$4,900	$200	(-$1,800)	$2,600	(-$2,000)	$20	(-$11,600)
2025	$95,100	(-$1,200)	$9,800	$400	(-$3,500)	$5,200	(-$3,700)	$40	$102,100
2026	$47,200	(-$2,400)	$4,900	$700	(-$7,000)	$10,700	(-$7,500)	$170	$46,800
2027	$46,800	(-$3,000)	$4,900	$900	(-$8,500)	$13,600	(-$9,400)	$40	$45,300
2028	$46,500	(-$3,600)	$4,900	$1,100	(-$10,100)	$16,600	(-$10,500)	$70	$45,000
2029	$46,200	(-$4,200)	$4,900	$1,300	(-$11,500)	$19,800	(-$12,200)	$70	$44,400
2030	$0	(-$4,800)	$0	$1,500	(-$12,900)	$23,000	(-$14,000)	$40	(-$7,200)
2031	$0	(-$4,800)	$0	$1,500	(-$12,800)	$23,400	(-$13,700)	$70	(-$6,300)
2032	$0	(-$4,800)	$0	$1,500	(-$12,900)	$23,400	(-$13,400)	$70	(-$6,100)
2033	$0	(-$4,800)	$0	$1,500	(-$13,100)	$23,400	(-$13,200)	$40	(-$6,200)
2034	$0	(-$4,800)	$0	$1,500	(-$13,300)	$23,400	(-$12,900)	$70	(-$6,000)
Total	$315,400	(-$39,000)	$39,200	$12,100	(-$107,400)	$185,100	(-$112,500)	$1,020	$293,900

ii. Trailer TRU Owner

Based on CARB's ARBER[152] and Dun and Bradstreet[153] databases, the average number of trailer TRUs owned by companies with more than 100 employees is 7. Therefore, to illustrate the costs to a typical business, staff considered an average trailer TRU fleet with seven trailer TRUs. Trailer TRU fleet owners would incur capital costs for new units purchased beginning in 2023 to comply with the PM emission standard. To determine the number of new trailer TRUs that would be purchased by a typical business owning trailer TRUs, staff used the current average age of the trailer TRU fleet. Based on the statewide TRU inventory, the average age of a trailer TRU is five years old. With an average useful life of 10 years,[154] and assuming that all of the TRUs were the same age and did not already meet the PM emission standard, a typical business owning trailer TRUs would turnover their fleet and purchase seven new units in 2027. All cost assumptions are the same as discussed in previous sub-sections for trailer TRUs.

Table C43 shows the annual amortized cost for a typical business owning trailer TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from $0 to $5,500. The total amortized cost for a typical business owning trailer TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $27,800. To show the feasibility of compliance for a typical business owning trailer TRUs, staff compared the maximum amortized annual cost of $5,500 to the annual revenue of a typical business in the truck transportation industry, which is $36.5 million.[155] The maximum amortized annual cost for a typical business owning trailer TRUs to comply with the Proposed Amendments is less than 1/10th of one percent of their annual revenue.

Table C44 shows the annual unamortized cost for a typical business owning trailer TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from $0 to $22,400. The total unamortized cost for a typical business owning trailer TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $24,300. To show the feasibility of compliance for a typical business owning trailer TRUs, staff compared the maximum unamortized annual cost of $22,400 to the annual revenue of a typical business in the truck transportation industry, which is $36.5 million.[156] The maximum unamortized annual cost for a typical business owning

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[152] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[153] Dun and Bradstreet Database, Employee data for companies that own trailer TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[154] California Air Resources Board, Draft 2019 Update to Emissions Inventory for Transport Refrigeration Units, October 2019. (web link: https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_emissioninventory2019.pdf)
[155] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)
[156] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)

trailer TRUs to comply with the Proposed Amendments is less than 1/10 of one percent of their annual revenue.

Table C43. Estimated Annual Cost to a Typical Business Owning Trailer TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	PM Emission Standard Costs	Refrigerant Costs	Refrigerant Maintenance Costs	Administrative Costs	Total
2022	$0	$0	$0	$0	$0
2023	$0	$0	$0	$300	$300
2024	$0	$0	$0	$0	$0
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$300	$300
2027	$4,900	$200	$100	$300	$5,500
2028	$4,900	$200	$100	$0	$5,200
2029	$4,900	$200	$100	$0	$5,200
2030	$4,900	$200	$100	$300	$5,500
2031	$4,900	$200	$100	$0	$5,200
2032	$0	$0	$100	$0	$100
2033	$0	$0	$100	$300	$400
2034	$0	$0	$100	$0	$100
Total	$24,500	$1,000	$800	$1,500	$27,800

Table C44. Estimated Unamortized Cost to a Typical Business Owning Trailer TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	PM Emission Standard Costs	Refrigerant Costs	Refrigerant Maintenance Costs	Administrative Costs	Total
2022	$0	$0	$0	$0	$0
2023	$0	$0	$0	$300	$300
2024	$0	$0	$0	$0	$0
2025	$0	$0	$0	$0	$0
2026	$0	$0	$0	$300	$300
2027	$21,200	$800	$100	$300	$22,400
2028	$0	$0	$100	$0	$100
2029	$0	$0	$100	$0	$100
2030	$0	$0	$100	$300	$400
2031	$0	$0	$100	$0	$100
2032	$0	$0	$100	$0	$100
2033	$0	$0	$100	$300	$400
2034	$0	$0	$100	$0	$100
Total	$21,200	$800	$800	$1,500	$24,300

b. Applicable Facility Owners

Applicable facilities would incur costs to comply with the facility registration, registration fee, and reporting requirements in the Proposed Amendments. The costs to applicable facilities that are considered typical businesses are not expected to be different from the costs outlined previously (see Section C.1.g).

i. Refrigerated WHDC Owner

Based on CARB's TRU Applicable Facility Inventory[157] and Dun and Bradstreet[158] databases, the average building size of a refrigerated WHDC owned by companies with more than 100 employees is 125,000 square feet and would incur reporting costs as described for a standard refrigerated WHDC in Section C.1.g.iii.1.

Table C45 shows the total cost for a typical business owning a refrigerated WHDC to comply with the Proposed Amendments from 2022 to 2034 is estimated to range from $222 to $27,810, depending on the reporting option chosen. The annual cost to comply would range from $0 to $2,392. To show the feasibility of compliance for a typical business owning a refrigerated WHDC, staff compared the maximum annual cost of $2,392 to the annual revenue of a typical business owning a refrigerated WHDC, which is $67.4 million.[159] The maximum annual cost for a typical business owning a refrigerated WHDC to comply with the Proposed Amendments is less than 1/100th of one percent of their annual revenue.

Table C45. Estimated Annual Cost to a Typical Business Owning a Refrigerated WHDC to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Registration Costs	Registration Fee	Collect and Report TRU Information to CARB (Reporting Option 1)	Check Compliance Onsite/Turn Non-Compliant TRUs Away (Reporting Option 2)	Only do Business with Compliant Companies (Reporting Option 2)
2022	$0	$0	$0	$0	$0
2023	$50	$43	$2,299	$1,899	$0
2024	$0	$0	$2,299	$1,899	$0
2025	$0	$0	$2,299	$1,899	$0
2026	$0	$43	$2,299	$1,899	$0
2027	$0	$0	$2,299	$1,899	$0
2028	$0	$0	$2,299	$1,899	$0
2029	$0	$43	$2,299	$1,899	$0
2030	$0	$0	$2,299	$1,899	$0
2031	$0	$0	$2,299	$1,899	$0

[157] California Air Resources Board, Transport Refrigeration Unit Applicable Facility Inventory, February 2020.
[158] Dun and Bradstreet Database, Employee data for companies that own refrigerated WHDCs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[159] Dun and Bradstreet Database, Employee and revenue data for companies that own refrigerated WHDCs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

Year	Registration Costs	Registration Fee	Collect and Report TRU Information to CARB (Reporting Option 1)	Check Compliance Onsite/Turn Non-Compliant TRUs Away (Reporting Option 2)	Only do Business with Compliant Companies (Reporting Option 2)
2032	$0	$43	$2,299	$1,899	$0
2033	$0	$0	$2,299	$1,899	$0
2034	$0	$0	$2,299	$1,899	$0
Total	$50	$172	$27,588	$22,788	$0

ii. Grocery Store Owner

CARB's TRU Applicable Facility Inventory[160] and Dun and Bradstreet[161] databases indicate that the average building size of a grocery store owned by companies with more than 100 employees is 52,000 square feet and would incur reporting costs as described for a standard grocery store in Section C.1.g.iii.2.

Table C46 shows the total cost for a typical business owning a grocery store to comply with the Proposed Amendments from 2022 to 2034, which is estimated to range from $222 to $10,686, depending on the reporting option chosen. The annual cost to comply would range from $0 to $965, depending on the reporting option chosen. To show the feasibility of compliance for a typical business owning a grocery store to comply with the Proposed Amendments, staff compared the maximum annual cost of $965 to the annual revenue of a typical business owning a grocery store, which is $67.4 million.[162] The maximum annual cost for a typical business owning a grocery store to comply with the Proposed Amendments is less than 1/100th of one percent of their annual revenue.

Table C46. Estimated Annual Cost to a Typical Grocery Store Owner to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Registration Costs	Registration Fee	Collect and Report TRU Information to CARB (Reporting Option 1)	Check Compliance Onsite/Turn Non-Compliant TRUs Away (Reporting Option 2)	Only do Business with Compliant Companies (Reporting Option 2)
2022	$0	$0	$0	$0	$0
2023	$50	$43	$872	$472	$0
2024	$0	$0	$872	$472	$0
2025	$0	$0	$872	$472	$0
2026	$0	$43	$872	$472	$0
2027	$0	$0	$872	$472	$0

[160] California Air Resources Board, Transport Refrigeration Unit Applicable Facility Inventory, February 2020.
[161] Dun and Bradstreet Database, Employee data for companies that own grocery stores, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[162] Dun and Bradstreet Database, Employee and revenue data for companies that own refrigerated WHDCs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

Year	Registration Costs	Registration Fee	Collect and Report TRU Information to CARB (Reporting Option 1)	Check Compliance Onsite/Turn Non-Compliant TRUs Away (Reporting Option 2)	Only do Business with Compliant Companies (Reporting Option 2)
2028	$0	$0	$872	$472	$0
2029	$0	$43	$872	$472	$0
2030	$0	$0	$872	$472	$0
2031	$0	$0	$872	$472	$0
2032	$0	$43	$872	$472	$0
2033	$0	$0	$872	$472	$0
2034	$0	$0	$872	$472	$0
Total	$50	$172	$10,464	$5,664	$0

iii. Seaport Facility or Railyard Owner

Typical businesses owning a seaport facility or railyard would incur reporting costs as described in Section C.1.g.iii.3. Table C47 shows the total cost for a typical business owning a seaport facility or railyard to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $34,662. The annual cost for a typical business owning a seaport facility or railyard to comply with Proposed Amendments is estimated to range from $0 to $2,963.

Table C47. Estimated Annual Cost to a Typical Business Owning a Seaport Facility or Railyard to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Registration Costs	Registration Fee	Reporting Option 1 - Collect and Report TRU Information to CARB)
2022	$0	$0	$0
2023	$50	$43	$2,870
2024	$0	$0	$2,870
2025	$0	$0	$2,870
2026	$0	$43	$2,870
2027	$0	$0	$2,870
2028	$0	$0	$2,870
2029	$0	$43	$2,870
2030	$0	$0	$2,870
2031	$0	$0	$2,870
2032	$0	$43	$2,870
2033	$0	$0	$2,870
2034	$0	$0	$2,870
Total	$50	$172	$34,440

3. Direct Costs on Small Businesses

For the purposes of the Proposed Amendments, companies with 100 or fewer employees are considered small businesses.[163] Meeting the small business criteria does not relieve TRU or applicable facility owners of any requirements in the Proposed Amendments. Staff used the small business criteria for analysis purposes only. The estimated costs to TRU and applicable facility owners considered to be small business to comply with the Proposed Amendments are discussed below.

a. TRU Owners

i. Truck TRU Owner

Based on CARB's ARBER[164] and Dun and Bradstreet[165] databases, 95 percent of truck TRU fleets are considered small business. The average number of truck TRUs owned by companies with 100 or fewer employees is 5. Therefore, to illustrate the costs to a small business, staff considered an average fleet with five truck TRUs. All cost assumptions are the same as discussed in previous sub-sections for truck TRUs. A fleet consisting of five truck TRUs would be required to purchase zero-emission truck TRUs beginning in 2023, as shown in Table C48.

Table C48. Annual Number of Zero-Emission Truck TRU Purchases Required by the Proposed Amendments for a Small Business Owning Truck TRUs from 2022 to 2034

Year	Number of Zero-Emission Truck TRUs Purchased
2022	0
2023	1
2024	1
2025	0
2026	1
2027	1
2028	1
2029	0
2030	0
2031	0
2032	0
2033	0
2034	0
Total	5

[163] California Government Code, Title 2, Division 3, Part 5.5, Chapter 6.5, §14837. (web link: https://leginfo.legislature.ca.gov/faces/codes_displaySection.xhtml?sectionNum=14837.&lawCode=GOV)
[164] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[165] Dun and Bradstreet Database, Employee data for companies that own truck TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

To assess the costs to a small business owning truck TRUs, staff assumed the truck TRU owner also owns the truck TRU home base facility where charging infrastructure would be installed to support operation of the battery-electric truck TRUs purchased to comply with the zero-emission truck TRU requirement. As discussed in Section C.1.d.ii, staff assumed owners would install infrastructure on the same schedule as the truck TRUs transition to zero-emission technology, adding enough chargers to accommodate the battery-electric truck TRU population each year.

As discussed in Section C.1.d, staff assumed that the cost of new TRUs purchased to comply with the Proposed Amendments would be amortized. This is based on stakeholder input indicating that businesses generally do not pay the total capital cost up front. In addition to the amortized costs to comply with the Proposed Amendments, staff also determined the unamortized cost to TRU owners that may not have access to financing.

Table C49 shows the amortized annual cost for a small business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from -$4,100 to $40,400. The total cost for a small business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $223,000. To show the feasibility of compliance for a small business owning truck TRUs, staff compared the maximum amortized annual cost of $40,400 to the annual revenue of a small business in the truck transportation industry, which is $1.5 million.[166] The maximum amortized annual cost for a small business owning truck TRUs to comply with the Proposed Amendments is less than 3 percent of their annual revenue.

Table C50 shows the unamortized annual cost for a small business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034, which ranges from -$4,900 to $53,600. The total unamortized cost for a small business owning truck TRUs to comply with the Proposed Amendments from 2022 to 2034 is estimated to be $185,800. To show the feasibility of compliance for a small business owning truck TRUs, staff compared the maximum unamortized annual cost of $53,600 to the annual revenue of a small business in the truck transportation industry, which is $1.5 million.[167] The maximum unamortized annual cost for a small business owning truck TRUs to comply with the Proposed Amendments is less than 4 percent of their annual revenue.

[166] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)
[167] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)

Table C49. Estimated Annual Cost to a Small Business Owning Truck TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Costs	Electricity Costs	LCFS Credits	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$11,200	$0	$1,100	$0	$0	$0	$0	$190	$12,500
2024	$1,800	(-$1,900)	$2,300	$200	(-$3,600)	$2,600	$0	$20	$1,400
2025	$17,500	(-$1,200)	$2,300	$400	(-$3,500)	$5,200	(-$2,000)	$0	$18,700
2026	$28,300	(-$1,800)	$3,400	$400	(-$5,200)	$8,000	(-$3,700)	$90	$29,500
2027	$39,200	(-$2,400)	$4,500	$600	(-$6,800)	$10,900	(-$5,600)	$40	$40,400
2028	$38,700	(-$3,000)	$4,500	$700	(-$8,400)	$13,900	(-$7,500)	$20	$38,900
2029	$32,400	(-$3,000)	$3,400	$900	(-$8,200)	$14,100	(-$8,700)	$40	$30,900
2030	$32,400	(-$3,000)	$3,400	$900	(-$8,100)	$14,400	(-$8,700)	$40	$31,300
2031	$21,500	(-$3,000)	$2,300	$900	(-$8,000)	$14,600	(-$8,700)	$20	$19,600
2032	$10,700	(-$3,000)	$1,100	$900	(-$8,100)	$14,600	(-$8,600)	$40	$7,600
2033	$0	(-$3,000)	$0	$900	(-$8,200)	$14,600	(-$8,400)	$40	(-$4,100)
2034	$0	(-$3,000)	$0	$900	(-$8,300)	$14,600	(-$8,200)	$20	(-$4,000)
Total	$233,700	(-$28,300)	$28,300	$7,700	(-$76,400)	$127,500	(-$70,100)	$560	$223,000

Table C50. Estimated Unamortized Annual Cost to a Small Business Owning Truck TRUs to Comply with the Proposed Amendments from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Costs	Electricity Costs	LCFS Credits	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$48,500	$0	$4,900	$0	$0	$0	$0	$190	$53,600
2024	$11,300	(-$1,900)	$4,900	$200	(-$3,600)	$2,600	$0	$20	$13,500
2025	$0	(-$1,200)	$0	$400	(-$3,500)	$5,200	(-$2,000)	$0	(-$1,100)
2026	$47,200	(-$1,800)	$4,900	$400	(-$5,200)	$8,000	(-$3,700)	$90	$49,900
2027	$46,800	(-$2,400)	$4,900	$600	(-$6,800)	$10,900	(-$5,600)	$40	$48,400
2028	$46,500	(-$3,000)	$4,900	$700	(-$8,400)	$13,900	(-$7,500)	$20	$47,100
2029	$0	(-$3,000)	$0	$900	(-$8,200)	$14,100	(-$8,700)	$40	(-$4,900)
2030	$0	(-$3,000)	$0	$900	(-$8,100)	$14,400	(-$8,700)	$40	(-$4,500)
2031	$0	(-$3,000)	$0	$900	(-$8,000)	$14,600	(-$8,700)	$20	(-$4,200)
2032	$0	(-$3,000)	$0	$900	(-$8,100)	$14,600	(-$8,600)	$40	(-$4,200)
2033	$0	(-$3,000)	$0	$900	(-$8,200)	$14,600	(-$8,400)	$40	(-$4,100)
2034	$0	(-$3,000)	$0	$900	(-$8,300)	$14,600	(-$8,200)	$20	(-$4,000)
Total	$200,300	(-$28,300)	$24,500	$7,700	(-$76,400)	$127,500	(-$70,100)	$560	$185,800

ii. Trailer TRU Owner

Based on CARB's ARBER[168] and Dun and Bradstreet[169] databases, 90 percent of trailer TRU fleets are considered small business. The average number of trailer TRUs owned by companies considered to be small business is seven. This is the same number of trailer TRUs owned by a typical business.

Therefore, the cost of owning trailer TRUs for a small business would be the same as the costs described for a typical business in Section C.2.a.ii. To show the feasibility of compliance for a small business owning trailer TRUs, staff compared the maximum amortized annual cost of $5,500 and the maximum unamortized annual cost of $22,400 to the annual revenue of a small business in the truck transportation industry, which is $1.5 million.[170] The maximum amortized annual cost for a small business owning trailer TRUs to comply with the Proposed Amendments is less than 1 percent of their annual revenue, while the maximum unamortized annual cost is less than 2 percent.

The similar trailer TRU fleet size for a typical business (more than 100 employees) and small business (100 or fewer employees) may be due to the small sample size in which staff only had employee data from Dun and Bradstreet for 63 trailer TRU fleets reported in ARBER. It may also be due to the possibility that typical trucking companies may not specialize solely in refrigerated transport and their fleets may also include non-refrigerated trucks or trailers.

b. Applicable Facility Owners

i. Refrigerated WHDC Owner

Based on CARB's TRU Applicable Facility Inventory[171] and Dun and Bradstreet[172] databases, 96 percent of refrigerated WHDCs are considered small business. The average building size of a refrigerated WHDC considered to be a small business is 87,000 square feet and would incur reporting costs as described for a standard refrigerated WHDC. Therefore, the cost of owning a refrigerated WHDC for a small business would be the same as the costs described for a typical business in Section C.2.b.i. To show the feasibility of compliance for a small business owning a refrigerated WHDC, staff compared the maximum annual cost of $2,393 to the annual

[168] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[169] Dun and Bradstreet Database, Employee data for companies that own trailer TRUs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[170] United States Census Bureau, 2012 SUSB Annual Datasets by Establishment Industry, 2015. (web link: https://www.census.gov/data/datasets/2012/econ/susb/2012-susb.html, last accessed March 12, 2021)
[171] California Air Resources Board, Transport Refrigeration Unit Applicable Facility Inventory, February 2020.
[172] Dun and Bradstreet Database, Employee data for companies that own refrigerated WHDCs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)

revenue of a small business owning a refrigerated WHDC, which is $10.1 million.[173] The average annual cost for a typical business owning a refrigerated WHDC to comply with the Proposed Amendments is less than 1/10th of one percent of their annual revenue.

ii. Grocery Store Owner

CARB's TRU Applicable Facility Inventory[174] and Dun and Bradstreet[175] databases indicate 90 percent of grocery stores are considered small business. Grocery stores considered to be small businesses have an average building size of 30,000 square feet. They would incur reporting costs as described for a standard grocery store. Therefore, the cost of owning a grocery store for a small business would be the same as the costs described for a typical business in Section C.2.b.ii. To show the feasibility of compliance for a small business owning a grocery store to comply with the Proposed Amendments, staff compared the maximum annual cost of $963 to the annual revenue of a small business owning a grocery store, which is $2.46 million.[176] The average annual cost for a small business owning a grocery store to comply with the Proposed Amendments is less than 1/10th of one percent of their annual revenue.

iii. Seaport Facility or Railyard Owner

Seaport facilities and railyards are not considered small businesses.

4. Direct Costs on Individuals

The Proposed Amendments would not result in any direct costs on individuals. However, staff anticipate the Proposed Amendments would result in indirect costs to individuals to the extent that compliance costs are passed through to consumers of refrigerated products. Assuming the total net cost of the Proposed Amendments is fully passed through to consumers, the estimated cost to California is calculated by dividing the total cost of the Proposed Amendments by 13,272,939 California households.[177] Table C51 shows the total impact of the Proposed Amendments from 2022 to 2034 is $77.38 per household with a yearly average of $5.95.

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[173] Dun and Bradstreet Database, Employee and revenue data for companies that own refrigerated WHDCs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[174] California Air Resources Board, Transport Refrigeration Unit Applicable Facility Inventory, February 2020.
[175] Dun and Bradstreet Database, Employee data for companies that own grocery stores, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[176] Dun and Bradstreet Database, Employee and revenue data for companies that own refrigerated WHDCs, Proprietary, 2019. (web link: https://www.dnb.com/ca-en/)
[177] California Department of Finance, Demographic Research Unit, "P-4 Projected Households, Household Population, Group Quarters and Persons per Household for the Counties and State of California," June 12, 2020. (web link: https://www.dof.ca.gov/forecasting/demographics/projections/documents/P4_HHProjections_B2019.xlsx)

Table C51. Cost of the Proposed Amendments per California Household from 2022 to 2034[178]

Year	Annual Net Cost of Proposed Amendments (millions)	Cost per Household
2022	$0	$0.00
2023	$30.5	$2.30
2024	$43.1	$3.25
2025	$61.3	$4.62
2026	$96.0	$7.23
2027	$124.0	$9.34
2028	$129.7	$9.77
2029	$128.5	$9.68
2030	$118.0	$8.89
2031	$100.6	$7.58
2032	$74.8	$5.64
2033	$62.2	$4.69
2034	$58.3	$4.39
Total	$1,027.0	$77.38

Individuals may see health benefits as described in Section B.4.a. Individuals may see macroeconomic indirect and induced benefits and costs, which are discussed further in Section E.

D. Fiscal Impacts

This chapter describes costs and benefits that would be incurred by local, State, and federal government agencies due to the Proposed Amendments. Local government agencies that own TRUs or applicable facilities would be subject to the same direct costs and benefits outlined in Section C, as well as experience changes in revenue from utility user taxes, diesel fuel taxes, and local sales taxes. State government agencies that own TRUs or applicable facilities would also be subject to the same direct costs and benefits outlined in Section C, as well as experience changes in revenue from diesel fuel taxes, Energy Resources Fees, CARB fees, and State sales taxes. Costs to CARB would include staffing and resources needed to implement and enforce the Proposed Amendments. CARB does not own any TRUs or applicable facilities. Federal government agencies that own TRUs or applicable facilities would also be subject to the same direct costs and benefits outlined in Section C. In addition, the Proposed Amendments would result in health benefits to individuals in California. These benefits may translate to cost savings for local and State healthcare providers.

[178] If the net cost to comply with the Proposed Amendments is not passed through to consumers of refrigerated products, the indirect cost to individuals will be lower than the numbers presented in this table.

Staff determined the number and percentage of TRUs relative to the total population owned by local, State, and federal government using ARBER reporting data as shown in Table D1.[179]

Table D1. Number of TRUs Owned by Local, State, and Federal Government in 2019

	Privately Owned	Local Government	State Government	Federal Government
Number of TRUs	193,091	256	154	7
Percentage of Total Number of TRUs	99.780%	0.132%	0.080%	0.004%

Staff determined the number of truck TRU home base facilities and applicable facilities owned by local, State, and federal government by using ARBER[180] and the TRU Applicable Facility Inventory.[181] Table D2 includes the number of truck TRU home base facilities and applicable facilities owned by local, State, and federal government agencies, which staff used to calculate the direct costs to local, State, and federal government facility owners.

Table D2. Number of Facilities Owned by Local, State, and Federal Government in 2019

Government	Truck TRU Home Base	Refrigerated WHDC	Grocery Store	Port Facility	Railyard
Local Government	25	9	0	10	0
State Government	6	2	0	0	0
Federal Government	1	0	12	0	0

1. Local Governments

a. TRU and Facility Owner Costs

The Proposed Amendments would have a small fiscal impact to local government agencies that own TRUs or applicable facilities, relative to the total estimated cost of the Proposed Amendments. Using 2019 data from the ARBER database,[182] staff determined the percentage of TRUs owned by local governments to be 0.132 percent of the total number of TRUs (see Table D1). Staff applied this percentage to the total equipment-related direct costs in Table C22 to estimate the costs incurred by local government TRU owners. Staff determined that 25 truck TRU home base facilities and 19 applicable facilities are owned by local government (see Table D2).[183]

[179] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed September 2019)
[180] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed September 2019)
[181] California Air Resources Board, Applicable TRU Facility Inventory, February 2020.
[182] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed September 2019)
[183] California Air Resources Board, Applicable TRU Facility Inventory, February 2020.

The assumptions underlying the direct costs to local government agencies are identical to those identified in Section C of the SRIA. The estimated direct costs to local government TRU and applicable facility owners are summarized in Table D3.

Table D3. Total Direct Equipment and Infrastructure-Related Costs to Local Governments from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Truck TRU Infrastructure Capital Costs	Truck TRU Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$23,000	$1,000	$0	$0	$0	$27,000	$0	$15,000	$66,000
2024	$48,000	$1,000	(-$2,000)	$3,000	(-$3,000)	$62,000	$4,000	$82,000	$195,000
2025	$72,000	$1,000	(-$5,000)	$8,000	(-$5,000)	$91,000	$10,000	$83,000	$255,000
2026	$108,000	$0	(-$7,000)	$11,000	(-$8,000)	$137,000	$15,000	$95,000	$351,000
2027	$152,000	$0	(-$11,000)	$17,000	(-$12,000)	$175,000	$22,000	$88,000	$431,000
2028	$157,000	$0	(-$14,000)	$23,000	(-$14,000)	$182,000	$29,000	$90,000	$453,000
2029	$155,000	(-$1,000)	(-$16,000)	$27,000	(-$17,000)	$170,000	$34,000	$95,000	$447,000
2030	$144,000	(-$1,000)	(-$17,000)	$31,000	(-$19,000)	$144,000	$38,000	$93,000	$413,000
2031	$121,000	(-$1,000)	(-$18,000)	$32,000	(-$19,000)	$102,000	$39,000	$96,000	$352,000
2032	$89,000	(-$1,000)	(-$18,000)	$32,000	(-$19,000)	$68,000	$39,000	$98,000	$288,000
2033	$74,000	(-$1,000)	(-$19,000)	$33,000	(-$19,000)	$37,000	$40,000	$98,000	$243,000
2034	$68,000	(-$1,000)	(-$19,000)	$33,000	(-$18,000)	$19,000	$40,000	$101,000	$223,000
Total	$1,211,000	(-$3,000)	(-$146,000)	$250,000	(-$153,000)	$1,214,000	$310,000	$1,034,000	$3,717,000

b. Utility User Tax

Several cities and counties in California levy a utility user tax on electricity usage. This tax varies from city to city and ranges from no tax to 11 percent. For this analysis, staff used a value of 3.53 percent, representing a population-weighted average.[184] By increasing the amount of electricity used, there would be an increase in the amount of utility user tax revenue collected by cities and counties.

c. Diesel Fuel Tax

Off-road diesel is exempt from on-road diesel taxes, but does incur sales tax.[185] Displacing diesel with electricity would decrease the total amount of diesel fuel dispensed in the State, resulting in a reduction in tax revenue collected by local governments. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[186] going towards State sales tax and 4.67 percent[187] going towards local sales tax.

d. Local Sales Tax

Sales tax is levied in California to fund a variety of programs at the local and State levels. The Proposed Amendments would result in the sale of more expensive TRUs in California, which would result in a direct increase in sales tax revenue collected by local governments. However, overall, local sales tax revenue may increase less than the direct increase from TRU and infrastructure sales if overall business spending does not increase. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[188] going towards State sales tax and 4.67 percent[189] going towards local sales tax.

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[184] California State Controller's Office, California Cities Utility Users Taxes Revenue and Tax Rate Fiscal Year 2018-19, November 2020. (web link: https://www.sco.ca.gov/Files-ARD-Local/LocRep/2018-19_Cities_UUT.pdf)

[185] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

[186] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)

[187] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

[188] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)

[189] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

e. Fiscal Impact on Local Governments

From 2022 to 2034, the cost to local governments due to the Proposed Amendments is estimated to be $3.7 million resulting from TRUs and applicable facilities owned by local governments. Local governments would also see a direct increase in utility user and local sales tax revenue of $19 million and a decrease in diesel fuel tax revenue of $4.9 million. Table D4 shows the total fiscal impact on local governments, which is estimated to be -$10.4 million from 2022 to 2034.

Table D4. Estimated Fiscal Impact on Local Governments from 2022 to 2034 (2019$)

Year	TRU and Facility Owner Costs	Utility User Tax Revenue	Local Diesel Fuel Tax	Local Sales Tax	Total
2022	$0	$0	$0	$0	$0
2023	$67,000	$0	$0	(-$1,633,000)	(-$1,566,000)
2024	$197,000	(-$84,000)	$76,000	(-$2,199,000)	(-$2,010,000)
2025	$255,000	(-$195,000)	$170,000	(-$1,731,000)	(-$1,501,000)
2026	$351,000	(-$292,000)	$250,000	(-$3,325,000)	(-$3,016,000)
2027	$431,000	(-$445,000)	$366,000	(-$2,565,000)	(-$2,213,000)
2028	$453,000	(-$580,000)	$461,000	(-$2,103,000)	(-$1,769,000)
2029	$448,000	(-$708,000)	$538,000	(-$1,086,000)	(-$808,000)
2030	$413,000	(-$796,000)	$584,000	$393,000	$594,000
2031	$352,000	(-$824,000)	$591,000	$416,000	$535,000
2032	$289,000	(-$836,000)	$605,000	$436,000	$494,000
2033	$243,000	(-$848,000)	$625,000	$447,000	$467,000
2034	$223,000	(-$863,000)	$640,000	$385,000	$385,000
Total	$3,722,000	(-$6,471,000)	$4,906,000	(-$12,565,000)	(-$10,408,000)

2. State Government

a. TRU and Facility Owner Costs

The Proposed Amendments would have a small fiscal impact to State government agencies that own TRUs or applicable facilities, relative to the total estimated cost of the Proposed Amendments. Using 2019 data from the ARBER database,[190] staff determined the percentage of TRUs owned by State government to be 0.08 percent of the total number of TRUs (see table D1). Staff applied this percentage to the total equipment-related direct costs in Table C22 to estimate the costs incurred by State government TRU owners. Staff determined that 6 truck TRU home base facilities and 2 applicable facilities are owned by State government (see Table D2).[191]

[190] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[191] California Air Resources Board, Applicable TRU Facility Inventory, February 2020.

The assumptions underlying the direct costs to State government are identical to those identified in Section C of the SRIA. Table D5 shows the estimated direct costs to State government TRU and facility owners from 2022 to 2034.

Table D5. Total Direct Equipment and Infrastructure-Related Cost to State Government from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Truck TRU Infrastructure Capital Costs	Truck TRU Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$0
2023	$14,000	$1,000	$7,000	$0	$0	$0	$0	$7,000	$29,000
2024	$29,000	$1,000	$15,000	$1,000	(-$1,000)	$2,000	(-$2,000)	$2,000	$47,000
2025	$44,000	$0	$22,000	$2,000	(-$3,000)	$5,000	(-$3,000)	$1,000	$68,000
2026	$65,000	$0	$33,000	$4,000	(-$4,000)	$7,000	(-$5,000)	$7,000	$107,000
2027	$91,000	$0	$42,000	$5,000	(-$7,000)	$10,000	(-$7,000)	$3,000	$137,000
2028	$95,000	$0	$44,000	$7,000	(-$8,000)	$14,000	(-$9,000)	$3,000	$146,000
2029	$93,000	$0	$41,000	$8,000	(-$10,000)	$17,000	(-$10,000)	$4,000	$143,000
2030	$86,000	(-$1,000)	$35,000	$9,000	(-$10,000)	$19,000	(-$11,000)	$3,000	$130,000
2031	$73,000	(-$1,000)	$25,000	$9,000	(-$11,000)	$19,000	(-$11,000)	$4,000	$107,000
2032	$53,000	(-$1,000)	$16,000	$9,000	(-$11,000)	$20,000	(-$11,000)	$4,000	$79,000
2033	$45,000	(-$1,000)	$9,000	$10,000	(-$11,000)	$20,000	(-$11,000)	$4,000	$65,000
2034	$41,000	(-$1,000)	$5,000	$10,000	(-$11,000)	$20,000	(-$11,000)	$4,000	$57,000
Total	$729,000	(-$3,000)	$294,000	$74,000	(-$87,000)	$153,000	(-$91,000)	$46,000	$1,115,000

b. Diesel Fuel Tax

Displacing diesel with electricity would decrease the total amount of diesel fuel dispensed in the State, resulting in a reduction in diesel fuel tax revenue collected by State government. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with 3.94 percent[192] going towards State sales tax and 4.67 percent[193] going towards local sales tax.

c. Energy Resources Fee

The Energy Resources Fee is a $0.0003/kWh surcharge levied on consumers of electricity purchased from electrical utilities.[194] The revenue collected is deposited into the Energy Resources Programs Account of the General Fund which is used for ongoing energy programs and projects deemed appropriate by the Legislature, including but not limited to, activities of the California Energy Commission.

d. CARB Fees

The Proposed Amendments include TRU operating fees and applicable facility registration fees that would impose a direct, on-going cost to TRU owners and applicable facility owners. The fee schedule is presented in Section C.1.g. The proposed fees would result in revenue to the State to offset costs to CARB to implement and enforce the Proposed Amendments (see Appendix A: Fee Development).

e. State Sales Tax

Sales tax is levied in California to fund a variety of programs at the local and State levels. The Proposed Amendments would result in the sale of more expensive TRUs in California, which would result in a direct increase in sales tax revenue collected by the State. However, overall, State sales tax revenue may increase less than the direct increase from TRU and infrastructure sales if overall business spending does not increase. For this analysis, staff used the combined State and local sales tax rate of 8.6 percent, which is a weighted average based on county-level output, with

[192] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)

[193] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

[194] California Department of Tax and Fee Administration, 2020 Electrical Energy Surcharge Rate, December 2019. (web link: https://www.cdtfa.ca.gov/formspubs/l725.pdf)

3.94 percent[195] going towards State sales tax and 4.67 percent[196] going towards local sales tax.

f. Costs to CARB

i. Additional Staffing

The following additional permanent, full-time CARB staff would be needed to successfully implement and enforce the Proposed Amendments:

- 4.0 Air Resources Technician (ART) I positions beginning in Fiscal Year 2023-2024 to implement the Proposed Amendments. Duties would include assisting TRU owners and applicable facility owners with registration and reporting, providing technical assistance, and issuing compliance labels.
- 1.0 Staff Services Manager, 3.0 Air Pollution Specialist, 2.0 ART II, and 4.0 ART I positions beginning in Fiscal Year 2023-2024 to conduct enforcement activities, such as issuing and processing citations. The need for increased enforcement would result from additional requirements in the Proposed Amendments requiring out-of-state based TRU reporting, TRU operating fees, applicable facility registration, applicable facility registration fees, and applicable facility reporting.

The Fiscal Year 2022-2023 budget does not include any resources specifically for implementation or enforcement of the Proposed Amendments (the additional functions described above) because the Proposed Amendments have not yet been adopted. CARB will seek authorization to use fees collected to augment staff once the Board acts on the proposal. Table D6 shows the number of positions needed by CARB and the cost for each classification in 2021.

Table D6. Number of CARB Positions Needed and 2021 Costs

Position	Number of Positions	Initial Budget Year Cost (Annual Salary plus Benefits per Position)	Ongoing Cost (Annual Salary plus Benefits per Position)
Air Pollution Specialist	3	$195,000	$194,000
Air Resources Technician I	8	$85,000	$84,000
Air Resources Technician II	2	$101,000	$100,000
Staff Services Manager	1	$168,000	$167,000

Table D7 shows the estimated staffing costs expected to be incurred by CARB from 2022 to 2034. SB 854 authorizes CARB to assess fees to cover its reasonable costs,

[195] California Department of Tax and Fee Administration, Detailed Description of the Sales & Use Tax Rate. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sut-rates-description.htm, last accessed May 24, 2021)

[196] California Department of Tax and Fee Administration, California City & County Sales & Use Tax Rates, October 2020. (web link: https://www.cdtfa.ca.gov/taxes-and-fees/sales-use-tax-rates.htm)

with specific considerations, on all off-road and other mobile sources certification and compliance programs not currently covered under the existing fee regulation authority (Health and Safety Code section 43019).[197] The Proposed Amendments include TRU operating fees and applicable facility registration fees. CARB intends to seek authority to use the collected fees to cover program costs as allowed by SB 854.

Table D7. Estimated Annual Staffing Costs Incurred by CARB from 2022 to 2034

Year	Annual CARB Staffing Costs
2022	$0
2023	$849,500
2024	$1,692,000
2025	$1,685,000
2026	$1,685,000
2027	$1,685,000
2028	$1,685,000
2029	$1,685,000
2030	$1,685,000
2031	$1,685,000
2032	$1,685,000
2033	$1,685,000
2034	$1,685,000
Total	$19,391,500

g. Fiscal Impact on State Government

From 2022 to 2034, the cost to State government due to the Proposed Amendments is estimated to be $1.1 million resulting from TRUs and applicable facilities owned by State government, and CARB would incur costs of approximately $19.4 million. State government would also see a direct increase in revenue from Energy Resources Fees, TRU operating fees, applicable facility registration fees, and State sales tax of $59.5 million and a decrease in diesel fuel tax revenue of $22.6 million. Table D8 shows the total fiscal impact to State government agencies, which is estimated to be -$16.4 million from 2022 to 2034. CARB will seek authorization to use collected fees to offset costs incurred to implement and enforce the Proposed Amendments.

[197] California Health and Safety Code § 43019.1, Division 26, Senate Bill No. 854, July 27, 2018. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB854)

Table D8. Estimated Fiscal Impact to State Government from 2022 to 2034 (2019$)

Year	Costs to CARB	TRU and Facility Owner Costs	State Diesel Fuel Tax	Energy Resources Fee	TRU Operating Fee and Applicable Facility Registration Fee	State Sales Tax	Total
2022	$0	$0	$0	$0	$0	$0	$0
2023	$850,000	$29,000	$0	$0	(-$9,145,000)	(-$1,388,000)	(-$9,654,000)
2024	$1,692,000	$46,000	$331,000	(-$4,000)	(-$1,093,000)	(-$1,868,000)	(-$896,000)
2025	$1,685,000	$68,000	$748,000	(-$9,000)	(-$961,000)	(-$1,470,000)	$61,000
2026	$1,685,000	$106,000	$1,099,000	(-$13,000)	(-$7,567,000)	(-$2,825,000)	(-$7,515,000)
2027	$1,685,000	$138,000	$1,641,000	(-$20,000)	(-$2,330,000)	(-$2,179,000)	(-$1,065,000)
2028	$1,685,000	$145,000	$2,092,000	(-$25,000)	(-$3,224,000)	(-$1,786,000)	(-$1,113,000)
2029	$1,685,000	$143,000	$2,495,000	(-$30,000)	(-$4,569,000)	(-$923,000)	(-$1,199,000)
2030	$1,685,000	$130,000	$2,746,000	(-$33,000)	(-$3,422,000)	$334,000	$1,440,000
2031	$1,685,000	$107,000	$2,789,000	(-$34,000)	(-$4,308,000)	$354,000	$593,000
2032	$1,685,000	$80,000	$2,837,000	(-$35,000)	(-$3,849,000)	$371,000	$1,089,000
2033	$1,685,000	$63,000	$2,891,000	(-$35,000)	(-$3,512,000)	$380,000	$1,472,000
2034	$1,685,000	$57,000	$2,941,000	(-$36,000)	(-$4,598,000)	$327,000	$376,000
Total	$19,392,000	$1,112,000	$22,610,000	(-$274,000)	(-$48,578,000)	(-$10,673,000)	(-$16,411,000)

3. Federal Government

a. TRU and Facility Owner Costs

The Proposed Amendments would have a small fiscal impact to federal government agencies that own TRUs or applicable facilities, relative to the total estimated cost of the Proposed Amendments. Using 2019 data from the ARBER database,[198] staff determined the percentage of TRUs owned by the federal government to be 0.004 percent of the total number of TRUs (see Table D1). Staff applied this percentage to the total equipment-related direct costs in Table C22 to estimate the costs incurred by federal government TRU owners. Staff determined that 1 truck TRU home base facility and 12 applicable facilities are owned by the federal government (see Table D2).[199]

The assumptions underlying the direct costs to federal government agencies are identical to those identified in Section C of the SRIA. Table D9 shows the estimated direct costs to federal government TRU and facility owners from 2022 to 2034

[198] California Air Resources Board, Air Resources Board Equipment Registration System. (web link: https://arber.arb.ca.gov/, last accessed July 2020)
[199] California Air Resources Board, Applicable TRU Facility Inventory, February 2020.

Table D9. Total Direct Equipment and Infrastructure-Related Costs to Federal Government from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	(-$)	$0	$0	$0	$0
2023	$600	$0	$1,100	$0	(-$)	$0	$0	$1,200	$2,900
2024	$1,300	$0	$2,500	$200	(-$100)	$100	(-$100)	$1,900	$5,800
2025	$2,000	$0	$3,700	$400	(-$100)	$200	(-$100)	$1,900	$8,000
2026	$3,000	$0	$5,500	$600	(-$200)	$300	(-$200)	$2,500	$11,500
2027	$4,100	$0	$7,000	$900	(-$300)	$500	(-$300)	$2,000	$13,900
2028	$4,300	$0	$7,300	$1,100	(-$400)	$600	(-$400)	$2,000	$14,500
2029	$4,200	$0	$6,800	$1,400	(-$400)	$800	(-$500)	$2,600	$14,900
2030	$3,900	$0	$5,800	$1,500	(-$500)	$800	(-$500)	$2,100	$13,100
2031	$3,300	$0	$4,100	$1,500	(-$500)	$900	(-$500)	$2,100	$10,900
2032	$2,400	$0	$2,700	$1,600	(-$500)	$900	(-$500)	$2,800	$9,400
2033	$2,000	$0	$1,500	$1,600	(-$500)	$900	(-$500)	$2,200	$7,200
2034	$1,900	$0	$800	$1,600	(-$500)	$900	(-$500)	$2,200	$6,400
Total	$33,000	$0	$48,800	$12,400	(-$4,000)	$6,900	(-$4,100)	$25,500	$118,500

b. Fiscal Impact on Federal Government

Staff do not anticipate any additional fiscal impact on federal government agencies other than the direct costs shown in Table D9. The fiscal impact to federal government agencies from 2022 to 2034 is estimated to be $118,500.

E. Macroeconomic Impacts

1. Methods for Determining Economic Impacts

This section describes the estimated impact of the Proposed Amendments on the California economy. The Proposed Amendments would result in changes in costs to TRU fleets and applicable facilities in order to comply with its requirements. These changes in expenditures would affect employment, output, and investment in sectors that supply freight and services in support of these businesses and industries.

The direct impacts of the Proposed Amendments would lead to additional indirect and induced effects, like changes in personal income that affect consumer expenditures across other spending categories. The incremental total economic impacts of the Proposed Amendments are simulated relative to the Baseline using cost data described in Section C. The analysis focuses on incremental change in major macroeconomic indicators from 2022 to 2034 including employment, output growth, and gross state product (GSP). The years of the analysis are used to simulate the Proposed Amendments through 12 months post full implementation.

Regional Economic Models, Inc. (REMI) Policy Insight Plus Version 2.4.1 is used to estimate the macroeconomic impacts of the Proposed Amendments on the California economy. REMI is a structural economic forecasting and policy analysis model that integrates input-output, computable general equilibrium, and econometric and economic geography methodologies.[200] REMI Policy Insight Plus provides year-by-year estimates of the Proposed Amendments, pursuant to the requirements of SB 617 and the California Department of Finance.[201, 202]

CARB uses the REMI single-region, 160-sector model. Several adjustments were made to the model reference case to reflect the impacts of current economic conditions and to reflect the Department of Finance conforming forecasts. First, the REMI model's National Control was updated with a short-term national forecast based on the U.S. Economic Outlook for 2020-2022 from the University of Michigan's Research Seminar

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[200] For further information and model documentation see: https://www.remi.com/model/pi/

[201] California Legislature, Senate Bill 617, signed on October 5, 2011. (web link: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120SB617)

[202] Department of Finance, Chapter 1: Standardized Regulatory Impact Analysis for Major Regulations - Order of Adoption, 2013. (web link: http://www.dof.ca.gov/Forecasting/Economics/Major_Regulations/SB_617_Rulemaking_Documents/documents/Order_of_Adoption-2.pdf)

in Quantitative Economics (RSQE)[203] release on February 19, 2021, which was made available on the REMI website.[204] Second, the National and Regional Controls in REMI were updated to reflect the most recent Department of Finance conforming forecasts which include population projections dated March 2021 and U.S. real GDP and employment forecasts, and California civilian employment growth numbers dated November 2020. Because the Department of Finance forecasts only extended to 2024, staff made the assumption that post-2024, U.S. income and employment would continue to grow at the same rate as projected in the RSQE forecast.

2. Inputs of the Assessment

The estimated economic impact of the Proposed Amendments is sensitive to modeling assumptions. This section provides a summary of the assumptions and inputs used to determine the suite of policy variables that best reflect the macroeconomic impacts of the Proposed Amendments. The direct costs estimated in Section C and the non-mortality health benefits estimated in Section B are translated into REMI policy variables and used as inputs for the macroeconomic analysis.[205]

The direct costs of the Proposed Amendments, are described in Section C, and include capital costs for new zero-emission truck TRUs and supporting infrastructure, new TRUs equipped with engines certified to meet a PM emission standard, lower GWP refrigerants, as well as annual costs for maintenance, diesel and electricity usage, LCFS credit revenue, CARB fees, and administrative costs for registration and reporting.

Equipment, operational, and administrative costs and savings for truck, trailer, and DSC TRU fleets are input into the economic model as a change in production costs in the truck transportation industry (NAICS 484). Similar equipment, operational, and administrative costs for TRU generator set and railcar TRU fleets are input into the economic model as a change in production costs in the water transportation (NAICS 483) and rail transportation (NAICS 482) industries, respectively.

Costs borne by applicable facilities are also input into the economic model as increases in production costs. Infrastructure and maintenance costs at truck TRU home bases are input as production cost increases to the truck transportation industry, refrigerated WHDC costs are input as production cost increases to the warehousing and storage industry (NAICS 493), seaport facility costs are input into the model as increases in production costs to the scenic and sightseeing transportation and support activities for transportation industry (NAICS 487, 488), and railyard costs are input into the model as increases in production costs to the rail transportation industry (NAICS 482). For grocery stores, 99 percent of the costs are input as production cost increases to the retail trade industry (NAICS 44, 45) and the remaining 1 percent is input as production cost increases to the wholesale trade industry (NAICS 42). This

[203] U.S. Research Seminar in Quantitative Economics Forecast, February 19, 2021. (web link: https://lsa.umich.edu/econ/rsqe.html)

[204] REMI Forecast Updates (web link: https://www.remi.com/forecast-updates/, last accessed May 2021)

[205] Refer to Appendix B: Macroeconomic Modeling Inputs for a full list of REMI inputs for this analysis.

split was informed by NAICS classification data from the applicable grocery stores and supercenters.

Costs and savings incurred by TRU fleets and applicable facilities would result in corresponding changes in final demand for industries supplying those particular services or equipment. Changes in demand for TRU equipment and maintenance from the in-state portion of all the TRU fleets is assumed to be met by businesses in the refrigeration equipment and supplies merchant wholesalers' industry (NAICS 423740) and is input into the model as an exogenous change in demand to the wholesale trade industry (NAICS 42). Changes in demand for diesel fuel is input into the model as an exogenous change in demand to the petroleum and coal products manufacturing industry (NAICS 324). The additional demand for charging equipment necessary for zero emission TRUs is input into the model as increased demand to the other electrical equipment and component manufacturing industry (NAICS 3359) and the infrastructure upgrades necessary for charging is input into the model as increased demand for the construction industry (NAICS 23). Changes in demand for electricity is input into the model as an exogenous change in demand to the electric power generation, transmission and distribution industry (2211). Reporting and other administrative services is modeled as increased demand in the office administrative services and facilities support services industry (NAICS 5611, 5612).

Table E1 illustrates the sources of changes in production costs for TRU fleets and applicable facilities and corresponding changes in final demand by industry as described above.

Table E1. Sources of Changes in Production Cost and Final Demand by Industry

Source of Cost or Savings	Industries with changes in production costs[206]	Industries with changes in final demand (NAICS)
TRU Equipment and Maintenance	TRU fleets	Wholesale trade (42)
Diesel Fuel	TRU fleets	Petroleum and coal products manufacturing (324)
Electricity and Infrastructure	TRU fleets and applicable facilities	Electric power generation, transmission, and distribution (2211), construction (23), other electrical equipment and component manufacturing (3359)
Compliance Plans, Load Surveys[207]	Applicable facilities	Management, scientific, and technical consulting services (5416)
Registration and Reporting	TRU fleets and applicable facilities	Office administrative services; facilities support services (5611, 5612)

[206] TRU fleets include businesses within the truck transportation (484), water transportation (483), and rail transportation (482) industries. Applicable facilities include businesses within the truck transportation (484), warehousing and storage (493), retail trade (44, 45), wholesale trade (42), and scenic and sightseeing transportation and support activities for transportation industries (487, 488).
[207] Compliance plan and load surveys are a cost element associated with Alternative 1, but is included in this table to describe the relationships between the costs and mirrored increases in demand.

Source of Cost or Savings	Industries with changes in production costs[206]	Industries with changes in final demand (NAICS)
ETS Data Plans[208]	TRU fleets	Management, scientific, and technical consulting services (5416)

In addition to these changes in production costs and final demand for businesses, there would also be economic impacts as a result of fiscal effects. The Proposed Amendments would result in changes in diesel, electricity, and sales tax revenues. The changes in tax revenue are modeled as changes in State and local government spending, assuming that this revenue is not offset elsewhere. The additional CARB staff needed to implement the Proposed Amendments is modeled as an increase in government employment. As described in Appendix A: Fee Development, the fees collected through the Proposed Amendments will offset all employment and implementation costs of the TRU program and are not anticipated to result in additional economic impacts through increased government spending. For this reason, the increased fee revenue collected through the Proposed Amendments was not added to the REMI modeling as an increase in state government spending, nor was government spending decreased to reflect the opportunity costs of additional hires.

The health benefits resulting from emission reductions of the Proposed Amendments reduce health care costs for individuals on average. The reduction in healthcare cost is modeled as a decrease in spending for hospitals, with a reallocation of the spending towards other goods and increased savings. The GHG emission reduction benefits as valued through the SC-CO2 represent the avoided damage from climate change worldwide per MT of CO2e. These benefits fall outside the scope of the economic model and are not evaluated here.

3. Results of the Assessment

The results from the REMI model provide estimates of the impact of the Proposed Amendments on the California economy. These results represent the annual incremental change from the implementation of the Proposed Amendments relative to the Baseline. The California economy is anticipated to grow through 2034, therefore, negative impacts reported here should be interpreted as a slowing of growth and positive impacts as an acceleration of growth resulting from the Proposed Amendments.

a. California Employment Impacts

Table E2 presents the impacts of the Proposed Amendments on total employment in California and for the primary and secondary industries impacted by the Proposed Amendments, for all of the odd years of the assessment.[209] The statewide employment impacts of the Proposed Amendments are anticipated to be slightly positive in 2023

[208] ETS Data plans are a cost element associated with Alternative 1, but is included in this table to describe the relationships between the costs and mirrored increases in demand.
[209] The Proposed Amendments have no impacts in 2022. In 2034, the impacts are similar to the impacts in 2033 as evidenced in the figures that are also presented in this section.

and 2024, corresponding with demand for TRU equipment and infrastructure needed to support operation of zero-emission truck TRUs from in-state fleets. From 2025 to 2034, the employment impacts are estimated to be negative as the overall costs of the Proposed Amendments offset the positive impacts of additional in-state demand. The changes in statewide employment represent, at most, a 0.01% change relative to baseline California employment.

The overall trend in employment changes by major sector are illustrated in Figure F1. The major sectors that are estimated to have increased demand or direct increases to employment such as the retail and wholesale sector and the government sector are estimated to have increases in employment in the early years of the assessment. From 2027 to 2034, all major sectors are anticipated to have slight decreases in employment relative to the Baseline.

Industries that are estimated to have net costs, decreases in demand, or revenue loss are anticipated to have decreases in employment growth. This includes the various transportation sectors that operate TRU equipment, warehousing, retail, and petroleum and coal products manufacturing. The wholesale trade industry includes both the suppliers of TRU equipment (the refrigeration equipment and supplies merchant wholesalers' industry) and some of the applicable grocery store and supercenters that would face costs under the Proposed Amendments. On net, this industry is estimated to have positive employment impacts from 2023 to 2028, followed by a slight decline in employment growth.

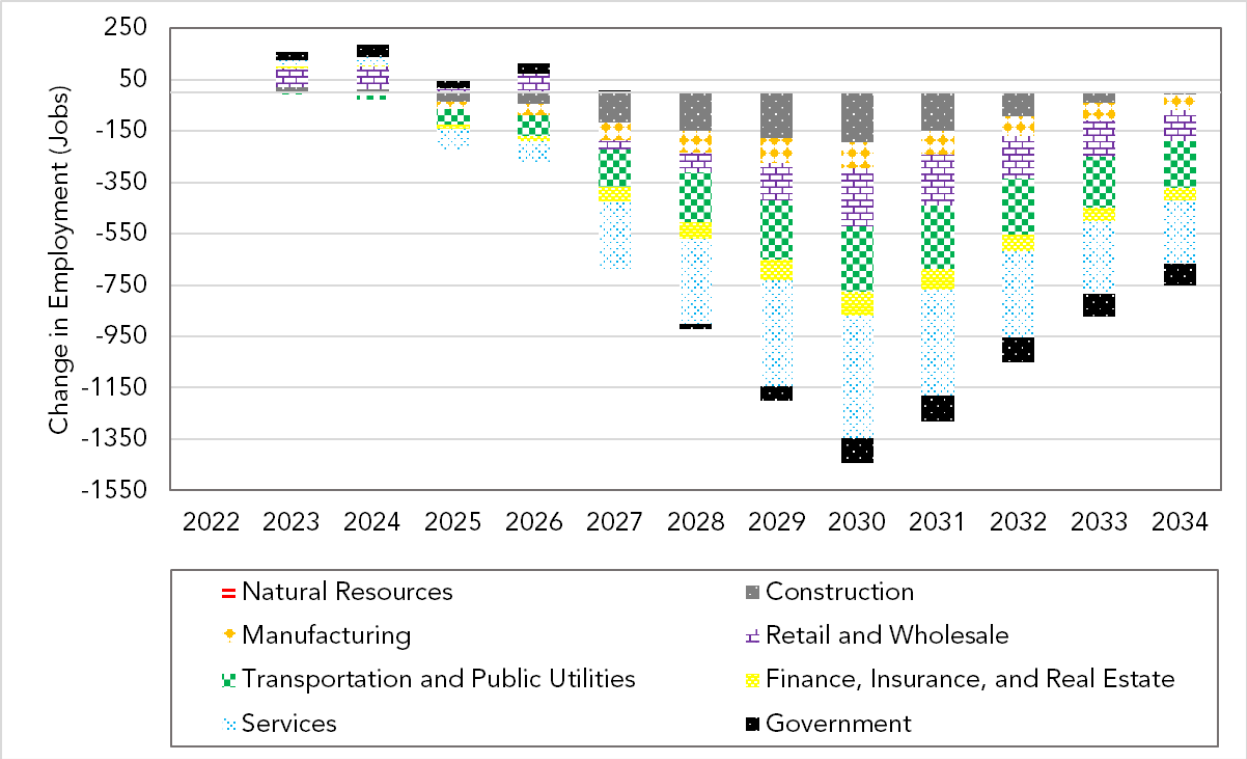
Industries that are estimated to have increased demand may see employment growth. In particular, the electric power and generation industry is estimated to see slight increases in employment growth in the latter years of the analysis associated with increased demand for electricity from truck TRUs.

Table E2. Summary of Employment Impacts Associated with the Proposed Amendments

Industry	Units	2023	2025	2027	2029	2031	2033
CA statewide	Total Employment (millions)	23.6	24.3	24.3	24.2	24.2	24.3
CA statewide	Percent change	0.00%	0.00%	0.00%	-0.01%	-0.01%	0.00%
CA statewide	Change in jobs	150	-180	-680	-1,200	-1,280	-870
Truck transportation	Percent change	0.00%	-0.02%	-0.04%	-0.05%	-0.06%	-0.05%
Truck transportation	Change in jobs	-10	-40	-100	-140	-150	-120
Water transportation	Percent change	-0.02%	-0.03%	-0.08%	-0.13%	-0.15%	-0.14%
Water transportation	Change in jobs	0	0	-10	-10	-10	-10
Rail Transportation	Percent change	0.00%	-0.02%	-0.05%	-0.08%	-0.09%	-0.09%
Rail Transportation	Change in jobs	0	0	-10	-10	-10	-10
Scenic and sightseeing trans. and support activities for trans.	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.02%	-0.01%
Scenic and sightseeing trans. and support activities for trans.	Change in jobs	0	0	-10	-20	-20	-20
Warehousing and storage	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	-0.01%
Warehousing and storage	Change in jobs	0	-10	-10	-20	-30	-20
Retail trade	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Retail trade	Change in jobs	-20	-60	-120	-150	-130	-80
Wholesale trade	Percent change	0.01%	0.01%	0.01%	0.00%	-0.01%	-0.01%
Wholesale trade	Change in jobs	90	70	90	0	-70	-60
Petroleum and coal products mfg.	Percent change	0.00%	-0.01%	-0.01%	-0.02%	-0.02%	-0.02%
Petroleum and coal products mfg.	Change in jobs	0	0	0	0	0	0
Electric power gen. and dist.	Percent change	0.00%	0.01%	0.02%	0.03%	0.04%	0.04%
Electric power gen. and dist.	Change in jobs	0	0	10	10	20	20
Construction	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Construction	Change in jobs	20	-40	-110	-170	-150	-40
Other electrical equipment and component mfg.	Percent change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other electrical equipment and component mfg.	Change in jobs	0	0	0	0	0	0

Industry	Units	2023	2025	2027	2029	2031	2033
Office administrative services; Facilities support services	Percent change	0.00%	0.02%	0.02%	0.01%	0.01%	0.01%
Office administrative services; Facilities support services	Change in jobs	0	20	20	10	10	10
State government	Percent change	0.00%	0.00%	0.00%	0.00%	-0.01%	-0.01%
State government	Change in jobs	20	20	10	-10	-30	-20
Local government	Percent change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Local government	Change in jobs	20	10	0	-40	-70	-60

Figure E1. Changes in Employment by Major Sector



b. California Business Impacts

Gross output is used as a measure for business impacts because it represents an industry's sales or receipts and tracks the quantity of freight or services produced in a given time period. Output is the sum of output for each private industry, state, and local government as it contributes to the state's GDP, and is affected by production cost and demand changes. As production cost increases or demand decreases, output is expected to contract, but as production costs decline or demand increases, industries would likely experience growth.

As illustrated in Table E3, the Proposed Amendments are estimated to result in an increase in statewide output in 2023 and 2024. From 2025 to 2031, the Proposed Amendments are estimated to lead to a slight decrease in statewide output. The changes in statewide output are no larger than 0.01 percent of baseline levels.

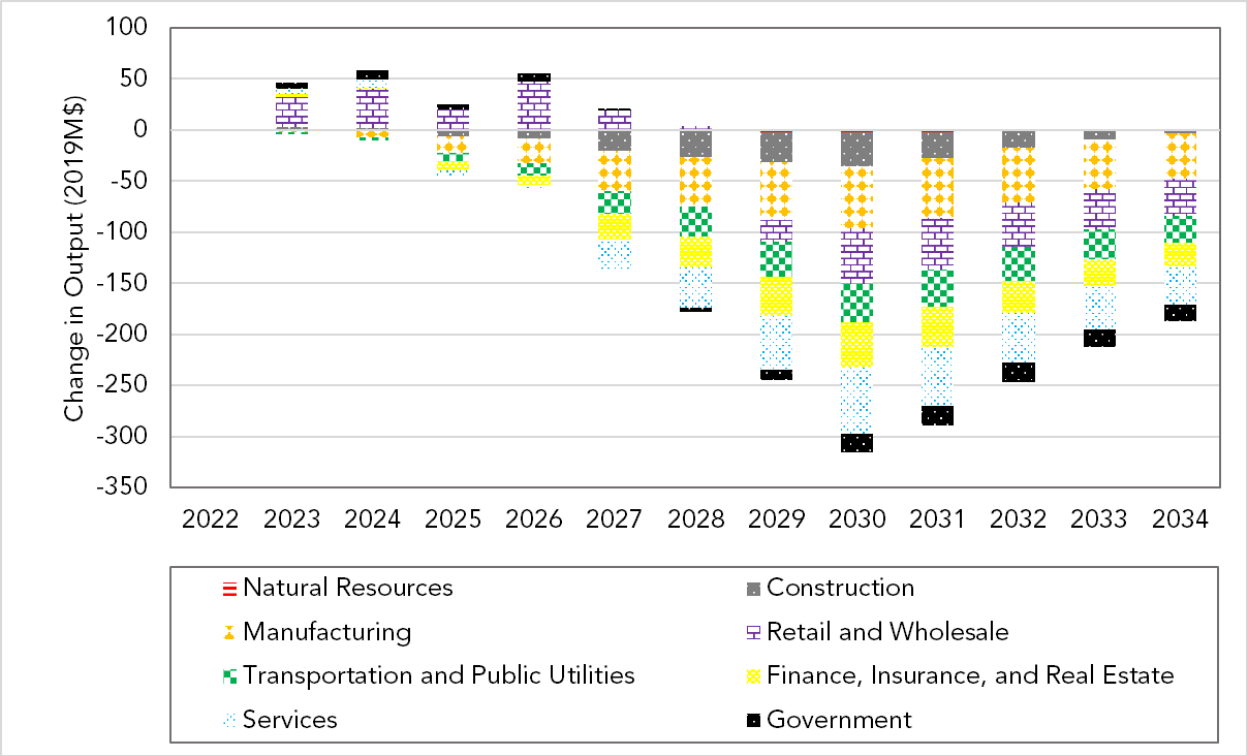
Figure E2 illustrates the impacts to output by major sector. Similar to the employment impacts, sectors and industries that are anticipated to face production cost increases, decreases in demand, or decreased revenue are anticipated to have corresponding decreases in output, while industries that are anticipated to see increases in demand are estimated to have increases in output.

Table E3. Summary of Output Impacts Associated with the Proposed Amendments

Industry	Units	2023	2025	2027	2029	2031	2033
CA statewide	Total Output (2019B$)	4,932	5,240	5,343	5,463	5,603	5,778
CA statewide	Percent change	0.00%	0.00%	0.00%	-0.01%	-0.01%	0.00%
CA statewide	Change (2019M$)	43	-21	-115	-245	-289	-212
Truck transportation	Percent change	0.00%	-0.02%	-0.04%	-0.05%	-0.06%	-0.05%
Truck transportation	Change (2019M$)	-2	-8	-19	-28	-30	-26
Water transportation	Percent change	-0.02%	-0.03%	-0.08%	-0.13%	-0.15%	-0.14%
Water transportation	Change (2019M$)	-1	-2	-5	-8	-10	-10
Rail Transportation	Percent change	0.00%	-0.02%	-0.05%	-0.08%	-0.09%	-0.09%
Rail Transportation	Change (2019M$)	0	0	-1	-2	-3	-3
Scenic and sightseeing trans. and support activities for trans.	Percent change	0.00%	0.00%	-0.01%	-0.02%	-0.02%	-0.01%
Scenic and sightseeing trans. and support activities for trans.	Change (2019M$)	0	-1	-3	-4	-5	-4
Warehousing and storage	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	-0.01%
Warehousing and storage	Change (2019M$)	0	0	-1	-2	-3	-2
Retail trade	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	-0.01%
Retail trade	Change (2019M$)	-2	-7	-16	-20	-18	-13
Wholesale trade	Percent change	0.01%	0.01%	0.01%	0.00%	-0.01%	-0.01%
Wholesale trade	Change (2019M$)	31	28	36	-1	-31	-27
Petroleum and coal products mfg.	Percent change	0.00%	-0.01%	-0.01%	-0.02%	-0.02%	-0.02%
Petroleum and coal products mfg.	Change (2019M$)	0	-4	-10	-14	-16	-15
Electric power gen. and dist.	Percent change	0.00%	0.01%	0.02%	0.04%	0.04%	0.04%
Electric power gen. and dist.	Change (2019M$)	0	4	10	16	18	19
Construction	Percent change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Construction	Change (2019M$)	3	-6	-19	-30	-26	-8
Other electrical equipment and component mfg.	Percent change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Other electrical equipment and component mfg.	Change (2019M$)	0	0	0	0	0	0

Industry	Units	2023	2025	2027	2029	2031	2033
Office administrative services; Facilities support services	Percent change	0.00%	0.02%	0.02%	0.01%	0.01%	0.01%
Office administrative services; Facilities support services	Change (2019M$)	0	3	2	2	2	2
State and local government	Percent change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
State and local government	Change (2019M$)	6	5	2	-10	-19	-17

Figure E2. Changes in Output by Major Sector



c. Impacts on Investments in California

Private domestic investment consists of purchases of residential and nonresidential structures and of equipment and software by private businesses and nonprofit institutions. It is used as a proxy for impacts on investments in California because it provides an indicator of the future productive capacity of the economy.

The changes in private investment for the Proposed Amendments, relative to the Baseline, are shown in Table E4 and show a decrease in private investment of $2 million in 2023 and a decrease of as large as $47 million in 2029. In any given year this represents changes of less than 0.01 percent of baseline investment.

Table E4. Changes in Gross Domestic Private Investment

Units	2023	2025	2027	2029	2031	2033
Private Investment (2019B$)	448	484	493	503	514	530
Percent Change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Change (2019M$)	-2	-14	-36	-47	-39	-13

d. Impacts on Individuals in California

As modeled, the Proposed Amendments do not impose direct costs on individuals in California. However, the costs incurred by affected businesses and the public sector would cascade through the economy and affect individuals. One measure of the statewide impact is the change in real personal income.

Table **E5** shows the annual change in real personal income across all individuals in California. Total personal income decreases by $9 million in 2023, then continues a downward trend, with a decrease of $119 million in 2033. The change in personal income can also be divided the California population to show the average or per capita impact on personal income. Personal income initially decreases by less than $1 per person in 2023 and decreases by about $4 per person in 2029 and 2031, the years with the greatest impact.

Table E5. Change in Personal Income

Units	2023	2025	2027	2029	2031	2033
Personal Income (2019B$)	2,587	2,742	2,846	2,959	3,104	3,219
Percent Change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Change (2019M$)	-9	-56	-134	-175	-166	-119
Per Capita Change (2019$)	0	-1	-2	-4	-4	-3

e. Impacts on Gross State Product (GSP)

Gross State Product (GSP) is the market value of all freight and services produced in California and is one of the primary indicators used to gauge the health of the economy. Table E6 shows the annual change in gross state product as estimated as a result of the Proposed Amendments. Under the Proposed Amendments, GSP is anticipated to increase slightly in 2023 and 2024. This primarily reflects the initial increase in demand for TRU equipment from the in-state TRU fleets. There is a slight decrease in GSP growth as the Proposed Amendments increase in costs over time. In 2031, GSP is estimated to $153 million lower than baseline levels, a 0.01 percent decrease.

Table E6. Change in Gross State Product

Units	2023	2025	2027	2029	2031	2033
Gross State Product (2019B$)	2,923	3,119	3,194	3,282	3,378	3,488
Percent Change	0.00%	0.00%	0.00%	0.00%	-0.01%	0.00%
Change (2019M$)	27	-7	-56	-128	-153	-109

f. Creation or Elimination of Businesses

The Proposed Amendments do not directly result in business creation or elimination and the REMI model cannot directly estimate the creation or elimination of businesses. However, changes in the jobs and output for the California can be used to understand some of the potential impacts. The overall jobs and output impacts are small relative to the total California economy, about 0.01 percent. However, impacts in some sectors are larger or occur at different times, as described in previous sections.

Reductions in output could indicate elimination of businesses. Conversely, increased output within an industry could signal the potential for additional business creation if existing businesses cannot accommodate all future demand. There is no threshold that identifies the creation or elimination of business. Based on the modeling of output

changes, the wholesale trade industry sees increased output in several years and increased purchases of zero-emission TRUs would benefit zero-emission TRU manufacturers, as well as businesses in the zero-emission TRU supply chain.

As discussed in Section B.2, the Proposed Amendments would also provide opportunities for design, engineering, construction, and project management firms to design new and expanded infrastructure at truck TRU home base facilities. While the net impact of the Proposed Amendments on the construction industry is estimated to be slightly negative, there will be some businesses within this industry that see additional demand that could lead to the creation of business.

The industries that house TRU fleets and applicable facilities may face infrastructure related costs and see net decreases in output growth. Many of the applicable facilities are large, and while they face compliance costs, it is unlikely that they would be eliminated. Many of the TRU fleets, however, are small businesses and face significant compliance costs. The truck transportation, rail transportation, and water transportation sectors are estimated to have decreases in output of about 0.1 percent relative to baseline levels and could potentially result in elimination of some businesses. Section C.2 and C.3 discuss the impact of the Proposed Amendments on typical businesses and small businesses. The annualized compliance costs on typical businesses is expected to be less than 1 percent of total annual revenue and would not be anticipated to lead to significant business elimination. For small business TRU fleets, annualized compliance costs are on average expected to be less than 1 percent of total revenue, but in some years could approach 3 percent of total annual revenue. Staff cannot rule out the possibility of some elimination of business.

g. Incentives for Innovation

The Proposed Amendments provide a strong signal for the development of zero-emission TRU technologies and help in building a robust market for advanced technologies. Staff anticipate growth in the industries that manufacture zero-emission TRU technologies, which would strengthen the supply chain and result in technology improvements earlier than they would have otherwise occurred. For example, improvements in battery weight and range are needed to improve market acceptance and bring overall battery-electric technology costs down. These improvements would allow advanced technologies to further expand into extended range TRU applications, as well as other off-road sectors. In addition, due to the large volume of refrigerated freight that moves through California, there is the possibility that the Proposed Amendments would compel TRU OEMs to incorporate advanced technologies and lower-GWP refrigerant into units sold outside of the State.

h. Competitive Advantage or Disadvantage

Staff do not anticipate impacts to the competitive advantage or disadvantage of businesses currently doing business in the State because the Proposed Amendments impose requirements equally on all TRUs that operate in California, whether the business that owns or operates them is based in-state or out-of-state. All businesses owning or operating TRUs would be subject to the same zero-emission truck TRU, PM

emission standard, lower-GWP refrigerant, and administrative requirements, regardless of in-state or out-of-state ownership status. Thus, the Proposed Amendments would not create any competitive disadvantage to businesses located in California.

Businesses that already use zero-emission TRU technologies may gain a competitive advantage compared to fleets that rely on diesel-powered TRUs in the Baseline. Some businesses may already be using cold plate and cryogenic TRUs in addition to battery-electric TRUs. Such businesses will not have large compliance costs associated with the Proposed Amendments and may also gain a competitive advantage compared to fleets that rely on diesel-powered TRUs in the Baseline.

Applicable facilities are required to pay registration fees and ensure that TRUs operating on their property are compliant. The applicable facilities are based on size thresholds and facilities below these specific thresholds will not face direct costs associated with the Proposed Amendments. Therefore, facilities below the threshold may gain a slight competitive advantage compared to larger facilities. Out-of-state facilities will not face the same registration fees and reporting costs. Therefore, California-based facilities may also face a competitive disadvantage to other similar-sized applicable facilities in close proximity, but in another state. Staff do not consider these impacts significant because fees and reporting costs are relatively small compared to the total cost of the Proposed Amendments, and small compared to the total revenue of these facilities.

i. Summary of Agency Interpretation of the Assessment Results

As modeled, CARB estimates the Proposed Amendments are unlikely to have a significant impact on the California economy. Table E7 summarizes the major economic indicators in California for the odd years of the analysis. Overall the change in the growth of jobs, state GDP, and output is projected to not exceed 0.01 percent of the Baseline.

Table E7. Summary of Macroeconomic Impacts of the Proposed Amendments

Economic Indicator	Units	2023	2025	2027	2029	2031	2033
GSP	Percent Change	0.00%	0.00%	0.00%	0.00%	-0.01%	0.00%
GSP	Change (2019M$)	27	-7	-56	-128	-153	-109
Personal Income	Percent Change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Personal Income	Change (2019M$)	-9	-56	-134	-175	-166	-119
Employment	Percent Change	0.00%	0.00%	0.00%	-0.01%	-0.01%	0.00%
Employment	Change (jobs)	150	-180	-680	-1,200	-1,280	-870
Output	Percent Change	0.00%	0.00%	0.00%	-0.01%	-0.01%	0.00%
Output	Change (2019M$)	43	-21	-115	-245	-289	-212
Private Investment	Percent Change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	0.00%
Private Investment	Change (2019M$)	-2	-14	-36	-47	-39	-13

F. Alternatives

1. Alternative 1

Alternative 1 is a more stringent requirement for trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets operating in California. Under this alternative, all trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines would be required to meet diesel emission standards for PM, NOx, and CO. This is in contrast to the Proposed Amendments, which only require newly manufactured trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines to meet a PM emission standard. Additionally, trailer TRUs, DSC TRUs, and TRU generator sets would be required to use zero-emission operation while stationary at certain facilities in California and be equipped with an electronic telematics system. Although the PM, NOx, and CO diesel emission standards and zero-emission operation while stationary requirement would result in greater emission benefits, it would also require the purchase of more expensive TRUs, as well as the purchase and installation of approximately 38,000 plugs to support zero-emission operation at applicable facilities statewide. Railcar TRUs would not be subject to the zero-emission operation requirement. Requirements for lower GWP refrigerant, zero-emission truck TRUs, registration, reporting, and fees would remain unchanged from the Proposed Amendments. Key elements of Alternative 1 include the following:

By December 31, 2022:

- Newly manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California shall use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all (same as Proposed Amendments).

By December 31, 2023:

- All truck TRU fleets shall turnover at least 15 percent each year (for 7 years) to zero-emission technology. All truck TRUs operating in California shall be zero-emission by December 31, 2029 (same as Proposed Amendments).
- MY 2023 and older trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines shall meet a 0.02 g/hp-hr PM emission standard (more stringent than Proposed Amendments).
- MY 2024 and newer trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines, regardless of horsepower, shall meet the U.S. EPA Tier 4 final emission standards (PM, NOx, CO) for 25-50 horsepower engines (more stringent than Proposed Amendments).
- MY 2024 and newer trailer TRUs, DSC TRUs, and TRU generator sets shall use zero-emission operation when stationary for more than 15 minutes at an applicable facility and be equipped with an electronic tracking system (ETS) (more stringent than Proposed Amendments).

By December 31, 2027:

- All trailer TRUs, DSC TRUs, and TRU generator sets operating in California shall use zero-emission operation when stationary for more than 15 minutes at an applicable facility and be equipped with an ETS (more stringent than Proposed Amendments).

By December 31, 2030:

- All trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines, regardless of horsepower, shall meet the more stringent U.S. EPA Tier 4 final emission standards (PM, NOx, CO) for 25-50 horsepower engines (more stringent than Proposed Amendments.

This alternative aligns with proposals from stakeholders advocating for the most stringent requirements feasible.

a. Costs

Under Alternative 1, the total direct cost to TRU owners is the summation of the cost of zero-emission truck TRUs, electric-standby or hybrid-electric TRUs (eTRU) capable of zero-emission operation, Level 3 VDECS, lower GWP refrigerant, ETS, and supporting infrastructure, as well as annual costs for maintenance, diesel and electricity usage, electronic telematics system data plans, LCFS credit revenue, CARB fees, and administrative costs for registration and reporting.

Staff used the cost estimates for battery-electric truck TRUs discussed in Section C.1.d.i and refrigerant costs discussed in Section C.1.d.iv. Compliance with the in-use PM standard in Alternative 1 would be achieved by retrofitting the TRU engine with a Level 3 VDECS.

To comply with the PM, NOx, and CO diesel emission standards and zero-emission operation while stationary requirement, staff assumed TRU owners would purchase new trailer and DSC eTRUs capable of zero-emission operation equipped with a greater than 25 horsepower engine, since these units would be fully compliant with Alternative 1. The capital cost for a new trailer TRU or DSC TRU to comply with Alternative 1 is $35,000, which is based on the current average cost of commercially available single-temperature and multi-temperature eTRUs with a greater than 25 horsepower engine. The capital cost for a new railcar TRU to comply with Alternative 1 is $28,390, which is the current average cost of commercially available units with a greater than 25 horsepower engine. The capital cost for a new TRU generator set to comply with Alternative 1 is $19,900, which is the current average cost of commercially available "pin-on" and "under-slung" units with a greater than 25 horsepower engine.

The capital cost for ETS is $1,000, which is based on estimates from TRU fleets and both major OEMs. The cost for an ETS data plan cost is $240 per year.

The cost for the purchase and installation of 30A 480V 3-phase plugs at applicable facilities is estimated to be $13,600 per plug,[210] This does not include additional site transformer or substation costs. In addition, facilities that request a significant electrical service upgrade with their electric utility may need to pay for a method of service or a load survey that is estimated to cost $50,000.[211, 212] Based on the estimated number of TRU visits for each facility type and the electrical power draw of TRUs, staff assumed this would apply to all 321 refrigerated HCWHDCs and 4 railyards. Table F1 shows the incremental costs associated with Alternative 1.

Table F1. Capital Costs for Alternative 1 (2019$)

Equipment Type	Baseline Cost per Unit	Proposed Cost per Unit	Incremental Cost per Unit
Diesel Truck TRU	$19,300	$44,600	$25,300
Truck eTRU	$20,400	$44,600	$24,200
Diesel Trailer TRU/DSC TRU <25hp	$25,530	$35,000	$9,470
Diesel Trailer TRU/DSC TRU >25hp	$28,390	$35,000	$6,610
Trailer/DSC eTRU <25hp	$31,630	$35,000	$3,070
Railcar TRU <25hp	$25,530	$28,390	$2,860
TRU Generator Set <25hp	$17,300	$19,900	$2,500
Level 3 VDECS	$0	$5,190[213]	$5,190
Electronic Telematics System	$0	$1,000[214]	$1,000
Truck TRU - Level 2 Charger	$0	$1,154	$1,154
Truck TRU – Level 2 Charger Installation	$0	$3,733	$3,733
Applicable Facility - 30A 480V 3-phase plug (including installation)	$0	$13,600[215]	$13,600

From 2022 to 2034, Alternative 1 is estimated to cost $6.56 billion compared to the Baseline versus $1.03 billion for the Proposed Amendments compared to the Baseline. The higher cost of Alternative 1 is due to the cost of trailer TRUs and DSC TRUs equipped with a greater than 25 horsepower engine and capable of zero-emission operation, as well as the purchase and installation of 38,000 plugs at applicable facilities to support the zero-emission operation of TRUs onsite. These higher costs are slightly offset by lower operating and maintenance costs and LCFS credits. Table F2, Table F3, and Table F4 show the total net costs, direct costs, and cost savings for Alternative 1, respectively.

[210] Based on the average of CARB funded projects and confidential data obtained from industry sources that requested non-attribution.
[211] If a utility customer has a service request for new load greater than six megawatts or need an additional distribution circuit, the customer will be required to pay for a method of survey.
[212] Survey costs claimed confidential data obtained from industry sources that requested non-attribution.
[213] Claimed confidential data obtained from industry sources that requested non-attribution.
[214] Claimed confidential data obtained from industry sources that requested non-attribution.
[215] Average of CARB funded projects and claimed confidential data obtained from industry sources that requested non-attribution. Does not include additional site transformer or substation costs.

Table F2. Total Projected Net Costs for Alternative 1 from 2022 to 2034 (2019M$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Diesel Fuel Costs	Electricity Costs	ETS Data Plan Costs	LCFS Credit Revenue	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$0	$0	$19.6	$19.6
2023	$666.2	$0.9	$51.0	$0	$0	$0	$0	$0	$11.1	$729.2
2024	$116.7	(-$2.7)	$52.2	$2.8	(-$14.9)	$14.9	$5.8	(-$12.7)	$4.7	$166.8
2025	$170.9	(-$5.1)	$54.1	$3.1	(-$24.2)	$25.9	$10.8	(-$19.9)	$4.6	$220.2
2026	$233.7	(-$7.5)	$56.7	$3.3	(-$34.3)	$37.6	$16.7	(-$28.3)	$11.4	$289.3
2027	$788.7	(-$10.3)	$59.1	$3.6	(-$44.4)	$51.2	$23.1	(-$37.9)	$6.7	$839.8
2028	$769.8	(-$19.7)	$60.2	$3.9	(-$81.5)	$94.4	$48.3	(-$64.4)	$9.5	$820.5
2029	$770.0	(-$21.0)	$60.5	$4.2	(-$82.5)	$100.8	$50.1	(-$67.4)	$8.7	$823.4
2030	$764.9	(-$21.7)	$60.4	$4.4	(-$83.4)	$106.2	$51.7	(-$69.6)	$7.5	$820.4
2031	$751.1	(-$22.0)	$59.6	$4.5	(-$84.5)	$109.9	$53.2	(-$69.3)	$8.4	$810.9
2032	$308.5	(-$22.4)	$59.1	$4.5	(-$86.5)	$111.5	$54.0	(-$69.0)	$8.6	$368.3
2033	$263.7	(-$22.7)	$58.8	$4.6	(-$89.2)	$113.2	$54.9	(-$68.7)	$7.7	$322.3
2034	$270.6	(-$23.1)	$59.0	$4.7	(-$91.4)	$115.1	$55.8	(-$68.4)	$8.8	$331.1
Total	$5,874.8	(-$177.3)	$690.7	$43.6	(-$716.8)	$880.7	$424.4	(-$575.6)	$117.3	$6,561.8

Table F3. Total Projected Direct Costs for Alternative 1 from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Electricity Costs	ETS Data Plan	Infrastructure Capital Costs	Infrastructure Maintenance Costs	Administrative Costs	Total
2022	$0	$0	$0	$0	$0	$0	$19,600,000	$19,600,000
2023	$666,200,000	$900,000	$0	$0	$51,000,000	$0	$11,100,000	$729,200,000
2024	$116,700,000	$0	$14,900,000	$5,800,000	$52,200,000	$2,800,000	$4,700,000	$197,100,000
2025	$170,800,000	$0	$25,900,000	$10,800,000	$54,100,000	$3,100,000	$4,600,000	$269,300,000
2026	$233,700,000	$0	$37,600,000	$16,700,000	$56,700,000	$3,300,000	$11,400,000	$359,400,000
2027	$788,700,000	$0	$51,200,000	$23,100,000	$59,100,000	$3,600,000	$6,700,000	$932,400,000
2028	$769,800,000	$0	$94,400,000	$48,300,000	$60,200,000	$3,900,000	$9,500,000	$986,100,000
2029	$770,000,000	$0	$100,800,000	$50,100,000	$60,500,000	$4,200,000	$8,700,000	$994,300,000
2030	$764,900,000	$0	$106,200,000	$51,700,000	$60,400,000	$4,400,000	$7,500,000	$995,100,000
2031	$751,100,000	$0	$109,900,000	$53,200,000	$59,600,000	$4,500,000	$8,400,000	$986,700,000
2032	$313,600,000	$0	$111,500,000	$54,000,000	$59,100,000	$4,500,000	$8,600,000	$551,300,000
2033	$280,500,000	$0	$113,200,000	$54,900,000	$58,800,000	$4,600,000	$7,700,000	$519,700,000
2034	$294,400,000	$0	$115,100,000	$55,800,000	$59,000,000	$4,700,000	$8,800,000	$537,800,000
Total	$5,920,400,000	$900,000	$880,700,000	$424,400,000	$690,700,000	$43,600,000	$117,300,000	$8,078,000,000

Table F4. Total Projected Cost Savings for Alternative 1 from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Diesel Fuel Costs	LCFS Credit Revenue	Total
2022	$0	$0	$0	$0	$0
2023	$0	$0	$0	$0	$0
2024	$0	(-$2,700,000)	(-$14,900,000)	(-$12,700,000)	(-$30,300,000)
2025	$0	(-$5,100,000)	(-$24,200,000)	(-$19,900,000)	(-$49,200,000)
2026	$0	(-$7,500,000)	(-$34,300,000)	(-$28,300,000)	(-$70,100,000)
2027	$0	(-$10,300,000)	(-$44,400,000)	(-$37,900,000)	(-$92,600,000)
2028	$0	(-$19,700,000)	(-$81,500,000)	(-$64,400,000)	(-$165,600,000)
2029	$0	(-$20,900,000)	(-$82,500,000)	(-$67,400,000)	(-$170,800,000)
2030	$0	(-$21,700,000)	(-$83,400,000)	(-$69,600,000)	(-$174,700,000)
2031	$0	(-$22,000,000)	(-$84,500,000)	(-$69,300,000)	(-$175,800,000)
2032	(-$5,200,000)	(-$22,400,000)	(-$86,400,000)	(-$69,000,000)	(-$183,000,000)
2033	(-$16,900,000)	(-$22,700,000)	(-$89,200,000)	(-$68,700,000)	(-$197,500,000)
2034	(-$23,800,000)	(-$23,100,000)	(-$91,400,000)	(-$68,400,000)	(-$206,700,000)
Total	(-$45,900,000)	(-$178,100,000)	(-$716,700,000)	(-$575,600,000)	(-$1,516,300,000)

b. Benefits

Staff developed emission reduction estimates for Alternative 1 according to the methodology described in Section B.1.a. Alternative 1 would result in greater PM2.5, NOx, and GHG emission reductions than the Proposed Amendments. Figure F1, Figure F2, and Figure F3 show the PM2.5, NOx, and GHG emissions under the Baseline, Proposed Amendments, and Alternative 1.

Figure F1. Projected PM2.5 Emissions under the Baseline, Proposed Amendments, and Alternative 1

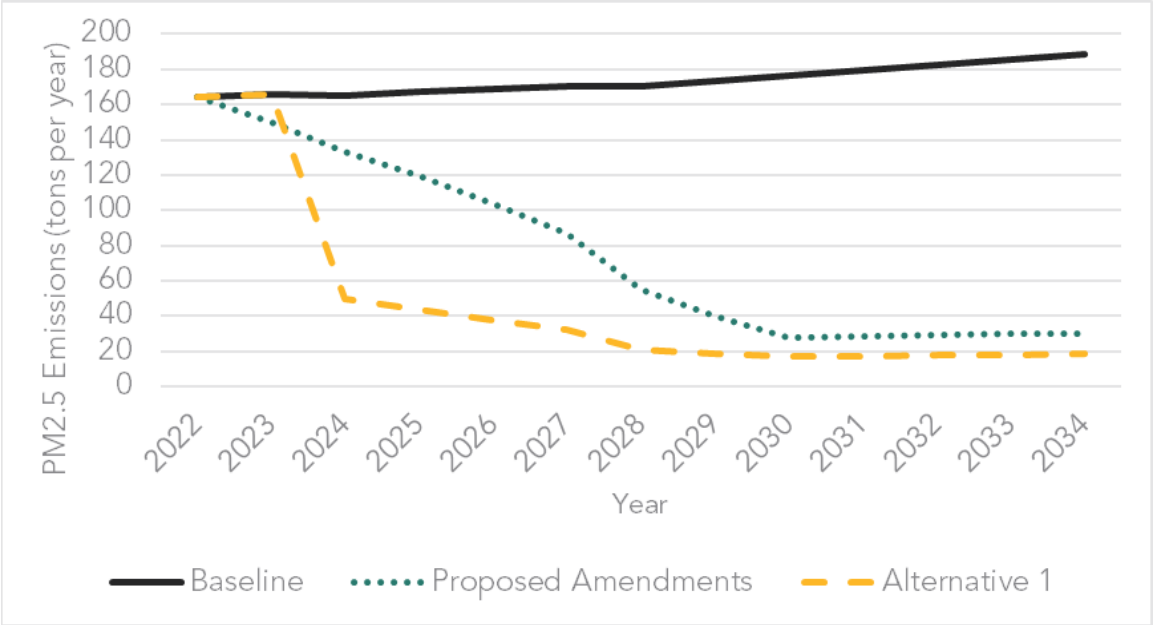


Figure F2. Projected NOx Emissions under the Baseline, Proposed Amendments, and Alternative 1

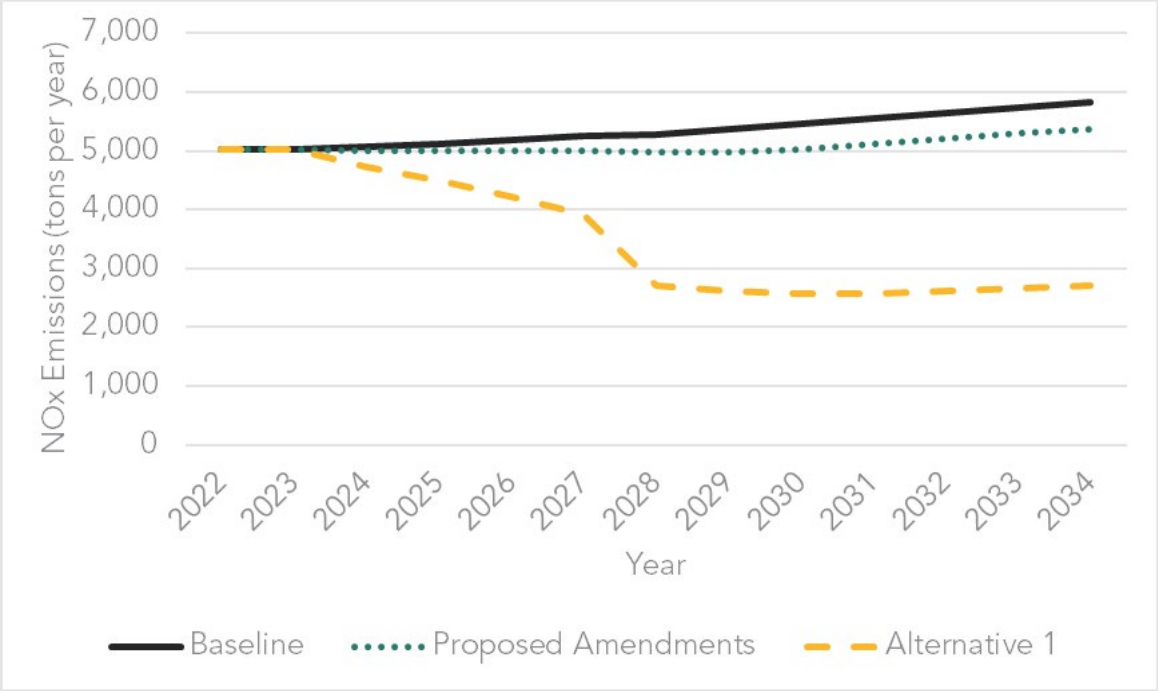
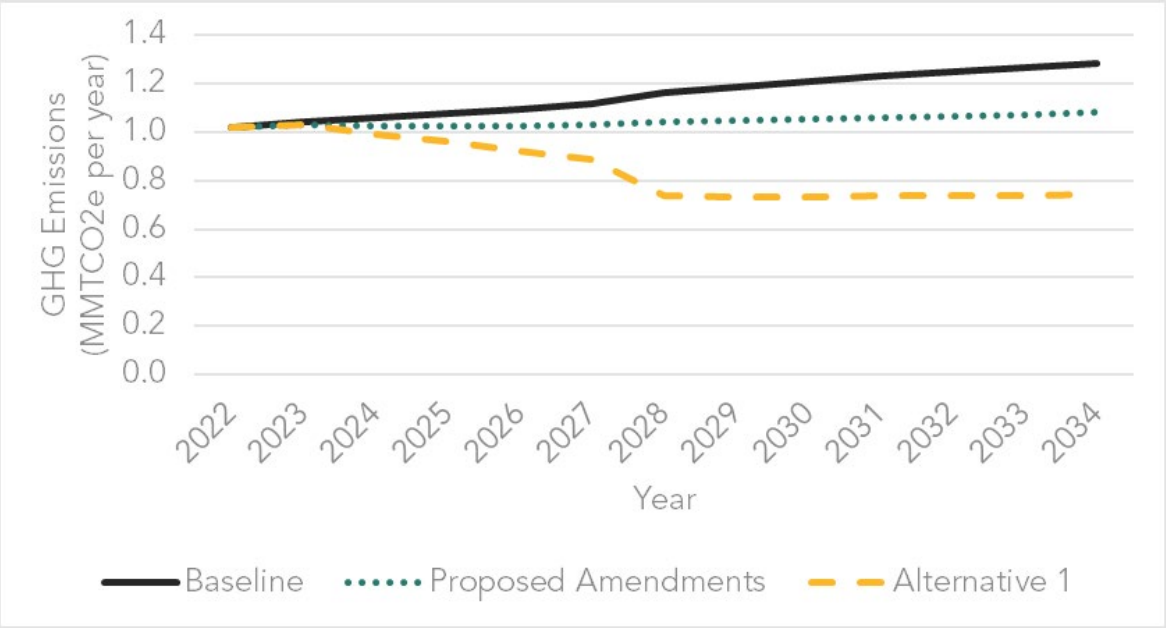


Figure F3. Projected GHG Emissions under the Baseline, Proposed Amendments, and Alternative 1



Staff used the estimation methodologies described in Section B.4.a.ii.2 to quantify avoided cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and emergency room visits for respiratory illness and asthma that would be expected to result from Alternative 1. Staff calculated the health benefits for Alternative 1 using the methodology described in Section B.4.a.ii.3. Table F5 shows the statewide valuation of avoided health outcomes for Alternative 1. Alternative 1 results in a higher valuation of health benefits at $3.95 billion compared to the Proposed Amendments at $1.75 billion.

Table F5. Statewide Valuation of Avoided Health Outcomes for Alternative 1 from 2022 to 2034

Outcome	Avoided Incidents	Valuation
Avoided Premature Deaths	400	$3,947,125,769
Avoided Hospitalizations	128	$6,920,114
Avoided Emergency Room Visits	195	$162,941
Total	723	$3,954,208,824

c. Economic Impacts

Alternative 1 is more stringent compared to the Proposed Amendments, in which all trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets would be required to meet diesel emission standards for NOx, PM, and CO. Additionally, trailer TRUs, DSC TRUs, and TRU generator sets would be required to use zero-emission operation while stationary at certain facilities in California and be equipped with an ETS. This results in higher incremental costs relative to the Proposed Amendments.

The macroeconomic impact analysis results, for the odd years of the analysis, are shown in Table F6. In 2023, Alternative 1 is estimated to result in a slight increase GSP, output, and employment. The increased economic activity is a result of increased demand due to purchases and installation of equipment and infrastructure by in-state fleets, as well as construction activity required to equip applicable facilities with the ability to support the zero-emission stationary requirements. After the initial boost to economic activity, the overall increased costs of Alternative 1 result in decreases in overall economic activity. In years 2029 to 2031, Alternative 1 is estimated to decrease GSP, personal income, employment, and output by 0.01 percent to 0.07 percent below baseline levels. Relative to the Proposed Amendments. These impacts are approximately 3 times as large as those estimated under the Proposed Amendments.

Table F6. Summary of Macroeconomic Impacts of Alternative 1

Economic Indicator	Units	2023	2025	2027	2029	2031	2033
GSP	Percent Change	0.01%	-0.01%	-0.01%	-0.03%	-0.03%	-0.01%
GSP	Change (2019M$)	393	-174	-324	-894	-940	-422
Personal Income	Percent Change	-0.01%	-0.01%	-0.03%	-0.04%	-0.04%	-0.02%
Personal Income	Change (2019M$)	-230	-239	-840	-1,104	-1,128	-480
Employment	Percent Change	0.01%	-0.01%	-0.02%	-0.03%	-0.03%	-0.01%
Employment	Change (jobs)	3,400	-1,730	-3,990	-7,760	-7,800	-3,130
Output	Percent Change	0.01%	-0.01%	-0.01%	-0.03%	-0.03%	-0.02%
Output	Change (2019M$)	686	-347	-656	-1,651	-1,746	-840
Private Investment	Percent Change	-0.01%	-0.02%	-0.05%	-0.07%	-0.06%	-0.01%
Private Investment	Change (2019M$)	-65	-107	-228	-343	-322	-71

Figure F4 illustrates the changes in employment by major sector associated with Alternative 1. The large increase in employment in 2023 primarily reflects a one-time short-lived increased demand for construction activities to install infrastructure in applicable facilities. From 2024 to 2034, the changes in employment closely match the pattern in overall costs for Alternative 1. The greatest decreases in overall employment occur between 2029 to 2031, directly following the years with greatest incremental costs.

Figure F4. Changes in Employment by Major Sector Associated with Alternative 1

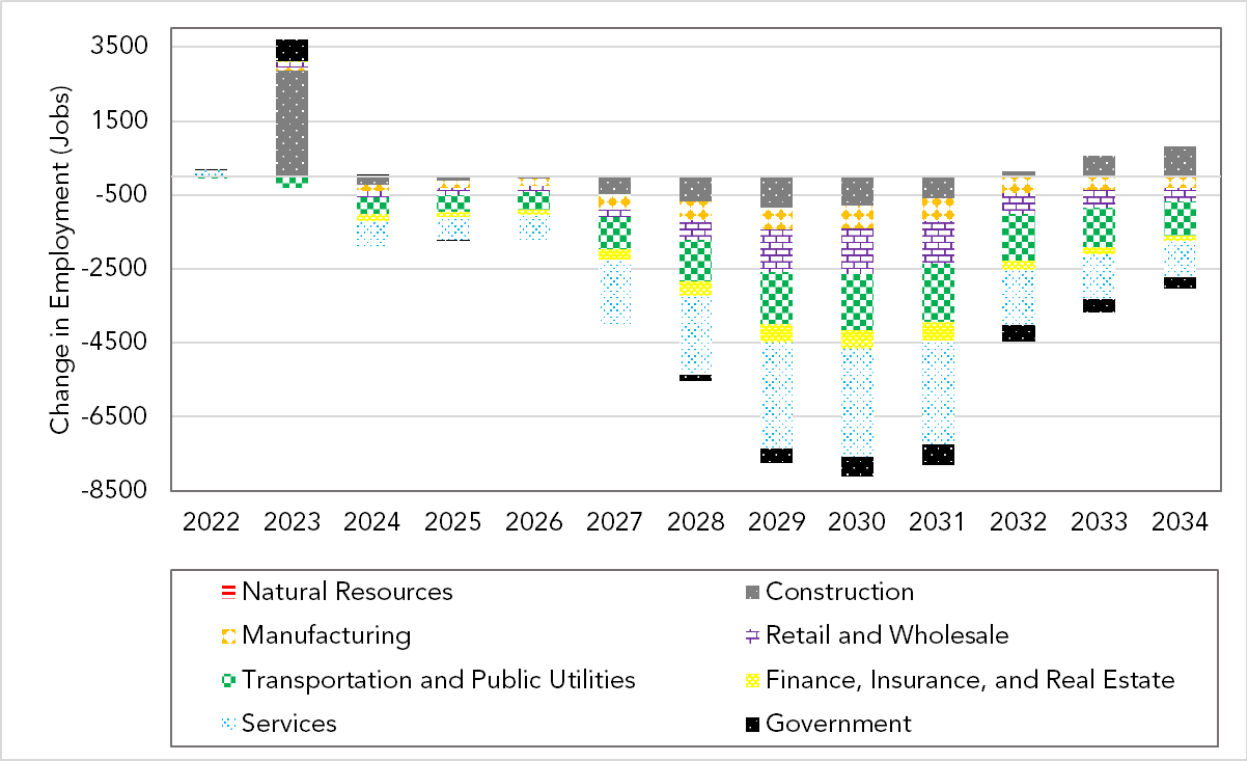
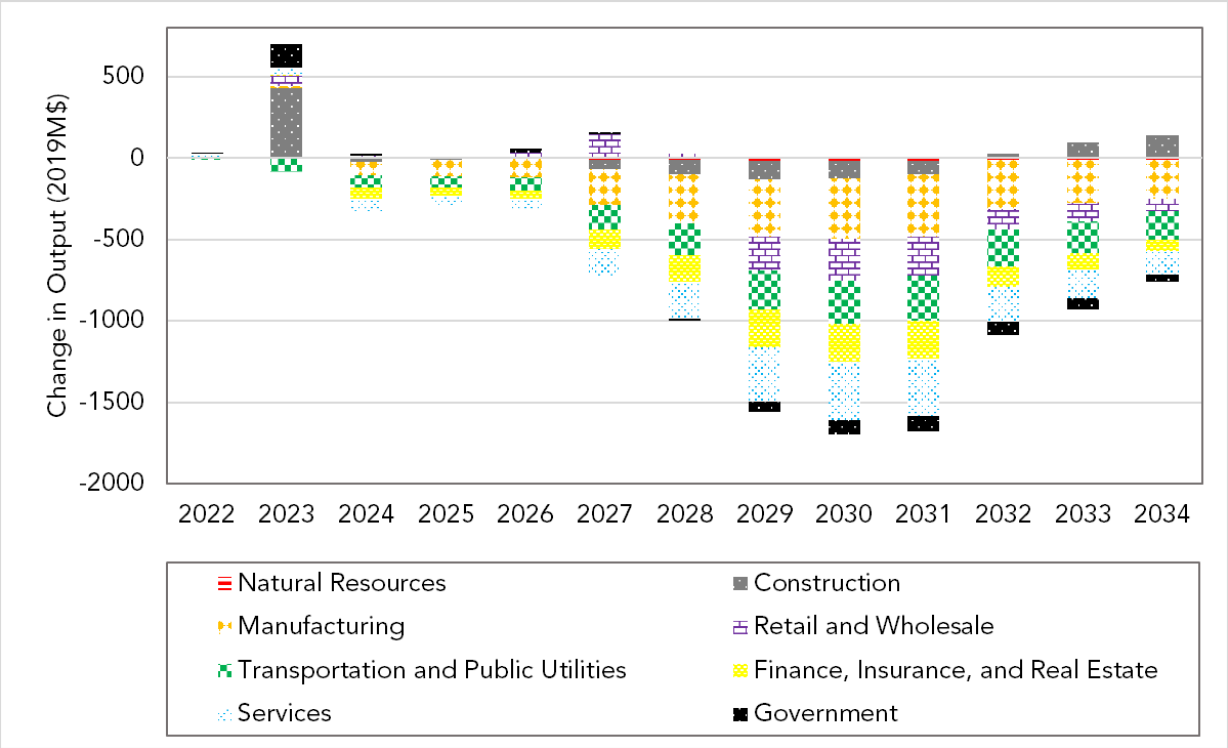


Figure F5 illustrates the changes in output by major sector associated with Alternative 1. The trends in output are similar to the trends that were observed for employment. Alternative 1 is estimated to result in increases in California output in 2023, primarily due to demand in the construction sector, followed by decreases in overall output from 2024 to 2034. The slight increase in overall output in 2027 results from the Baseline full compliance assumption that caused significant turnover in 2020 to force compliance with the TRU ATCM. This leads to a surge in demand for new equipment in 2027. See Section A.6 for more information.

Figure F5. Changes in Output by Major Sector Associated with Alternative 1



d. Cost-Effectiveness

Cost-effectiveness is a measure of the cost of a regulation per ton of expected emission reduction. There are multiple approaches to calculating cost-effectiveness. Staff calculated the cost-effectiveness of Alternative 1 (in $/weighted ton) using the cost-effectiveness method provided in the Carl Moyer Program Guidelines Appendix C by dividing the cost over a period of time by the weighted emission reductions (in tons per year) over that time period.[216] Table F7 shows the cost-effectiveness for the Proposed Amendments and Alternative 1. Staff estimated that Alternative 1 would be less cost-effective than the Proposed Amendments due to the higher direct costs.

Table F7. Cost-Effectiveness of the Proposed Amendments and Alternative 1

Proposal	Carl Moyer Program Cost-Effectiveness per Weighted Ton
Proposed Amendments	$35,828
Alternative 1	$116,361
Difference in Cost-Effectiveness	$80,533

e. Reason for Rejecting

Although Alternative 1 achieves greater emissions benefits in the early years of implementation, staff rejected Alternative 1 because it does not meet the directive of

[216] California Air Resources Board, Carl Moyer Program Guidelines, Appendix C, April 27, 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic/msprog/moyer/guidelines/2017/2017_cmpgl.pdf)

EO N-79-20 to transition off-road vehicles and equipment operations in the State to zero-emission by 2035. In addition to the zero-emission truck TRU requirements in the Proposed Amendments, staff intend to pursue an additional rulemaking to transition the remaining TRU categories to zero-emission per the EO. Alternative 1 would impose significant costs on the TRU industry only to be subject to additional zero-emission requirements in the near future. Stakeholders have also expressed concern regarding the feasibility of the zero-emission operation while stationary requirement included in Alternative 1 because TRUs and the facilities where they operate are often not under the same ownership. There is not currently a standardized plug for electric-standby or hybrid-electric TRUs that would be used to comply with the zero-emission operation requirement. Without plug standardization, it would be difficult to ensure compatibility between TRUs and facility infrastructure owned by different entities.

2. Alternative 2

Alternative 2 is a less stringent requirement for truck TRUs operating in California. Under this alternative, all newly manufactured truck TRU, trailer TRU, DSC TRU, railcar TRU, and TRU generator set engines would be required to meet a PM emission standard. In contrast to the Proposed Amendments, Alternative 2 does not include a requirement for truck TRUs to transition to zero-emission technology. Requirements for registration, reporting, and fees would remain unchanged from the Proposed Amendments. Key elements of Alternative 2 include the following:

By December 31, 2022:

- All newly manufactured truck TRUs, trailer TRUs, and DSC TRUs that operate in California shall use refrigerant with a GWP less than or equal to 2,200, or use no refrigerant at all (same as Proposed Amendments).
- MY 2023 and newer TRU engines shall meet a PM performance standard of 0.02 g/hp-hr (less stringent than Proposed Amendments).

This alternative aligns with proposals from stakeholders advocating for elimination of zero-emission requirements.

a. Costs

Under Alternative 2, the total direct cost to TRU owners is the summation of the cost of TRUs equipped with engines certified to meet the PM emission standard, lower GWP refrigerant, CARB fees, and administrative costs for registration and reporting. A truck TRU with an engine that meets a 0.02 g/hp-hr PM emission standard is not currently available since all commercially available truck TRUs are under 25 horsepower. Therefore, staff estimated the incremental cost of a truck TRU by assuming the same cost ratio for a less than 25 horsepower trailer TRU to a greater than 25 horsepower trailer TRU would apply to truck TRUs. Staff used the cost estimates for trailer TRUs, DSC TRUs, railcar TRUs, and TRU generator sets equipped with an engine that meets the PM emission standard discussed in Section C.1.d.iii and

refrigerant costs discussed in Section C.1.d.iv. Table F8 shows the incremental costs associated with Alternative 2.

Table F8. Capital Costs for Alternative 2 (2019$)

	Baseline Cost	Proposed Cost	Incremental Cost
Diesel Truck TRU	$18,600	$20,860	$2,260
Diesel Trailer TRU/DSC TRU/Railcar TRU	$25,450	$28,540	$3,090
TRU Generator Set	$17,260	$19,900	$2,640

From 2022 to 2034, Alternative 2 is estimated to cost $919.7 million compared to the Baseline versus $1.03 billion for the Proposed Amendments compared to the Baseline. Alternative 2 would not require the purchase of zero-emission truck TRUs or supporting infrastructure. This would result in lower costs to California compared to the Proposed Amendments. Table F9 shows the total direct costs for Alternative 2.

Table F9. Total Projected Net Costs for Alternative 2 from 2022 to 2034 (2019$)

Year	Equipment Capital Costs	Equipment Maintenance Costs	Administrative Costs	Total
2022	$0	$0	$0	$0
2023	$12,900,000	$900,000	$10,800,000	$24,600,000
2024	$24,300,000	$1,400,000	$4,300,000	$30,000,000
2025	$37,900,000	$1,800,000	$4,300,000	$44,000,000
2026	$53,100,000	$2,200,000	$11,000,000	$66,300,000
2027	$80,400,000	$2,700,000	$5,900,000	$89,000,000
2028	$83,500,000	$3,500,000	$6,800,000	$93,800,000
2029	$87,500,000	$3,900,000	$8,200,000	$99,600,000
2030	$89,600,000	$4,000,000	$7,100,000	$100,700,000
2031	$89,600,000	$4,100,000	$8,100,000	$101,700,000
2032	$76,700,000	$4,100,000	$7,600,000	$88,500,000
2033	$77,300,000	$4,200,000	$7,400,000	$88,900,000
2034	$79,900,000	$4,300,000	$8,600,000	$92,700,000
Total	$792,700,000	$37,000,000	$90,000,000	$919,700,000

b. Benefits

Staff developed emission reduction estimates for Alternative 2 according to the methodology described in Chapter B.1.a. Alternative 2 would result in fewer emission reductions than the Proposed Amendments, and would not achieve any NOx emission reductions compared to the Baseline. Figure F6, Figure F7, and Figure F8 show the PM2.5, NOx, and GHG emissions under the Baseline, Proposed Amendments, and Alternative 2.

Figure F6. Projected PM2.5 Emissions under the Baseline, Proposed Amendments, and Alternative 2

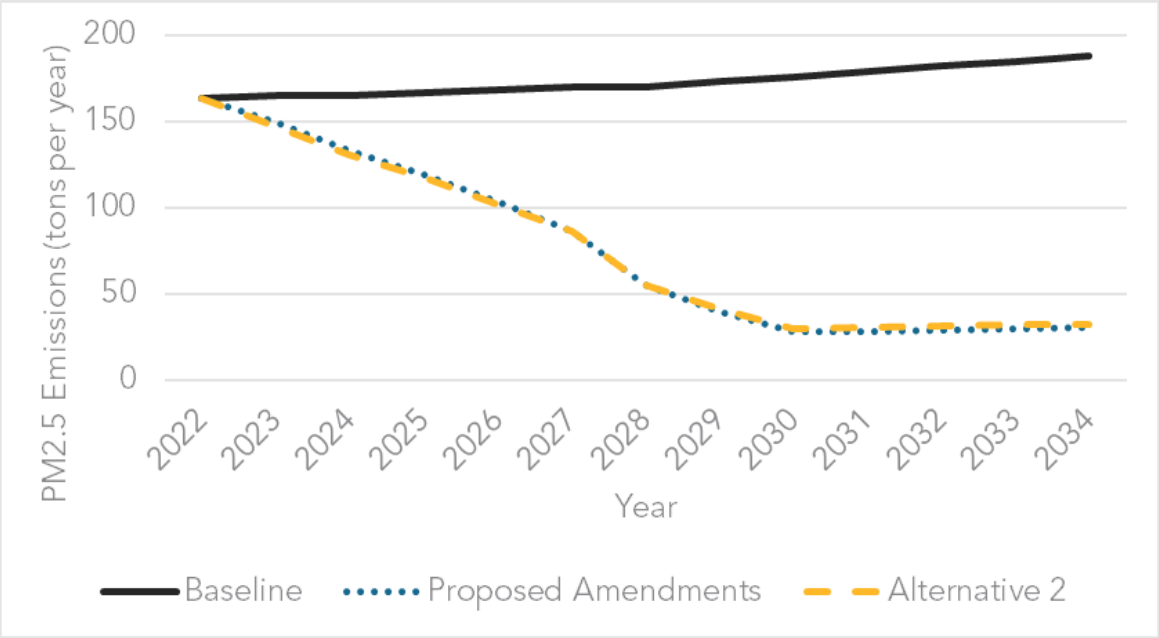


Figure F7. Projected NOx Emissions under the Baseline, Proposed Amendments, and Alternative 2

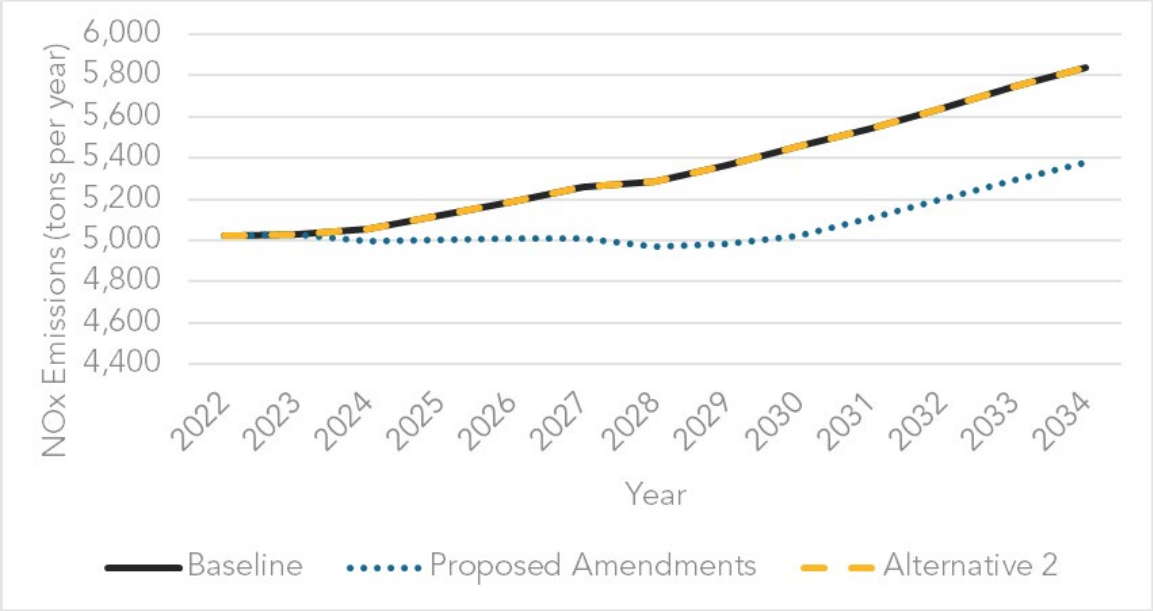
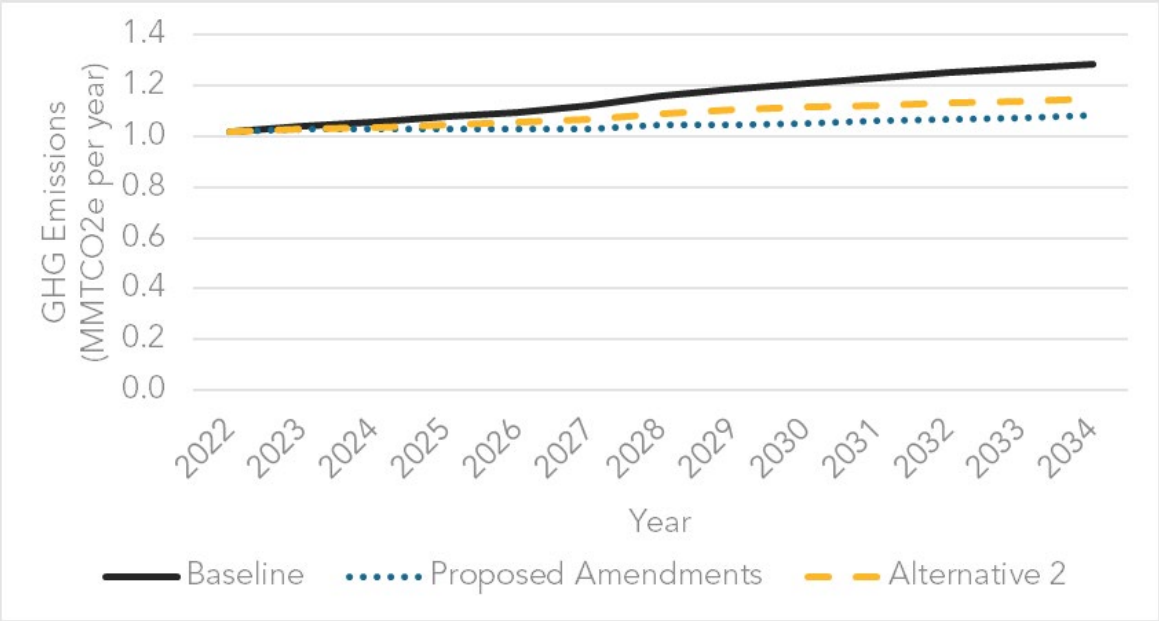


Figure F8. Projected GHG Emissions under the Baseline, Proposed Amendments, and Alternative 2



Staff used the estimation methodologies described in Section B.4.a.ii.2 to quantify avoided cardiopulmonary mortality, hospitalizations for cardiovascular illness and respiratory illness, and emergency room visits for respiratory illness and asthma that would be expected to result from Alternative 2. Staff calculated the health benefits for Alternative 2 using the methodology described in Section B.4.a.ii.3. Table F10 shows the statewide valuation of avoided health outcomes for Alternative 2. Alternative 2 results in a lower valuation of health benefits at $2.56 billion compared to the Proposed Amendments at $4.33 billion (see Table B5).

Table F10. Statewide Valuation of Avoided Health Outcomes for Alternative 2 from 2022 to 2034

Outcome	Avoided Incidents	Valuation
Avoided Premature Deaths	145	$1,434,905,310
Avoided Hospitalizations	46	$2,536,801
Avoided Emergency Room Visits	72	$59,892
Total	468	$1,437,502,003

c. Economic Impacts

Alternative 2 is less stringent compared to the Proposed Amendments, requiring truck TRUs to meet a PM emission standard instead of transitioning to zero-emission technology. As a result, Alternative 2 directly impacts fewer industries and results in lower incremental costs relative to the Proposed Amendments.

The macroeconomic impact analysis results are shown in Table F11. The overall impacts are similar to those under the Proposed Amendments. Unlike the Proposed

Amendments which are estimated to have some positive impacts to output and employment in the early years of the assessment, Alternative 2 is estimated to have slight negative impacts in all years of the assessment. This is because Alternative 2 does not have the same levels of demand for equipment from in-state fleets nor any of the infrastructure investments that would occur to support zero-emission TRUs. Alternative 2 also doesn't have costs subsequent mirrored increases in demand associated with changes diesel fuel and electricity use.

Table F11. Summary of Macroeconomic Impacts of Alternative 2

Economic Indicator	Units	2023	2025	2027	2029	2031	2033
GSP	Percent Change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
GSP	Change (2019M$)	-5	-26	-63	-108	-121	-110
Personal Income	Percent Change	0.00%	0.00%	0.00%	-0.01%	-0.01%	0.00%
Personal Income	Change (2019M$)	-22	-49	-104	-139	-154	-142
Employment	Percent Change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Employment	Change (jobs)	-80	-280	-640	-970	-1,040	-920
Output	Percent Change	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Output	Change (2019M$)	-10	-49	-120	-202	-228	-210
Private Investment	Percent Change	0.00%	0.00%	-0.01%	-0.01%	-0.01%	-0.01%
Private Investment	Change (2019M$)	-6	-16	-35	-46	-46	-36

Figure F9 and Figure F10 illustrate the impact of Alternative 2 on employment and output by major sector. Alternative 2 is estimated to have progressively larger impacts to employment and output, relative to the baseline, in all years of the assessment. These impacts closely match the pattern in the overall costs of Alternative 2 which increase overtime.

Figure F9. Changes in Employment by Major Sector Associated with Alternative 2

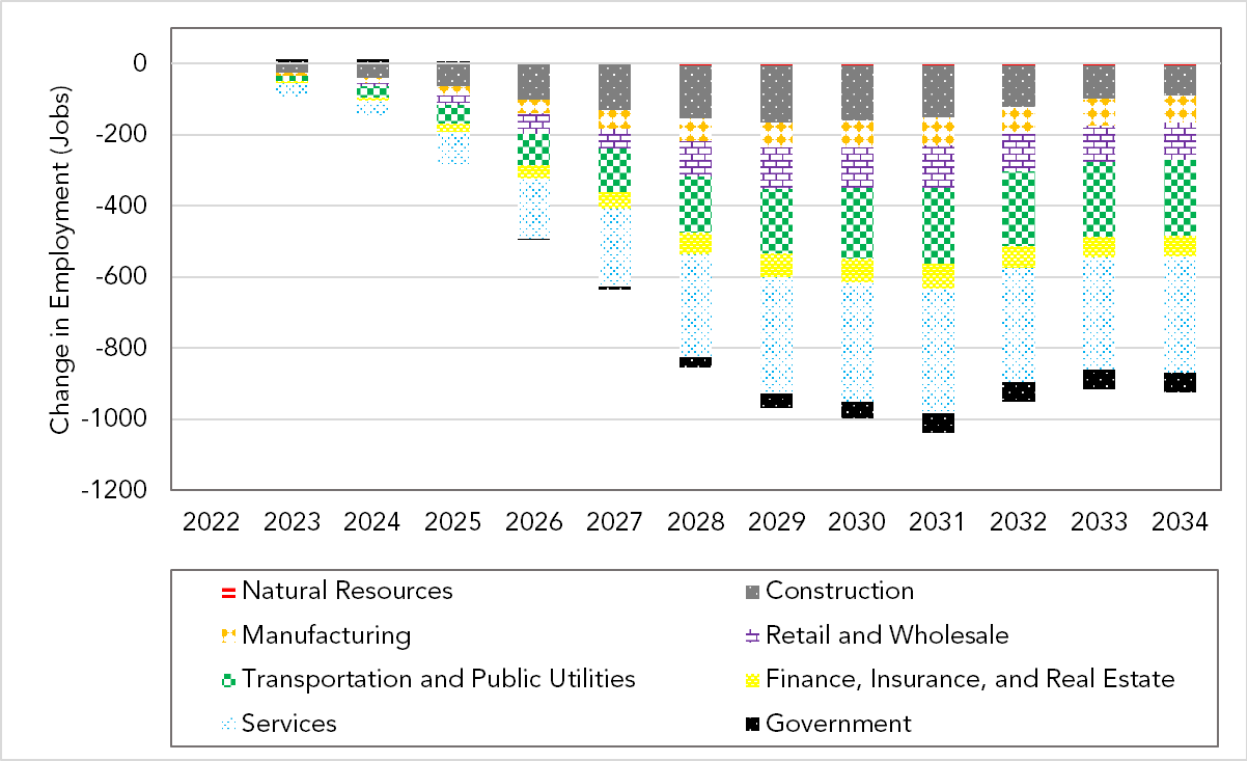
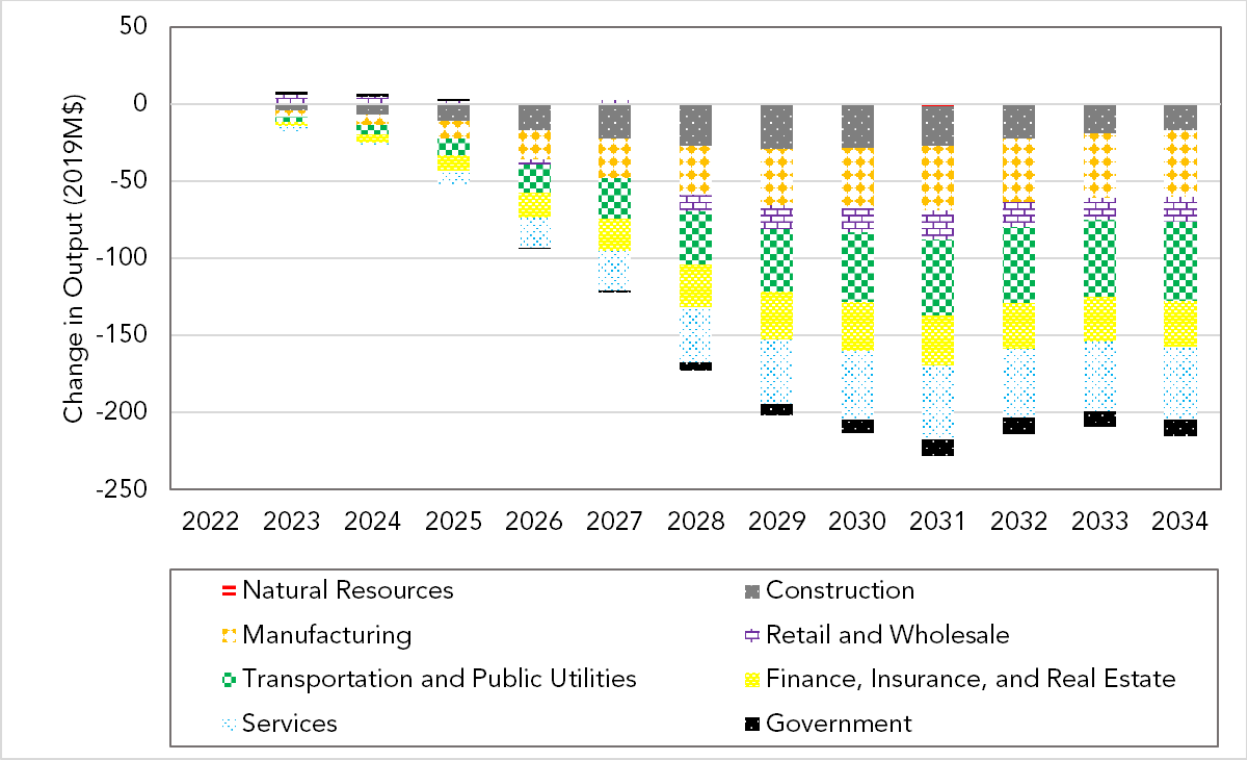


Figure F10. Changes in Output by Major Sector Associated with Alternative 2



d. Cost-Effectiveness

Cost-effectiveness is a measure of the cost of a regulation per ton of expected emission reduction. There are multiple approaches to calculating cost-effectiveness. Staff calculated the cost-effectiveness of Alternative 2 (in $/weighted ton) using the cost-effectiveness method provided in the Carl Moyer Program Guidelines Appendix C by dividing the cost over a period of time by the weighted emission reductions (in tons per year) over that time period.[217] Table F12 shows the cost-effectiveness for the Proposed Amendments and Alternative 2. Staff estimated that Alternative 2 would be slightly less cost-effective than the Proposed Amendments.

Table F12. Cost-Effectiveness of the Proposed Amendments and Alternative 2

Proposal	Carl Moyer Program Cost-Effectiveness per Weighted Ton
Proposed Amendments	$35,828
Alternative 2	$36,683
Difference in Cost-Effectiveness	$855

e. Reason for Rejecting

Staff rejected Alternative 2 because it is less cost-effective and would achieve fewer NOx and GHG reductions than the Proposed Amendments. Alternative 2 would not achieve any NOx reductions compared to the Baseline, which are needed to help meet the federal ambient air quality standards for ozone. Additionally, Alternative 2 does not include a zero-emission requirement for TRUs, failing to meet the directive of EO N-79-20 to achieve 100 percent zero-emission off-road vehicles and equipment by 2035; advance zero-emission TRU market development; and increase installation of electric or fueling infrastructure needed in California to support zero-emission technology.

[217] California Air Resources Board, Carl Moyer Program Guidelines, Appendix C, April 27, 2017. (web link: https://ww2.arb.ca.gov/sites/default/files/classic/msprog/moyer/guidelines/2017/2017_cmpgl.pdf)

Appendix A: Fee Development

This appendix describes California Air Resources Board (CARB or Board) staff's methodology for determining the fee amounts included in the Proposed Amendments.

CARB has historically used existing funds (primarily the Motor Vehicle Account) to implement and enforce the TRU ATCM. On June 27, 2018, California passed SB 854 (Committee on Budget and Fiscal Review, Chapter 51, Statutes of 2018).[218] SB 854 allows CARB to adopt a schedule of fees to cover all or part of CARB's reasonable costs associated with certification, audit, and compliance of off-road or non-vehicular engines and equipment, aftermarket parts, and emission control components sold in the State (limited to activities covered by HSC sections 38560, 43013 and 43018, on-road aftermarket parts under Vehicle Code section 27156(h)). As such, this legislation provides CARB the authority to assess fees to cover its reasonable costs, with specific considerations, on off-road and other mobile source certification and compliance programs not currently covered under the existing fee regulation authority under HSC section 43019. This new authority is housed in HSC section 43019.1. CARB will deposit fees collected into the Certification and Compliance Fund as required under HSC section 43019, used to support mobile source certification and compliance activities.

The Proposed Amendments include TRU operating fees and applicable facility registration fees. The proposed fees will enable the TRU program to be self-sustaining as allowed by SB 854. To develop the fees for the Proposed Amendments, staff determined the reasonable costs for the implementation and enforcement of the Proposed Amendments. Costs include labor and operations. Below is a description of both cost categories.

1. Labor Costs

Total labor costs include both the direct labor to implement TRU program activities (Direct Labor) and overhead costs that include administrative management, legal, and information technology costs to run the agency (Indirect Labor).

a. Direct Labor

The Direct Labor cost includes existing staff in the Transportation and Toxics Division and Enforcement Division, as well as new positions that CARB plans to request in a budget change proposal once the Board adopts the Proposed Amendments. Direct Labor costs include each staff and first level manager that would directly work on TRU program activities. Second level managers or above were not included in the calculation.

The percent time spent on TRU program activities is based on time estimates provided by current TRU program staff. The percent time was summed into a person year (PY)

[218] California Health and Safety Code § 43019.1, Division 26, Senate Bill No. 854, July 27, 2018. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB854

activity level for each classification. Each staff PY time was multiplied by the 2021 Fiscal Year Labor Budget class cost, which is a mid-range salary for each classification and includes benefits, operating expense, and equipment. Fiscal Year Labor Budget class cost is calculated annually through an administrative process which annualizes the California Department of Human Resources monthly salary by position class, adds an average of 53 percent of the salary cost for benefits, and adds an average of 20 percent of the salary cost for operating expenses and equipment for each class. Each class has its own benefit and operating expenses and equipment determination.

Table App. A-1 and Table App. A-2 show the annual Direct Labor cost for existing and new TRU program staff, respectively. The Direct Labor cost does not reflect the roughly 9.23 percent cut to labor costs across most State bargaining units as a result of negotiations in response to the current economic condition and anticipated impact on the State budget. Most of the agreements are temporary and are anticipated to have minimal impact during the effective dates of the Proposed Amendments.

Table App. A-1. Annual TRU Program Direct Labor Cost – Existing Staff

Classification	PY Time Estimate	2021/2022 FY Cost	Annual Direct Labor Cost
Air Pollution Specialist	0.75	$195,000	$146,250
Air Resources Engineer	0.5	$206,000	$103,000
Air Resources Supervisor I	0.25	$238,000	$59,500
Air Resources Technician II	4.2	$101,000	$424,200
Staff Air Pollution Specialist	0.25	$220,000	$55,000
Total	5.95	n/a	$787,950

Table App. A-2. Annual TRU Program Direct Labor Cost – New Staff

Classification	PY Time Estimate	2021/2022 FY Cost	Annual Direct Labor Cost
Air Pollution Specialist	3.0	$195,000	$585,000
Air Resources Technician I	8.0	$85,000	$680,000
Air Resources Technician II	2.0	$101,000	$202,000
Staff Services Manager I	1.0	$167,000	$167,000
Total	14.0	n/a	$1,634,000

b. Indirect Labor

Indirect Labor includes the management, administrative, legal, and information technology costs to run the agency. The Indirect Labor percentage was calculated directly for the agency using Division, Executive Office, and Chair Office management, Administrative Services Division, Legal Office, and information technology services staffing divided by the total agency labor force. The Indirect Labor percentage was calculated as 26 percent of the Direct Labor cost for CARB.

c. Total Labor Cost

Table App. A-3 shows the total annual labor cost for the TRU program.

Table App. A-3. Total Annual TRU Program Labor Cost

Annual Direct Labor Cost	Annual Indirect Labor Cost	Total Annual Labor Cost
$2,421,950	$629,707	$3,051,657

2. Operational Costs

Operational Costs are the direct costs to conduct program activity. As shown in Table App. A-4, this includes compliance labels, envelopes, and postage.

Table App. A-4. TRU Program Operational Costs

Item	Quantity Purchased Per Year	Estimated Cost Per Item	Operational Cost
Compliance Label (two per TRU)	162, 402	$2.50	$415,827
Envelope	81,201	$0.07	$5,822
Postage	81,201	$0.62	$51,563
Total	n/a	n/a	$473,211

3. Fee Calculation

CARB staff calculated the fee amounts based on TRU populations from the statewide TRU inventory and applicable facility populations from the Applicable Facility Inventory. Based on the TRU and applicable facility populations, staff determined the average annual number of TRUs and applicable facilities that would be expected to pay fees over a ten year period beginning in 2023 if the fees were collected every three years. The ten-year period was used to reflect the average useful life of a TRU. Staff also applied a 12 percent non-compliance rate, which is based on the average of non-reporting assumed in the statewide TRU inventory (3.75 percent) and the percentage of citations issued by CARB's Enforcement Division for non-reporting violations in 2019 (21 percent).[219] Table App. A-5 shows the cost per TRU or applicable facility and zero-emission TRU, respectively.

[219] California Air Resources Board, 2019 Annual Enforcement Report, June 2020. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-06/2019_Annual_Enforcement_Report.pdf)

Table App. A-5. Cost per TRU or Applicable Facility (to be Collected Every 3 Years)

Total Annual TRU Program Cost	Average Annual Number of TRUs/Applicable Facilities Subject to Fees	Average Annual Number of Zero-Emission TRUs Subject to Fees	Cost per TRU/Applicable Facility (every 3 years)	Cost per Zero-Emission TRU (every 3 years)
$3,524,868	81,201	1,965	$43	$22

The fee calculation is based on estimated population numbers and compliance rates. Staff may amend the fee amounts in a future rulemaking if collected fees do not fully cover CARB's costs for activities associated with the TRU program.

Appendix B: Macroeconomic Modeling Inputs

Table App. B-1 presents the specific inputs used in the REMI modeling for the Proposed Regulation. Staff adjusted costs from 2019 to 2018 dollars when input into the REMI model.

Table App. B-1. REMI Inputs

REMI Policy Variable	Industry	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Production Cost	Truck Transportation (484)	0.00	25.75	35.72	51.34	80.49	102.77	106.74	103.89	93.74	77.52	56.21	44.54	40.09
Production Cost	Water Transportation (483)	0.00	2.92	2.60	4.20	7.66	12.11	13.33	14.51	14.71	14.33	10.53	10.24	11.00
Production Cost	Rail Transportation (482)	0.00	0.41	0.56	0.97	1.79	2.46	2.73	2.88	2.85	2.55	2.20	2.17	2.05
Production Cost	Scenic And Sightseeing Transportation And Support Activities For Transportation (487, 488)	0.00	0.00	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.09	0.09
Production Cost	Warehousing And Storage (493)	0.00	0.21	2.35	2.39	2.52	2.46	2.50	2.65	2.58	2.62	2.78	2.71	2.75
Production Cost	Retail Trade (44-45)	0.00	0.37	0.55	0.56	0.75	0.58	0.59	0.79	0.61	0.62	0.83	0.64	0.65
Production Cost	Wholesale Trade (42)	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Exogenous Final Demand	Wholesale Trade (42)	0.00	31.22	41.84	31.92	63.40	47.26	37.13	16.50	-13.11	-13.69	-14.20	-14.51	-13.23
Exogenous Final Demand	Petroleum And Coal Products Manufacturing (324)	0.00	0.00	-1.66	-3.71	-5.44	-7.96	-10.03	-11.72	-12.71	-12.87	-13.17	-13.60	-13.93

REMI Policy Variable	Industry	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Exogenous Final Demand	Electric Power Generation, Transmission, And Distribution (2211)	0.00	0.00	2.38	5.54	8.33	12.69	16.53	20.16	22.68	23.47	23.82	24.17	24.59
Exogenous Final Demand	Construction (23)	0.00	3.60	4.56	3.85	6.00	5.01	4.57	2.88	0.49	0.50	0.50	0.51	0.52
Exogenous Final Demand	Other Electrical Equipment And Component Manufacturing (3359)	0.00	0.96	1.38	1.41	2.17	2.19	2.32	2.09	1.59	1.61	1.64	1.67	1.69
Exogenous Final Demand	Management, Scientific, And Technical Consulting Services (5416)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exogenous Final Demand	Office Administrative Services, Facilities Support Services (5611, 5612)	0.00	0.32	3.01	3.05	3.10	3.15	3.20	3.25	3.31	3.36	3.41	3.47	3.52
State And Local Government Spending	State Government Spending	0.00	1.35	1.50	0.71	1.69	0.54	-0.27	-1.50	-2.96	-3.02	-3.08	-3.14	-3.14
State And Local Government Spending	Local Government Spending	0.00	1.59	2.14	1.70	3.27	2.57	2.16	1.22	-0.18	-0.18	-0.20	-0.22	-0.16
State And Local Government Employment	State Government Employment	0.00	7.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00	14.00

REMI Policy Variable	Industry	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Consumer Spending	Reallocate Consumption: Hospitals	0.00	-0.03	-0.06	-0.10	-0.14	-0.19	-0.26	-0.32	-0.36	-0.38	-0.39	-0.41	-0.43

Appendix C

Summary and Response to Department of Finance Comments on the Standardized Regulatory Impact Assessment

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Date of Release: July 27, 2021
Date of Hearing: September 23, 2021

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Summary and Response to Department of Finance (DOF) Comments on the Standardized Regulatory Impact Assessment (SRIA)

DOF Comment #1: The costs of equipment disposal must be quantified. Because existing ATCM regulations prevent sale of non-complying TRUs within California, the revised emissions and zero-emission requirements will effectively decrease or eliminate the resale value of existing equipment that was complying under the existing ATCM requirements within California. Based on CARB's 2019 Emissions Inventory for Transport Refrigeration Units, historically around 20 percent of non-complying non-truck TRUs are replaced rather than retrofit and all truck TRUs must be replaced, which means around 45,000 of the original 200,000 TRUs will either need to be scrapped or sold interstate when they become non-compliant and the SRIA should quantify the costs associated with this.

Response: Because the current TRU ATCM imposes more stringent emissions requirements on TRUs operating in California compared to those that do not, TRU owners already scrap or sell their units for use out-of-state when they become non-compliant for use in California. Under the Proposed Amendments, the PM emission standard requirement applies to newly-manufactured units, while the zero-emission truck TRU requirement is phased in at 15 percent each year. The zero-emission truck TRU phase-in compliance schedule generally aligns with the average 7-to-10-year useful life for truck TRUs. Therefore, staff do not believe TRU turnover would be significantly accelerated due to the Proposed Amendments. Scrap and resale values should not be considerably affected. Based on current listings, truck TRUs can be sold out-of-state for $6,450 to $10,000 and trailer TRUs can be sold out-of-state for $7,500 to $16,400, depending on the model year and engine hours. Because the SRIA provides an upper bound estimate on costs, staff conservatively did not assume any cost savings associated with scrap and resale.

DOF Comment #2: The SRIA could be improved by including a more explicit discussion of the anticipated state revenues that would be generated by the proposed operating and facility registration fees that CARB proposes to collect from TRU owners. Furthermore, the SRIA notes an estimated $48 million in fee revenue would be collected over the lifetime of the regulation, yet CARB's implementation and enforcement costs are estimated to be only $19.4 million. The SRIA should clarify how the remaining fee revenue would be utilized by CARB.

Response: Staff have updated the economic analysis since the release of the SRIA on May 12, 2021. The changes include increasing the number of CARB staff needed to implement and enforce the Proposed Amendments and updating the salary amount used for the Staff Services Manager I position. These changes resulted in an increase of proposed TRU operating and applicable facility operating fees. In the SRIA, the TRU operating fee for a diesel TRU was $43, the TRU operating fee for a zero-emission TRU

is $22, and the applicable facility registration fee is $43. In the updated proposal, the TRU operating fee for a diesel TRU is $54, the TRU operating fee for a zero-emission TRU is $27, and the applicable facility registration fee is $54. Staff also updated the analysis to account for additional costs to CARB, including the indirect labor cost and operational cost (e.g., compliance labels, envelopes, and postage) expected as a result of the Proposed Amendments. More information on these costs can be found in Appendix G.

As a result of the updates, staff estimate that CARB's TRU program costs would be $47.1 million from 2022 to 2034. Approximately $60.8 million in fee revenue would be collected by CARB. However, the proposed fee amounts in the Proposed Amendments would not result in excess fee revenue. The approximate $13.7 million difference is due to existing TRU program labor costs not associated with the Proposed Amendments, and therefore not accounted for in the SRIA, as well as the required SRIA assumption of full compliance.

To determine the fee amounts, staff accounted for non-compliance since it is reflective of actual conditions. This results in a more accurate estimate of the number of TRUs and facilities that would comply with the fee requirements and the resulting fee revenue that CARB would collect. Staff used a non-compliance rate based on the average of non-reporting assumed in the statewide TRU inventory and the percentage of citations issued by CARB's Enforcement Division for non-reporting violations in 2019 equal to approximately 13 percent. Because the economic analysis assumes full compliance, the estimated fee revenue collected over the lifetime of the regulation would be less than what is presented in the SRIA. Table 1 shows the difference between the estimated TRU program cost and fee revenue, which is due to the non-compliance rate accounted for in the proposed fee calculations.

Table 1. Difference Between Estimated TRU Program Cost and Fee Revenue from 2022 to 2034

TRU Program Component	Estimated Cost or Estimated Cost Difference
Existing Labor Cost (Not included in SRIA)	$5,958,000
New Labor and Operational Cost	$47,137,000
Total TRU Program Cost	$53,095,000
Estimated Fee Revenue (Assuming 100% Compliance as Required by SRIA)	$60,820,000

TRU Program Component	Estimated Cost or Estimated Cost Difference
Difference Between Total TRU Program Cost and Fee Revenue (Assuming 100% Compliance as Required by SRIA)	$7,725,000
% Difference (Equal to Non-Compliance Rate)	13%

DOF Comment #3: The SRIA could be improved by including actual data for 2020 when it becomes available or using the most up-to-date data available. The current baseline assumption of significant turnover in 2020 results in nearly double the capital costs in 2027 ($120 million compared to an average of $65 million in all other years) because there are double the number of non-truck TRUs that need to take compliance actions in that year (around 40,000 in 2027 compared to an average of 20,000 in all other years). Updating the analysis would be helpful as the costs and benefits appear to be impacted significantly by the share of TRUs assumed to be non-compliant. Alternatively, the SRIA could include a separate scenario analysis with different assumptions on the share of non-compliant TRUs that need to come to compliance in 2020 to illustrate how impacts would vary if the share of non-compliant TRUs in 2020 were higher or lower than the 2018 rate.

Response: For the SRIA, staff used the legal baseline of full compliance with existing regulations by assuming that all non-complying TRUs are replaced in 2020 and the most up-to-date data available at the time of SRIA development. Staff agree that costs and benefits are impacted by the number of TRUs assumed to be non-compliant and that the analysis should be based on the most up-to-date data available. As newer data becomes available, staff will consider updating the analysis or adding a sensitivity analysis to determine how impacts would vary if the share of non-compliant TRUs in 2020 were higher or lower than the 2018 rate for inclusion in the Final Statement of Reasons.

Appendix D

Draft Supplemental Environmental Analysis

For the Proposed

Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

California Air Resources Board
1001 I Street
Sacramento, California 95814

Date of Release: July 27, 2021

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Tables

Figures

Attachments

List of Abbreviations

AB	Assembly Bill
APE	area of potential effect
ATCM	Airborne Toxic Control Measure
BAU	business-as-usual
BLM	Bureau of Land Management
Board	California Air Resources Board
CAL FIRE	California Department of Forestry and Fire Protection
CARB	California Air Resources Board
CCR	California Code of Regulations
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CPUC	California Public Utilities Commission
dBA	A-weighted decibels
diesel PM	diesel particulate matter
Draft Supplemental EA	draft supplemental environmental analysis
EIR	environmental impact report
EO	Executive Order
FTA	Federal Transit Administration
GHG	greenhouse gas
GWP	global warming potential
HDV	heavy-duty vehicle
HFC	hydrofluorocarbon
in/sec	inch per second

L_{eq}/L_{max}	equivalent noise level/maximum noise level
LOS	levels of service
LCFS	Low Carbon Fuel Standard
$MMTCO_2e$	million metric tons of CO_2 equivalent
NAAQS	national ambient air quality standards
NOx	oxides of nitrogen
NPDES	National Pollution Discharge Elimination System
$PM_{2.5}$	fine particulate matter
PPV	peak particle velocity
PRC	Public Resources Code
Proposed Amendments or Proposed Project	Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate
SB	Senate Bill
State SIP Strategy EA	EA for the State SIP Strategy
State SIP Strategy	Revised Proposed 2016 State Strategy for the State Implementation Plan
SWPPP	stormwater pollution prevention plan
TAC	toxic air contaminant
TCR	Tribal Cultural Resource
TRU	Transport Refrigeration Units
U.S. EPA	United States Environmental Protection Agency
ULETRU	ultra-low emission transport refrigeration unit
VdB	vibration decibels
VMT	vehicle miles travelled

1.0 Introduction and Background

A. Introduction

This draft supplemental environmental analysis (Draft Supplemental EA) is a program environmental document prepared to cover the Proposed Amendments to the Airborne Toxic Control Measure (ATCM) for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities where TRUs Operate (Proposed Amendments or Proposed Project). This Draft Supplemental EA is Appendix D to the staff report that will be presented to the California Air Resources Board (CARB or the Board) for consideration. The Project Description section of this Draft Supplemental EA presents a summary of the Proposed Amendments, as defined under the California Environmental Quality Act (CEQA). A detailed description of the Proposed Amendments is included in the "Staff Report: Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled TRU and TRU Generator Sets, and Facilities where TRUs Operate," (Staff Report) date of release July 27, 2021, which is hereby incorporated by reference.

This Draft Supplemental EA is intended to identify and disclose the Proposed Amendments' potential significant impacts on the environment and identify potential feasible mitigation measures and alternatives to lessen or avoid those significant environmental impacts. The Proposed Amendments are intended to create environmental benefits related to greenhouse gas (GHG) reductions and air quality improvements. However, in some cases, as described in Chapter 4 of this Draft Supplemental EA, potentially significant effects to environmental resources may occur due to implementation of compliance responses associated with the Proposed Amendments. It is expected that many of these potentially significant impacts can be feasibly avoided or mitigated to a less-than-significant level, as described in each resource area, due to project-specific environmental review processes associated with compliance responses and compliance with local and State laws and regulations. However, the Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient to mitigate an impact to less than significant or may not be implemented by other parties) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable.

B. Scope of Analysis and Assumptions

CARB has determined that a Supplemental EA is the appropriate kind of environmental document for evaluation of the Proposed Amendments. A Supplemental EA may be prepared when any of the following circumstances exist (Title 17 California Code of Regulations [CCR] Section 60004.3(a), Title 14 CCR Section 15162(a)):

- Substantial changes are proposed in the project which will require major revisions of the previous EA due to the involvement of new significant environmental

effects or a substantial increase in the severity of previously identified significant effects.

- Substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EA due to the involvement of new significant environmental effects or substantial increase in the severity of previously identified significant effects.

- New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EA was certified as complete shows the project will have one or more significant effects not discussed in the previous EA; significant effects previously examined will be substantially more severe than shown in the previous EA; or mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponent declines to adopt the mitigation measure or alternative; or, mitigation measures or alternatives that are considerably different from those analyzed in the previous EA would substantially reduce one or more significant effects on the environment, but the project proponent declines to adopt the mitigation measure or alternative.

The Proposed Amendments were initially included in the Revised Proposed 2016 State Strategy for the State Implementation Plan (State SIP Strategy). CARB certified an EA for the State SIP Strategy (State SIP Strategy EA) in March 2017; that EA is incorporated by reference into this Draft Supplemental EA for the Proposed Amendments. The State SIP Strategy EA discussed TRUs in the category of off-road equipment. Potential compliance responses included (CARB 2017a):

- Increase in manufacturing, production, and use of zero-emission technology, requiring the construction or modification of associated manufacturing facilities to increase supply of this technology, including electric hybrid or full battery electric-powered equipment.

- Increased demand for lithium batteries that could increase production, along with increases in lithium mining and exports from source countries or other states.

- Construction of new facilities or modifications to existing facilities to accommodate battery recycling.

- Construction of new cold storage facilities or expansion of modification of existing cold storage facilities.

The State SIP Strategy EA evaluated the potential impacts of these compliance responses. As described in Section 2, Project Description, additional compliance responses are now anticipated, including installation of fueling infrastructure to support

cryogenic transport refrigeration systems, increased manufacturing of metal cold plates, and construction of fuel cell manufacturing facilities. Therefore, CARB has decided to prepare a Draft Supplemental EA for the Proposed Amendments. This Draft Supplemental EA contains only the information necessary to supplement the State SIP Strategy EA so that it is adequate for the Proposed Amendments (Title 17 CCR Section 60004.3(b)).

The analysis of potentially significant adverse environmental impacts of the Proposed Amendments is based on the following assumptions:

1. This analysis addresses the potentially significant adverse environmental impacts resulting from implementing the Proposed Amendments compared to existing conditions (see Chapter 2, "Project Description").

2. The analysis of environmental impacts and determinations of significance are based on reasonably foreseeable compliance responses taken in response to implementation of the Proposed Amendments.

3. The analysis in this Draft Supplemental EA addresses environmental impacts both within California and outside the State to the extent they are reasonably foreseeable and do not require speculation.

4. The level of detail of impact analysis is necessarily and appropriately general because the Proposed Amendments are programmatic, in nature, because they apply, generally, to all potential regulated stakeholders. While the general locations of TRU owners and operators covered under the Proposed Amendments are known within California, decisions by the regulated entities regarding compliance options are unknown. Furthermore, attempting to predict decisions by entities regarding the specific location and design of infrastructure undertaken in response to implementation of the Proposed Amendments would be speculative at this stage due to the influence of other business and market considerations in those decisions. Since it would be speculative to predict the type and extent of development associated with potential compliance responses, it follows that any potential environmental impacts from this development are uncertain at this point. As a result, without adequate information about impacts, there is inherent uncertainty in the degree of mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in this Draft Supplemental EA.

   Notwithstanding the speculative nature of trying to predict specific compliance-response development inspired by the Proposed Amendments, for the sake of full disclosure, CARB staff identified, generally, potential types of development that could potentially occur in response to the Proposed Amendments. Though CARB staff acknowledges that CARB has no jurisdiction over land-use decisions, it, nonetheless, recommends several mitigation

measures that lead agencies should consider to mitigate potential environmental impacts associated with individual, compliance-response inspired projects.

Since only the lead agencies have the jurisdiction to enforce these mitigation measures, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be implemented by the lead agency with authority to do so, or may not be sufficient to mitigate an impact to less than significant) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is also possible that the amount of mitigation necessary to reduce environmental impacts to below a significant level may be less than disclosed in this Draft Supplemental EA for any specific compliance response. Specific development projects undertaken to implement the Proposed Amendments would undergo project-level environmental review as required and CEQA compliance processes at the time they are proposed. It is expected that potentially significant impacts of many individual development projects not yet identified at this stage would be avoidable or mitigable to less than significant, consistent with CEQA.

5. This Draft Supplemental EA generally does not analyze site-specific impacts when the location of future facilities or other infrastructure changes are speculative. However, the Draft Supplemental EA does examine regional (e.g., air district and/or air basin) and local issues to the degree feasible, where appropriate. As a result, the impact conclusions in the resource-oriented sections of Chapter 4, Impact Analysis and Mitigation Measures, cover broad types of impacts, considering the potential effects of the full range of reasonably foreseeable actions undertaken in response to the Proposed Amendments.

The degree of specificity required in a CEQA document corresponds to the degree of specificity inherent in the underlying activity it evaluates. An EA for broad programs cannot be as detailed as an EA for specific construction projects that follow the broad program (Title 14 CCR Section 15146(b)). For example, the assessment of a construction project would be naturally more detailed than one concerning the adoption of a local general plan because construction-related effects can be predicted with more accuracy (Title 14 CCR Section 15146(a)). Because this analysis addresses a broad program, a general level of detail is appropriate. However, this Draft Supplemental EA makes a rigorous effort to evaluate significant adverse impacts and beneficial impacts of the reasonably foreseeable compliance responses that could result from implementation of the Proposed Amendments and contains as much information about those impacts as is currently available, without being unduly speculative. The scope of analysis in this Draft Supplemental EA is intended to help focus public review and comments on the Proposed Amendments and ultimately to inform the Board of the environmental benefits and adverse impacts of the proposal.

C. Background Information on the TRU ATCM

To date, California has made significant progress towards meeting federal air quality attainment standards and Assembly Bill (AB) 32 goals of reducing GHG emissions to 1990 levels by 2020; however, California must continue making progress beyond 2020 to meet goals established by Senate Bill (SB) 32, the SIP, and other established State goals. Key State goals are:

- Federal health-based ambient air quality standards (with key milestones in 2023 and 2031),
- 40 percent reduction in GHG emissions from the 1990 levels by 2030,
- 80 percent reduction in GHG emissions below 1990 levels by 2050,
- 40 percent reduction in methane and hydrofluorocarbon (HFC) emissions below 2013 levels by 2030,
- 50 percent reduction in black carbon emissions below 2013 levels by 2030,
- 50 percent petroleum reduction target by 2030,
- 100 percent zero-emission from off-road vehicles and equipment operations by 2035, and
- Continued reductions in criteria air pollutants and toxic air contaminants (TACs) to protect public health.

Meeting these goals requires a bold transformation in all sectors, including industrial, residential, electricity, and transportation.

CARB adopted the TRU ATCM on February 26, 2004, with amendments in 2010 and 2011, to reduce diesel particulate matter (diesel PM) pollutant emissions. TRUs are powered by diesel internal combustion engines and designed to refrigerate or heat perishable products transported in insulated trucks, trailers, shipping containers, or railcars. TRU generator sets are internal combustion engine-powered generators designed to provide electric power to electrically-driven refrigeration units of any kind. Significant numbers of these units congregate at refrigerated warehouses or distribution centers, grocery stores, seaport facilities, intermodal railyards, and other facilities, emitting diesel PM pollutant emissions, a TAC, creating a health risk for those that live nearby.

The TRU ATCM requires that TRU engines that operate in California, including out-of-state TRUs while they are operating in California, meet specific performance standards. The TRU ATCM includes provisions of in-use performance standards with two levels of stringency that were phased-in over time. The first phase, beginning in 2008,

is the low emission TRU performance standards. The second phase, beginning in 2010, is the ultra-low emission TRU (ULETRU) performance standards.

CARB amended the TRU ATCM in 2010 and 2011. The 2010 amendments covered all TRU or TRU generator set original equipment manufacturers that directly or indirectly sell or offer for sale TRUs and TRU generator sets to the California market. They also included more stringent definitions for compliance. The 2011 amendments extended certain TRU performance standard compliance deadlines from those originally contained in the 2004 regulation to improve enforceability. The TRU ATCM is fully implemented. TRU owners have the following compliance options under the TRU ATCM:

- Use a TRU equipped with an engine that meets the United States Environmental Protection Agency (U.S. EPA) Tier 4 final emission standards for 25-50 horsepower engines (meets ULETRU).

- Retrofit the existing TRU with a Level 3 Verified Diesel Emission Control Strategy with 85 percent PM control (meets ULETRU).

- Use an alternative technology that eliminates TRU diesel engine operation (and emissions) while at a facility. Alternative technologies include electrification, cryogenic refrigeration systems, alternative fuel systems, exclusive use of alternative diesel fuel, fuel cell-powered refrigeration systems, and other technologies that eliminate emissions while at a facility (meets ULETRU).

- Replace the existing unit (engine and refrigeration system) with a new TRU equipped with an engine that meets the U.S. EPA Tier 4 final off-road emission standards for less than 25 horsepower engines, which would be in compliance until the seventh year after the replacement TRU's engine model year (does not meet ULETRU).

The TRU ATCM is working in conjunction with several other CARB regulations to reduce TAC emissions throughout the State. Importantly, the State SIP Strategy included a proposed measure for TRUs as part of the off-road equipment category (CARB 2017b). The Proposed Amendments aim to be consistent with and meet the goals of the SIP, providing necessary emission reductions for all of California's nonattainment areas to meet national ambient air quality standards (Health and Safety Code Sections 39002, 39003, 39602.5, 43000, 43000.5, 43013, 43018).

A detailed description of the Proposed Amendments is contained in Section 2.0, "Project Description."

D. Environmental Review Process: Requirements under the California Air Resources Board Certified Regulatory Program

CARB is the lead agency for the Proposed Amendments and has prepared this Draft Supplemental EA pursuant to its CEQA certified regulatory program. California Public Resources Code [PRC] Section 21080.5 allows public agencies with regulatory programs to prepare a "functionally equivalent" or substitute document in lieu of an environmental impact report or negative declaration, once the program has been certified by the Secretary for Resources Agency as meeting the requirements of CEQA. CARB's regulatory program was certified by the Secretary of the Resources Agency in 1978 (Title 14 CCR Section 15251(d)). As required by CARB's certified regulatory program, and the policy and substantive requirements of CEQA, CARB prepared this Draft Supplemental EA to assess the potential for significant adverse and beneficial environmental impacts associated with the Proposed Amendments and to provide a succinct analysis of those impacts (Title 17 CCR Section 60004.2). The resource areas from the CEQA Guidelines (Title 14 CCR Section 15000 et. seq.) Environmental Checklist (Appendix G of that document) were used as a framework for assessing potentially significant impacts.

CARB has determined that approval of the Proposed Amendments is a "project" as defined by CEQA. CEQA defines a project as "the whole of an action, which has a potential for resulting in either a direct physical change in the environment, or a reasonably foreseeable indirect physical change in the environment, and that is an activity directly undertaken by any public agency (Title 14 CCR Section 15378(a))." Although the policy aspects of the Proposed Amendments do not directly change the physical environment, indirect physical changes to the environment could result from reasonably foreseeable compliance responses taken in response to implementation actions identified in the Proposed Amendments. In addition, some of the construction activities undertaken to comply with this Proposed Amendments may also be part of California electric utilities projects mandated by the Clean Energy and Pollution Reduction Act (SB 350).

As required by CEQA, this Draft Supplemental EA contains "an environmental analysis of the reasonably foreseeable methods by which compliance with that rule or regulation will be achieved (Title 14 CCR Section 15378)." The analysis shall include reasonably foreseeable environmental impacts of the methods of compliance, reasonably foreseeable feasible mitigation measures related to significant impacts, and reasonably foreseeable alternative means of compliance that would avoid or eliminate significant impacts.

E. Organization of the Draft Supplemental EA

The Draft Supplemental EA is organized into the following chapters to assist the reader in obtaining information about the Proposed Amendments and its specific environmental issues.

- **Chapter 1, Introduction and Background,** provides a project overview and background information, and other introductory material.

- **Chapter 2, Project Description,** summarizes the Proposed Amendments, the potential reasonably foreseeable compliance responses taken in response to the Proposed Amendments, and implementation assumptions.

- **Chapter 3, Environmental and Regulatory Setting,** contains the environmental and regulatory setting relevant to the environmental analysis of the Proposed Amendments.

- **Chapter 4, Impact Analysis and Mitigation,** identifies the potential environmental impacts associated with the Proposed Amendments and mitigation measures for each resource impact area.

- **Chapter 5, Cumulative and Growth-Inducing Impacts,** analyzes the potential for cumulative effects of implementing the Proposed Amendments against a backdrop of past, present, and reasonably foreseeable future projects.

- **Chapter 6, Mandatory Findings of Significance,** discusses the potential for adverse impacts on human beings, cumulatively considerable environmental impacts, and whether the Proposed Amendments would have the potential to degrade the quality of the environment.

- **Chapter 7, Alternatives Analysis,** discusses a reasonable range of potentially feasible alternatives that could reduce or eliminate adverse environmental impacts associated with the Proposed Amendments.

- **Chapter 8, References,** identifies sources of information used in this Draft Supplemental EA.

F. Public Review Process for the Environmental Analysis

On July 31, 2019, CARB issued a Notice of Preparation for the Proposed Amendments, announcing that it would prepare an EA. At public workshops held on August 28, 2019; September 3, 2019; and September 11, 2019, CARB staff discussed proposed regulatory activities for drafting the Proposed Amendments. Staff also described plans to prepare a Draft Supplemental EA for the Proposed Amendments and invited public feedback on the scope of environmental analysis.

In accordance with CARB's certified regulatory program, and consistent with CARB's commitment to public review and input on regulatory actions, this Draft Supplemental EA is subject to a public review process. The Staff Report, which includes this Draft Supplemental EA, is posted for a public review period that begins on July 30, 2021 and ends on September 13, 2021. This period complies with the requirement for a minimum of 45 days of public review. (Title 17 CCR, section 60004.2(b)(2).)

2.0 Project Description

A. Objectives

Recognizing the need to attain the national ambient air quality standards (NAAQS) and California ambient air quality standards for criteria air pollutants, reduce exposure to TACs, and reduce GHG emissions, the primary objectives of the Proposed Amendments are the following:

1. Achieve reductions of oxides of nitrogen (NOx), fine particulate matter ($PM_{2.5}$), GHG, diesel particulate matter (diesel PM), black carbon, and HFC emissions from TRUs to provide public health benefits in communities near facilities that are heavily burdened by freight pollution.

2. Achieve the maximum emission reductions possible from TRUs to attain the NAAQS for criteria air pollutants (Health and Safety Code Sections 43000.5[b], 43018[a]).

3. Develop a regulation that is consistent with and meets the goals of the SIP, providing necessary emission reductions for all of California's nonattainment areas to meet NAAQS (Health and Safety Code Sections 39002, 39003, 39602.5, 43000, 43000.5, 43013, 43018).

4. Reduce the State's dependence on petroleum as an energy resource and support the use of diversified fuels in the State's transportation fleet (Health and Safety Code Section 43000[e], PRC Section 25000.5). In addition, petroleum use as an energy resource contributes substantially to the following public health and environmental problems: air pollution, acid rain, global warming, and the degradation of California's marine environment and fisheries (PRC Section 25000.5[b], [c]).

5. Decrease GHG emissions in support of statewide GHG reduction goals by limiting the use of internal-combustion-engine-powered TRUs, as identified in the Scoping Plan, which was developed to reduce GHG emissions in California, as directed by AB 32 (Ch. 488, Stats. of 2006, Nuñez). CARB's 2017 Climate Change Scoping Plan and 2016 Mobile Source Strategy aim to accelerate development and deployment of the cleanest feasible mobile source technologies and to improve access to clean transportation. Implementation of the Proposed Project would also provide further GHG reductions pursuant to AB 1493 (Ch. 200, Stats. of 2002, Pavley).

6. Maintain and continue reductions in emissions of GHGs beyond 2020, in accordance with AB 32 and SB 32 (Health and Safety Code Sections 38551[b], 38562, 38562.5, 38566), and pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's

mandate to reduce GHG emissions to the 1990 level by 2020 and 40 percent below the 1990 level by December 31, 2030.

7. Decrease HFC emissions through the use of lower global warming potential (GWP) refrigerants in TRUs, in accordance with Senate Bill 1383 (Health and Safety Code Section 39730.5), which requires a 40-percent reduction of HFC emissions below 2013 levels by 2030.

8. Lead the transition of California's off-road sector to zero-emission technology.

9. Complement existing programs and plans to ensure, to the extent feasible, that activities undertaken pursuant to the measures complement, and do not interfere with, existing planning efforts to reduce GHG emissions, criteria pollutants, petroleum-based transportation fuels, and TAC emissions.

10. Achieve emission reductions that are real, permanent, quantifiable, verifiable, and enforceable (Health and Safety Code Sections 38560, 38562[d][1]).

11. Improve zero-emission technologies for TRUs and fueling infrastructure to guide the acceleration of the development of environmentally superior TRUs that will continue to deliver the performance, practicality, and safety demanded by the market.

12. Ensure that all Californians can live, work, and play in a healthful environment free from harmful exposure to air pollution. Protect and preserve public health and well-being, and prevent irritation to the senses, interference with visibility, and damage to vegetation and property (Health and Safety Code Section 43000[b]) in recognition that the emission of air pollutants from motor vehicles is the primary cause of air pollution in many parts of the State (Health and Safety Code Section 43000[a]).

B. Description of Proposed Project and Reasonably Foreseeable Compliance Responses

1. TRU Reporting Requirements

a) Summary

Beginning December 31, 2023, CARB staff are proposing that owners report all truck TRUs, trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets operating in California to CARB. This includes California-based and out-of-state-based units.

b) Compliance Responses

This requirement is administrative and would not result in any direct or indirect environmental impacts.

2. Applicable Facility Registration and Reporting Requirements

a) Summary

Beginning December 31, 2023, CARB staff are proposing that owners of applicable facilities register their facility with CARB and choose one of two reporting options:

- Option 1: Report all TRUs that operate at their facility to CARB, or
- Option 2: Attest that only compliant TRUs operate at their facility.

Applicable Facilities include refrigerated warehouses or distribution centers with a building size greater than or equal to 20,000 square feet, grocery stores with a building size greater than or equal to 15,000 square feet, seaport facilities, and intermodal railyards if one or more trailer TRUs or TRU generator sets operate within the legal property boundary of the facility.

b) Compliance Responses

This requirement is administrative and would not result in any direct or indirect environmental impacts.

3. Lower Global Warming Potential Refrigerant Requirement

a) Summary

Beginning December 31, 2022, CARB staff are proposing that all newly-manufactured truck TRUs, trailer TRUs, and domestic shipping container TRUs use refrigerant with a GWP less than or equal to 2,200, or no refrigerant at all.

b) Compliance Responses

Reasonably foreseeable compliance responses associated with a lower-GWP refrigerant requirement could include changes in refrigerant manufacturing for new TRUs. Lower-GWP refrigerant would be introduced through natural turnover (i.e., replacement of existing units with new units that use refrigerant with a GWP less than or equal to 2,200, or no refrigerant at all). The current predominantly-used refrigerant in TRUs is R-404A. Despite being non-ozone depleting, R-404A refrigerant has a high GWP value of 3,922, which is above the proposed threshold of 2,200. R-452A refrigerant is a hydrofluoroolefin-based replacement for R-404A. Like R-404A, R-452A is non-ozone depleting, but has a lower GWP of 2,140 and will meet the proposed threshold. R-452A is a "design-compatible" replacement for R-404A because it offers similar levels of refrigeration performance, fuel efficiency, reliability, and refrigerant charge (Refrigerated Transporter 2017). Because TRUs using R-452A refrigerant are currently commercially available from both of the two major TRU manufacturers (Carrier Transicold 2020, Fleet Owner 2017), staff anticipate that TRUs with lower-GWP refrigerant will be manufactured at current facilities and production lines. Therefore, the use of lower-GWP refrigerants under this measure would not produce demand that could not be met by existing manufacturing facilities; therefore, the construction or expansion of new manufacturing facilities would not be required. No direct or indirect

adverse environmental impacts would be likely to occur. As a result, these compliance responses are not evaluated further in this Draft Supplemental EA.

4. PM Emission Standard Requirement

a) Summary

Beginning December 31, 2022, CARB staff are proposing that model year 2023 and newer trailer TRU, domestic shipping container TRU, railcar TRU, and TRU generator set engines meet a PM emission standard of 0.02 grams per brake horsepower-hour. Model year 2022 and older trailer TRU, domestic shipping container TRU, railcar TRU, and TRU generator set engines will continue to operate under the seven-year compliance deadline provided in the existing TRU ATCM requirements, in which they must meet ULETRU by December 31st of the seventh year after the engine model year.

b). Compliance Responses

Reasonably foreseeable compliance responses associated with the PM emission standard requirement could include changes in engine manufacturing. This would include improvements in technologies related to exhaust after treatment and/or engine performance. Such changes would be accommodated within the footprint of existing manufacturing facilities and production lines. Use of engines that meet the PM standard under this measure would not produce demand that could not be met by existing manufacturing facilities because two major TRU manufacturers capture a majority of the market and either produce a product that meets the requirement or intend to develop one. It is presumed these manufacturers would continue to capture a majority of the market; therefore, the construction or expansion of new manufacturing facilities would not be required. New units meeting the new PM standard would be introduced through natural turnover (i.e., replacement of existing units with new units equipped with engines that meet the PM standard). No new manufacturing facilities would be anticipated to be required. No direct or indirect adverse environmental impacts would likely occur. As a result, these compliance responses are not evaluated further in this Draft Supplemental EA.

5. Zero-Emission Technology Requirements

a) Summary

Beginning December 31, 2023, CARB staff are proposing that truck TRU fleets turnover at least 15 percent each year (for 7 years) to zero-emission technology. All truck TRUs operating in California must be zero-emission by December 31, 2029.

b) Compliance Responses

i) Batteries

The most likely compliance response for truck TRUs is the purchase of battery-electric TRUs and installation of supporting electrical infrastructure at approximately 1,000 truck

TRU home base facilities statewide. This is based on stakeholder input,[1] and that many products require TRUs to both heat and cool to maintain a stable temperature while controlling humidity and promoting adequate airflow, which other technologies are not capable of. This response would result in an increase in the manufacturing of battery-electric TRUs and in the construction of associated facilities to support the supply of battery-electric TRUs, as well as the construction of new battery-electric TRU charging stations to support operations throughout the State. Increased deployment of battery-electric TRUs could displace energy consumption in the form of fossil fuel combustion to the State's electricity grid, resulting in increased production of electricity and reduced rates of oil and gas extraction. Increased demand for lithium-ion batteries could result in the expansion or construction of new facilities, along with associated increases in lithium mining and exports from source countries or other states. For lithium-ion batteries, it is anticipated they would still have some useful life at the end of TRU life and are likely to be repurposed for a second life.

Disposal of any portion of TRUs, including portions of lithium-ion batteries that could not be repurposed, would be subject to and have to comply with existing laws and regulations governing solid and hazardous waste, such as California's Hazardous Waste Control laws (Health and Safety Code, Division 20, Chapter 6.5; 22 CCR, Division 4.5), and implementing regulations, such as the Universal Waste Rule (22 CCR Division 4.5, Chapter 23). Disposal of used batteries into solid waste landfills is prohibited; however, they could be refurbished, reused, or disposed of as hazardous waste. To meet an increased demand of refurbishing or reusing batteries, new facilities or modifications to existing facilities may be constructed to accommodate battery-recycling activities.

Fleet turnover would be largely unaffected. The annual 15 percent phase-in compliance schedule generally aligns with the average 7-to-10-year useful life for a truck TRU. Therefore, the proposed purchase requirement would not require a significant number of accelerated purchases.

ii) Solar Assist

Existing deployments of zero-emission truck TRUs use solar panels to extend the operating range of the TRU, in which the energy collected by the solar-assist system is used to directly run the refrigeration system or refuel the batteries. While this is a voluntary measure to extend range, given the current commercial adoption of solar assist units for zero-emission truck TRUs, it is expected that truck TRU fleet operators will continue to use them as they comply with the Proposed Amendments. High efficiency monocrystalline silicone solar photovoltaic cells are mounted on top of the refrigerated truck's roof to capture solar irradiation and convert it to electricity. A solar charge controller is used to optimize the power coming from the photovoltaic cells and manage the electric power delivery to the on-board deep-cycle absorbed glass mat or battery. Use of solar assist could result in the increased production of solar photovoltaic panels, requiring the construction of new or the modification of existing manufacturing

[1] Stakeholder comments during TRU Infrastructure Work Group Meeting on December 17, 2019.

facilities. Installation of solar assist systems on TRUs would require the use of minor construction equipment.

iii) Cold Plates

Eutectic cold plate TRU systems have been commercially available and in use for more than 50 years. Cold plate systems consist of a sheet metal shell, with cooling coils built inside, which holds the eutectic fluid. The fluid used in cold plates is a mixture of water and salts (e.g., sodium and potassium salts) that form a eutectic solution that has the lowest possible melting/freezing point. Cold plates are similar to the gel packs used in lunch boxes and ice chests, but larger. The cold plates are mounted on the ceiling and/or interior walls, or as partitions in the cargo area. Before perishable products are loaded, the TRU is plugged into base power and runs until the plates are frozen. After the plates are frozen and the product is loaded, the TRU is unplugged, and the truck begins the refrigerated deliveries.

Cold plate technology is already being used successfully in TRU operations. Cold plate refrigeration systems provide cooling for daily runs of 10–12 hours and are feasible only for fleets that return each day to base, where refueling infrastructure could be installed.

Use of this technology could result in an increase in manufacturing of metal cold plates, requiring new or modified production plants. Increased use would also require the installation of supporting electrical infrastructure at locations where daily refueling of cold plates could occur. These installations would be implemented within the footprint of existing facilities that would support refueling. These locations would be on previously disturbed land and consistent with applicable zoning. Increased cold plate use would also generate increased demand for electricity, prompting the need for more electricity generation. However, reliance on fossil fuels for energy would decrease as would the associated environmental impacts related to their extraction, refinement, manufacture, distribution, and combustion.

iv) Cryogenic

Cryogenic TRUs, use a cryogenic fluid (liquid carbon dioxide, liquid nitrogen, or liquid air) as the cooling agent, which replaces the diesel engine-driven refrigeration system utilized in a conventional TRU. The cryogenic fluid is contained in a refillable storage tank on the truck near the cargo space. When cooling is needed by the microprocessor controller, valves open to allow the liquid to flow from the tank into the evaporator coils, also called a heat exchanger, inside the cargo space. Electric fans circulate air through the coils. As the liquid evaporates, it cools the coil and the air passing over it. As a result, cool air is circulated through the cargo, maintaining the temperature set-point. Having cooled the coil and the air, the cryogenic fluid is directed outside the vehicle body into the atmosphere.[2]

Cryogenic transport refrigeration systems have been commercially available in Europe since the early 2000s. Even so, in the United States, this technology is in the pilot-scale

[2] Note that this byproduct does not contribute harmful emissions to the atmosphere.

deployment phase. Cryogenic TRUs are feasible for truck TRU fleets that return each day to base, where refueling infrastructure could be installed.

Use of this technology could result in the increased installation of cryogenic fueling infrastructure. These installations would be implemented within the footprint of existing facilities that would support refueling. These locations would be on previously disturbed land and consistent with applicable zoning. Increased demand for cryogenic TRUs would require increased production of cryogenic fluid, which is currently energy intensive. For this reason, the amount of fossil fuels that would be displaced because of the use of cryogenics is speculative—that is, some of the fuel savings realized from use of cryogenic technology could be offset by the fuel used during their manufacture, depending on the source of the energy for manufacturing.

v) Fuel Cells

Fuel cells are an emerging technology with potential application as an emissions-reducing technology for TRUs. Fuel cells convert the chemical energy of fuel, typically hydrogen or natural gas, to electricity through electrochemical reactions. If the fuel is natural gas, or if it is hydrogen obtained from the reformation of hydrocarbons (e.g., methane and methanol) the increased hydrocarbon use would offset some of the benefits from zero-emission TRU technology. For TRUs, fuel cells have been demonstrated. However, the high cost of the technology and limited availability of hydrogen fueling infrastructure need to be addressed prior to market acceptance. Fuel-cell-powered TRUs could be deployed in future years if the overall cost of the technology becomes viable, which could increase demand for these products, resulting in the construction and operation of new or expanded manufacturing facilities. However, this technology is not currently considered reasonably foreseeable given the stage of development.

C. Summary of Compliance Responses

Reasonably foreseeable compliance responses to the Proposed Project include the construction and operation of new or expanded manufacturing facilities for zero-emission TRU technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states. Equipment turnover would be largely unaffected because the proposed requirements would apply at the time of normal purchase and would not require any accelerated purchases.

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3.0 Environmental Setting

The CEQA Guidelines require an environmental impact report (EIR) to include an environmental setting section, which discusses the current environmental conditions near the project. This environmental setting constitutes the baseline physical conditions by which an impact is determined to be significant (Title 14 CCR Section 15125). For this Draft Supplemental EA, the CARB is using the baseline used in the prior environmental review to inform the evaluation required under CARB's certified regulatory program (see Title 17 CCR Section 60004.3(b)).

As discussed in Chapter 1 of this Draft Supplemental EA, CARB has a CEQA certified regulatory program and prepares an EA in lieu of an EIR. This Draft Supplemental EA is a functional equivalent to an EIR under CEQA; therefore, in an effort to comply with the policy objectives of CEQA, an environmental setting and a regulatory setting with environmental laws and regulations relevant to the Proposed Amendments have been included as Attachment A to this Draft Supplemental EA.

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4.0 Impact Analysis and Mitigation measures

A. Approach to Environmental Impact Analysis and Significance Determinations

This chapter contains an analysis of mitigation measures that could result from the Proposed Amendments. The baseline for the evaluation of impacts, as previously explained, is the baseline used in the State SIP Strategy EA.

Determinations reflected in this Draft Supplemental EA are based on the direction to provide only the information necessary to make the previous environmental analysis adequate for the project as revised (Title 17 CCR Section 60004.3). As a result, this analysis focuses on evaluating the following (Title 17 CCR Section 60004.3(a), title 14 CCR Section 15162(a)):

- Whether substantial changes are proposed in the project which will require major revisions of the previous EA due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects.

- Whether substantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EA due to the involvement of new significant environmental effects or substantial increase in the severity of previously identified significant effects.

- Whether new information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EA was certified as complete shows the project will have one or more significant effects not discussed in the previous EA; significant effects previously examined will be substantially more severe than shown in the previous EA; or mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponent declines to adopt the mitigation measure or alternative; or, mitigation measures or alternatives that are considerably different from those analyzed in the previous EA would substantially reduce one or more significant effects on the environment, but the project proponent declines to adopt the mitigation measure or alternative.

To determine whether the Proposed Amendments would have a potential effect on the environment that is new or substantially more severe than previously analyzed, CARB evaluated the potential physical changes to the environment resulting from the reasonably foreseeable compliance responses described in further detail in Chapter 2 of this EA.

1. Adverse Environmental Impact

The analysis of adverse effects on the environment and significance determinations for those effects reflect the programmatic nature of the analysis of the reasonably foreseeable compliance responses of the regulated entities and the marketplace. These reasonably foreseeable compliance responses are described in detail in Chapter 2. The Draft Supplemental EA addresses broadly defined types of impacts or actions that may be taken by others in the future as a result of the Proposed Amendments.

CARB does not have the ability or need to determine which specific projects (e.g., charging infrastructure) would occur at potentially thousands of locations, or the size and character of new or modified manufacturing facilities. CARB undertook an analysis of TRU home base locations as part of a process to determine the potential need for compliance extensions because locations were important for understanding what kinds of delays might be expected. This information was used to estimate the potential number of compliance extensions that might be needed. Although some home base locations were evaluated for the purpose of quantifying potential extensions, using these scenarios to inform the CEQA analysis would be insufficient because it is an incomplete set of information and is limited to home base locations studied for the sake of defining the potential need for compliance extensions. Furthermore, assuming what could occur at each location is not considered to be "reasonably foreseeable" as defined under CEQA, as various other projects could also occur. Attempting a location-specific analysis for the thousands of potential project locations in California would provide information that could be misleading since CARB has no way to predict which projects may occur where. Actual project locations would be driven by business-making decisions based on what is best for a given company and their operations using data unique to each location. CARB does not have access to, nor a practical way of obtaining or analyzing that specific type of information. Therefore, this EA does not contain location-specific analyses, although it does provide information on typical impacts that would result from the various technologies and other compliance responses anticipated to occur. Because these details cannot be known, CARB does not need to determine site-specific environmental characteristics affected by potential future manufacturing facilities and other infrastructure needed to accommodate the demand for zero-emission TRUs created by Proposed Amendments.

This Draft Supplemental EA takes a conservative approach and considers some environmental impacts as potentially significant because of the inherent uncertainties in the relationship between physical actions that are reasonably foreseeable under the Proposed Amendments and environmentally sensitive resources or conditions that may be affected. This approach tends to overstate environmental impacts considering these uncertainties and is intended to satisfy the good-faith, full-disclosure intention of CEQA. If specific projects are proposed and subjected to project-level environmental review, it is expected that many of the impacts recognized as potentially significant in the Draft Supplemental EA that are not already mitigated or avoided with this proposed approval, can later be avoided or reduced to a less-than-significant level. If a potentially significant environmental effect cannot be feasibly mitigated with certainty, this Draft Supplemental EA identifies

the impact as significant and unavoidable. Thus, if the Board adopts the Proposed Amendments with one or more significant and unavoidable environmental effect identified in this Draft Supplemental EA, the Board would adopt findings as part of the approval action for each significant impact in addition to a statement of overriding considerations (i.e., other benefits of the action including economic, legal, social, and technological are determined to outweigh and override its significant unavoidable effects).

2. Mitigation Measures

The Draft Supplemental EA contains a degree of uncertainty regarding implementation of feasible mitigation for potentially significant impacts. "'Feasible' means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors." (PRC Section 21061.1) While CARB is responsible for adopting the Proposed Amendments, it does not have authority over all the potential infrastructure and development projects that could be carried out in response to the Proposed Amendments. Other agencies are responsible for the review and approval, including any required environmental analysis, of any facilities and infrastructure that are reasonably foreseeable, including any definition and adoption of feasible project-specific mitigation measures, and any monitoring of mitigation implementation. For example, local cities or counties must review and decide to approve proposals to construct new facilities; CARB does not have jurisdiction over land use permitting of any potential development associated with the compliance responses. (Cal. Const., Article XI, section 7 ["A county or city may make and enforce within its limits all local, police, sanitary, and other ordinances and regulations not in conflict with general laws."]; California Building Industry Assn. v. City of San Jose (2015) 61 Cal.4th 435, 455; Big Creek Lumber Co. v. County of Santa Cruz (2006) 38 Cal.4th 1139, 1151-1152; HSC sections 39000-44474 [CARB's statutory authority provides no authority to regulate local land use permitting].) Additionally, State and/or federal permits may be needed for specific environmental resource impacts, such as take of endangered species, filling of wetlands, and streambed alteration.

Because CARB cannot predict the location, design, or setting of specific projects that may result and does not have authority over implementation of specific infrastructure projects that may occur, the programmatic analysis in the Draft Supplemental EA does not allow for identification of the precise details of project-specific mitigation. As a result, there is inherent uncertainty in the degree of feasible mitigation that would ultimately need to be implemented to reduce any potentially significant impacts identified in the Draft Supplemental EA.

Given the foregoing, and due to legal factors affecting the feasibility of CARB's proposed mitigation for several of the identified potential significant indirect impacts associated with the Proposed Amendments, CARB's implementation of the identified mitigation measures is infeasible, based on the following: 1) the lack of certainty of the scope, siting and specific design details of compliance-response development projects,

which prevents CARB from being able to determine the projects' significant environmental impacts; and 2) even there was certainty with respect to compliance-response development projects and associated significant environmental impacts, CARB lacks the legal authority and jurisdiction to permit these projects, which, inherently, prevents CARB from legally imposing any enforceable mitigation measures on the projects. Therefore, CARB's implementation of the mitigation measures suggested, below, in this EA are legally infeasible to implement and enforce.

Consequently, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusions (i.e., tending to overstate the risk that feasible mitigation may not be sufficient to mitigate an impact to less than significant) and discloses, for CEQA compliance purposes, that potentially significant environmental impacts may be unavoidable, where appropriate. It is also possible that the amount of mitigation necessary to reduce environmental impacts to below a significant level may be far less than disclosed in this Draft Supplemental EA on a case-by-case basis. It is expected that many potentially significant impacts of facility and infrastructure projects would be avoidable or mitigatable to a less-than-significant level as an outcome of their project-specific environmental review processes, conducted by the appropriate permitting agency with jurisdiction as the lead agency under CEQA. Note that, because this is a Draft Supplemental EA, application of State SIP Strategy EA mitigation measures is appropriate for certain impacts. Where State SIP Strategy EA mitigation measures are applied for significant impacts, a reference is included to the State SIP Strategy EA mitigation title.

Where applicable, consistent with CARB's certified regulatory program requirements (Title 17 CCR Section 60004.2), this Draft Supplemental EA also acknowledges potential beneficial effects on the environment in each resource area that may result from implementation of the Proposed Amendments.

B. Resource Area Impacts and Mitigation Measures

The following discussion provides a programmatic analysis of the reasonably foreseeable compliance responses that could result from implementation of the Proposed Amendments, described in Chapter 2 of this Draft Supplemental EA.

1. Aesthetics

Impact 1-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Aesthetics

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or

modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Landscape character can be defined as the visual and cultural image of a geographic area. It consists of the combination of physical, biological, and cultural attributes that make each landscape identifiable or unique. Visual character may range from predominately natural to heavily influenced by human development. Its value is related, in part, to the importance of a site to those who view it. Viewer groups typically include residents, motorists, and recreationists.

Impact 1-1 of the State SIP Strategy EA describes the short-term construction-related and long-term operational impacts on aesthetics. The analysis states that new or expanded manufacturing and recycling facilities, new infrastructure, and increased mining would introduce new construction equipment, staging areas, sources of nighttime lighting, ground disturbance, vegetation removal, and the introduction of new permanent structures that could alter the visual character of a landscape of scenic significance. However, Impact 1-1 of the State SIP Strategy EA indicates that it would be possible that some of the reasonably foreseeable compliance responses could be accomplished with minimal ground-disturbing activity. For lithium mining, the increased demand for lithium-ion batteries could cause additional lithium extracting resulting in adverse visual effects in areas where hard rock mining (Australia) and brine extraction activities (e.g., Chile, Argentina, Bolivia, and the United States) occur.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have aesthetic impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related and long-term operational impacts on aesthetics would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific aesthetic impacts associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them

to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any aesthetic impacts from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 1-1: Implement State SIP Strategy EA Mitigation Measure 1-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to aesthetics. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized general practices routinely required to avoid and/or minimize impacts to aesthetic resources include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project.

- The project proponent would color and finish the surfaces of all project structures and buildings visible to the public to: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The project proponent would submit a surface treatment plan to the lead agency for review and approval.

- To the extent feasible, the sites selected for use as construction staging and laydown areas would be areas that are already disturbed and/or are in locations of low visual sensitivity. Where feasible, construction staging and laydown areas for equipment, personal vehicles, and material storage would be sited to take advantage of natural screening opportunities provided by existing structures,

topography, and/or vegetation. Temporary visual screens would be used where helpful if existing landscape features did not screen views of the areas.

- All construction, operation, and maintenance areas would be kept clean and tidy, including the re-vegetation of disturbed soil and storage of construction materials and equipment would be screened from view and/or are generally not visible to the public, where feasible.

- Siting projects and their associated elements next to important scenic landscape features or in a setting for observation from State scenic highways, national historic sites, national trails, and cultural resources would be avoided to the greatest extent feasible.

- The project proponent would contact the lead agency to discuss the documentation required in a lighting mitigation plan, submit to the lead agency a plan describing the measures that demonstrate compliance with lighting requirements, and notify the lead agency that the lighting has been completed and is ready for inspection.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational impacts to aesthetics associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

2. Agriculture and Forestry Resources

Impact 2-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Agriculture and Forestry Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel

extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 2-1 of the State SIP Strategy EA describes the short-term construction-related and long-term operational impacts on agriculture and forestry resources. The analysis states that new or expanded manufacturing and recycling facilities, new infrastructure, and increased mining would likely occur in areas of compatible zoning (e.g., industrial); however, there exists the potential that Prime Farmland, Unique Farmland, Farmland of Statewide Importance, Williamson Act conservation contracts, and forest land or timberlands could be converted to industrial uses.

Impact 2-1 states that, while it is reasonable to anticipate that land use policies controlling the location of new industrial facilities would generally avoid conversion of important agricultural land, the potential cannot be entirely dismissed. If a facility were located on important farmland or property under a Williamson Act Contract, conversion of the agricultural land to urban uses could occur.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have agriculture and forest impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related and long-term operational impacts on agriculture and forestry resources would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific agriculture and forestry impacts associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of

any agriculture and forestry impacts from these future projects. Because implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 2-1: Implement State SIP Strategy EA Mitigation Measure 2-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to agriculture and forestry. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize agriculture and forestry resource impacts include:

- Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the environmental impacts of the project. Because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. Any mitigation specifically required for a new or modified facility would be determined by the lead agency and future environmental documents by local and State lead agencies should include analysis of the following:

    - Avoidance of lands designated as Important Farmlands (State defined Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) as defined by the Farmland Mapping and Monitoring Program.

    - Analysis of the feasibility of using farmland that is not designated as Important Farmland prior to deciding on the conversion of Important Farmland.

    - The feasibility, proximity, and value of the proposed project sites should be balanced before a decision is made to locate a facility on land designated as Important Farmland.

- Any action resulting in the conversion of Important Farmlands should consider mitigation for the loss of such farmland. Any such mitigation should be completed prior to the issuance of a grading or building permit by providing the permitting agency with written evidence of completion of the mitigation. Mitigation may include but is not limited to:

- Permanent preservation of off-site Important Farmland (State defined Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) of equal or better agricultural quality, at a ratio of at least 1:1.

    - Preservation may include the purchase of agricultural conservationeasement(s); purchase of credits from an established agricultural farmland mitigation bank; contribution of agricultural land or equivalent funding to an organization that provides for the preservation of farmland towards the ultimate purchase of an agricultural conservation easement.

    - Participation in any agricultural land mitigation program, including local government maintained, that provides equal or more effective mitigation than the measures listed.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational impacts to agriculture and forestry resources associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

3. Air Quality

Impact 3-1: Short-Term Construction-Related Effects to Air Quality

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for

electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 3-1 of the State SIP Strategy EA summarizes the potential short-term air quality impacts associated with construction activities. Although the specific location, type, and number of construction activities is not known, site grading and excavation activities would generate criteria air pollutants and TACs. For example, fugitive PM dust emissions, which is the primary pollutant of concern during construction, would be created. Exhaust emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips could also contribute to short-term increases in PM emissions, but to a lesser extent. Exhaust emissions from construction-related mobile sources also include reactive organic gases (ROGs) and NOx, which are precursors to ozone formation. These emission types and associated levels fluctuate greatly depending on the particular type, number, and duration of usage for the varying equipment. As discussed under State SIP Strategy EA Impact 3-1, these short-term emissions could contribute to the degradation of local and regional air quality, expose sensitive receptors to substantial pollutant concentrations, and conflict with applicable air quality plans.

Future construction emissions would be evaluated against an applicable threshold of significance established by the local air district. The types and severity of construction impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have air quality impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related impacts on air quality would be potentially significant as identified in the State SIP Strategy EA.

In connecting an air district's thresholds of significance to its anticipated date of attainment, projects that demonstrate levels of construction-related criteria air pollutant emissions below the applicable thresholds would not result in emissions that would conflict with an area achieving future attainment status under the NAAQS and California ambient air quality standards (CAAQS) as outlined by an applicable air quality plan.

Similarly, projects that demonstrate criteria air pollutant emissions levels in exceedance of an applicable threshold could contribute to the continued nonattainment designation of a region or potentially degrade a region from attainment to nonattainment resulting in acute or chronic respiratory and cardiovascular illness associated with human exposure to concentrations of criteria air pollutants above what U.S. EPA and CARB consider safe. Symptoms can include coughing, difficulty breathing, chest pain, eye and throat irritation and, in extreme cases, death caused by exacerbation of existing respiratory and cardiovascular disease, cancer, and impaired immune and lung function. Additional information on criteria air pollutants, their health effects, and background on NAAQS and CAAQS is provided in Attachment A.

However, the exact location and magnitude of specific health impacts that could occur as a result of project-level construction-related emissions in specific air basins is infeasible to model with any degree of accuracy with the level of information known about the Proposed Amendments. CARB estimates premature death and other health effects related to PM and NOx exposure based on peer-reviewed methodology developed by U.S. EPA and quantifies health benefits of regulations and programs using an incidence-per-ton methodology. There is an approximate linear relationship between premature deaths and other health outcomes and emission concentrations (CARB 2019). This modeling requires characterizing a change in air quality occurring under a policy or other change. There is substantial uncertainty regarding the construction details about compliance responses that would be needed to evaluate health effects related to construction emissions. For example, it is not known if a certain kind of compliance response would be clustered in one area or another, or the degree of grading that would be needed for each project (which affects PM emissions), or the kind of construction equipment that would be used (which affects PM and NOx emissions) so that a total amount of emissions across the State can be obtained that could be used in the incidence-per-ton methodology. As a result, it is not feasible to associate specific health impacts with compliance response construction emissions for the Proposed Amendments. This contrasts with operational emissions, which represent the air quality benefits of the Proposed Amendments. The net emissions reductions resulting from operation of the compliance responses can be modeled and demonstrate a net decrease in emissions, as discussed under Impact 3-2, and therefore conclusions about operational health benefits can be and are made on a broader scale.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related impacts on air quality associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any short-term construction-related impacts on air quality from these future projects. Since implementation and enforcement of this

mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 3-1: Implement State SIP Strategy EA Mitigation Measure 3-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to air quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize air quality impacts include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project.

- Project proponents would apply for, secure, and comply with all appropriate air quality permits for project construction from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to construction mobilization.

- Project proponents would comply with the federal Clean Air Act (The Act) and the California Clean Air Act (e.g., New Source Review and Best Available Control Technology criteria, if applicable).

- Project proponents would comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., construction-related fugitive PM dust regulations, indirect source review, and payment into offsite mitigation funds).

- For projects located in PM nonattainment areas, prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if they approve these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to air quality associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA. While short-term construction impacts would be significant and unavoidable, the long-term operation-related effects to air quality described under Impact 3-2 would be beneficial, consistent with the objectives of the Proposed Amendments.

Impact 3-2: Long-Term Operation-Related Effects to Air Quality

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, hydrogen fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 3-2 of the State SIP Strategy EA summarizes long-term operation-related effects to air quality and states that the proposed measures would result in substantial long-term reductions in criteria air pollutants and TACs, concluding that effects to air quality would be beneficial.

For the Proposed Amendments, staff determined the air quality CEQA baseline[3] is the 2019 emission level (referred to as the "2019 existing conditions" or "2019 Baseline") under the current level of compliance of TRUs subject to the TRU ATCM. The 2019 Baseline does not represent 100 percent compliance with the existing regulation; therefore, staff has determined that the level of emissions under current conditions provides the most accurate and informative baseline for CEQA analyses. The rate of emission reductions expected from the Proposed Amendments is compared to the 2019 existing conditions. CARB estimates TRU emissions in California using the statewide TRU emission inventory model. To model non-compliance, the inventory uses historical trends for units that did not comply with the TRU ATCM and is based on data reported in the Air Resources Board Equipment Registration program. Based on 2011 through 2018 reporting data, the modeled compliance rate in 2019 and in future years is 89 percent. The data sources and methodology used in the statewide TRU emission inventory model are described in Appendix H to the Staff Report.

While it is not possible to forecast precisely future levels of noncompliance, the compliance rate assumed in the emission inventory is based on multiple years of reporting data. Staff have made a good faith effort to anticipate and disclose the emissions levels assuming the current level of compliance is carried forward through the period analyzed in this EA (2019–2040). CARB staff has elected to include both a current baseline and future baseline in this Air Quality analysis to provide the public and the decision-maker (the Board) with the most accurate picture practically possible of the Proposed Amendments' beneficial impacts on air quality.

Based on CARB's current data on TRU production and sales, there has been a consistent trend of TRU growth due, in large part, to population growth and increased online and offline deliveries and the transport of temperature sensitive products that require the use of TRUs. While there is relative uncertainty about the actual future TRU population growth given the fluctuations of economic conditions over time, CARB expects TRU emission levels to follow along with the historical TRU growth trends. Even with this trend of growth in TRUs, the existing TRU ATCM would provide emissions reductions below the 2019 existing conditions, which is illustrated in Figure 4.B-1 and 4.B-2, below, with the exception of NOx emissions eventually exceeding the 2019 existing conditions mid-decade in the 2030s. CARB characterizes these emission reduction levels in the future as the business-as-usual (BAU) scenario. The BAU scenario is provided in addition to the 2019 existing conditions because it is useful for understanding ongoing benefits to air quality as it considers emissions that would occur under the current regulatory environment. As shown in Figure 4.B-1 and Figure 4.B-2, BAU emissions are anticipated to fluctuate and be less than 2019 existing conditions (i.e., baseline) over time.

[3] The CEQA baseline for determining the existence of any new or more significant adverse air quality or greenhouse gas impact is normally the existing environmental conditions at the time the analysis is conducted (14 CCR 15125).

Figure 4.B-1: $PM_{2.5}$ Emissions Projections with Forecasted TRU Population Growth

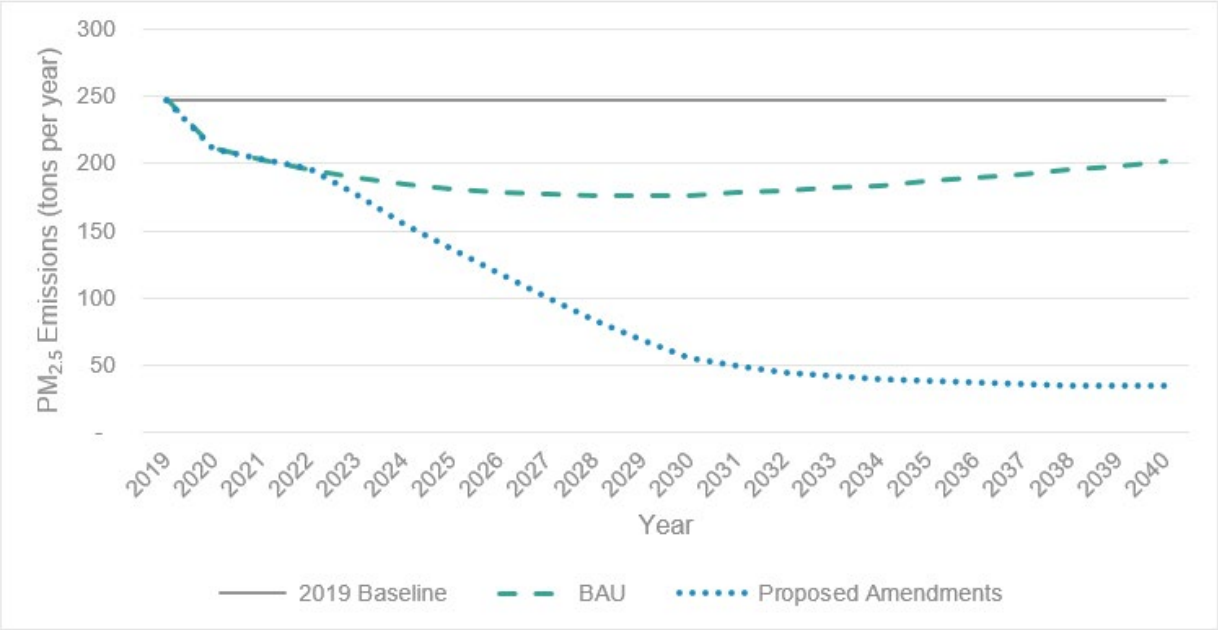
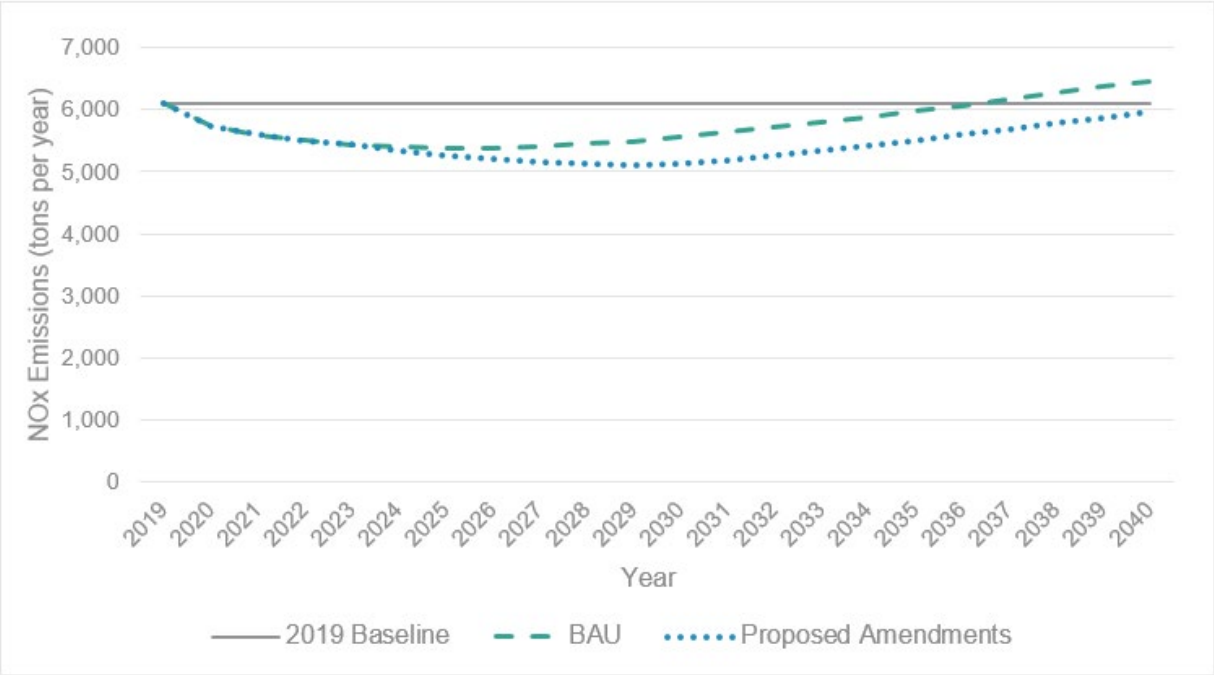


Figure 4.B-2: NOx Emissions Projections with Forecasted TRU Population Growth



Additionally, assuming the existing TRU population remained the same from 2019 onward, the Proposed Amendments would result in even more $PM_{2.5}$ and NOx emission reductions relative to the 2019 baseline as compared to the reductions that include the potential forecasted TRU population growth. This is due to a significant reduction in $PM_{2.5}$ and NOx emissions per existing TRU unit when comparing the $PM_{2.5}$ and NOx emissions per unit under the 2019 baseline and the emissions under the Proposed Amendments; the Proposed Amendments result in lower $PM_{2.5}$ and NOx emissions per TRU unit than the $PM_{2.5}$ and NOx emissions per TRU unit under the 2019 Baseline. Figures 4.B-3 and 4.B-4 summarize the $PM_{2.5}$ and NOx emissions under the 2019 existing conditions, a BAU scenario, and the Proposed Amendments without forecasted TRU population growth. In sum, the Proposed Amendments would reduce $PM_{2.5}$ and NOx emissions from diesel-powered TRUs relative to the 2019 existing conditions and the BAU scenario.

Figure 4.B-3: $PM_{2.5}$ Emissions Projections without Forecasted TRU Population Growth

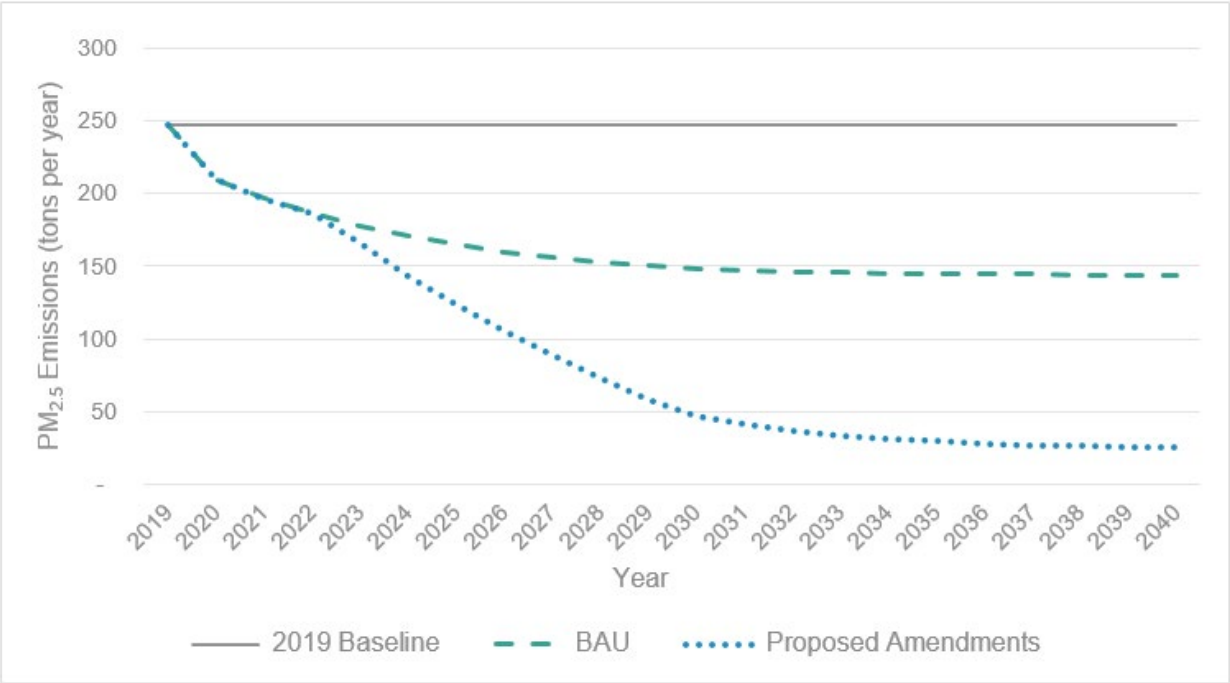
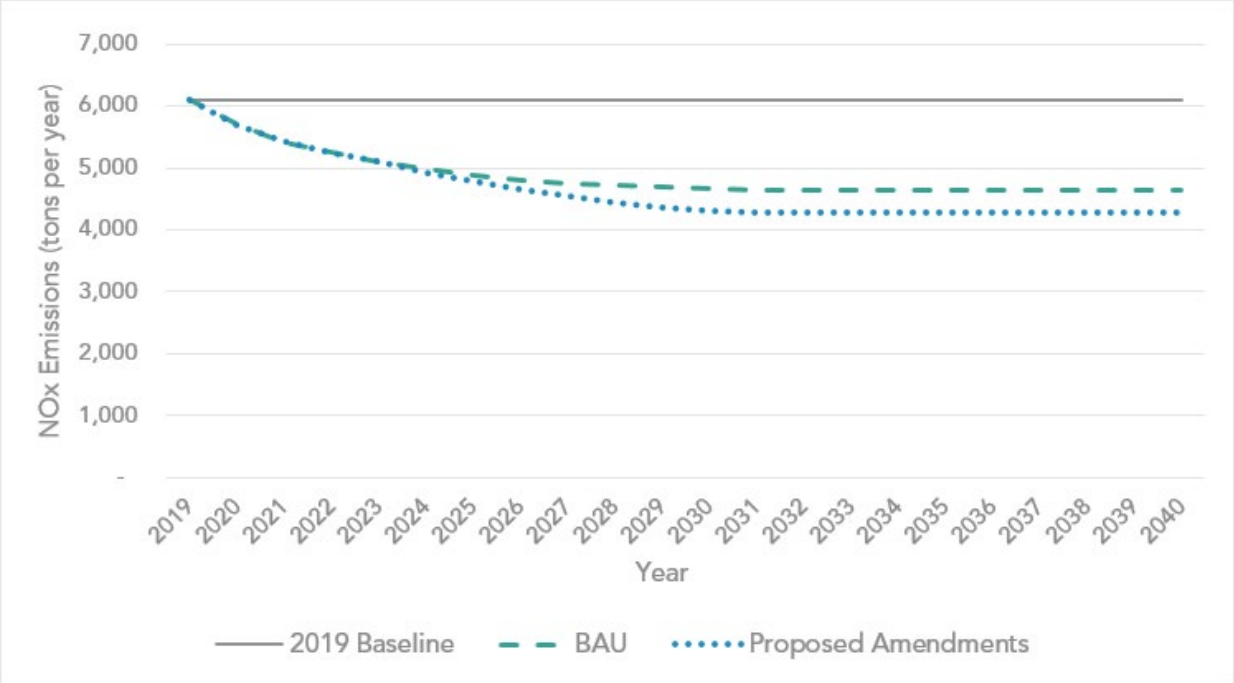


Figure 4.B-4: NOx Emissions Projections without Forecasted TRU Population Growth



The $PM_{2.5}$ emission benefits of the Proposed Amendments relative to 2019 existing conditions are greater than those relative to the BAU scenario. Compared with 2019 existing conditions, the Proposed Amendments result in $PM_{2.5}$ emission reductions beyond what would be achieved in the BAU scenario starting in 2023 because the Proposed Amendments require newly-manufactured trailer TRU, domestic shipping container TRU, railcar TRU, and TRU generator set engines to meet a more stringent diesel PM emission standard. The Proposed Amendments result in $PM_{2.5}$ and NOx emission reductions in 2024 when TRU owners would be required to transition 15 percent of their truck TRU fleet to zero-emission technology. In addition, the zero-emission technologies required under the Proposed Amendments will help create economies-of-scale and assist with reducing costs for the future advanced technology deployment in other sectors to further help achieve the emission reduction goals identified in the State SIP Strategy (CARB 2017a). Refer to Appendix H to the Staff Report for emissions modeling details.

Table 4.B-1 and Table 4.B-2 show the emission benefits from the Proposed Amendments with forecasted TRU population growth for $PM_{2.5}$ and NOx for the calendar year 2019, 2025, 2030, 2035, and 2040. Table 4.B-3 and Table 4.B-4 show the emission benefits from the Proposed Amendments without forecasted TRU population growth for $PM_{2.5}$ and NOx in the same years. By 2040, $PM_{2.5}$ and NOx emissions would be reduced by 83 percent and 8 percent, respectively, as compared to the BAU scenario. Reductions compared to the 2019 existing conditions would be greater, as shown in Figure 4.B-1 and Figure 4.B-2, and the Proposed Amendments would reduce an eventual increase in NOx emissions projected in the BAU scenario as shown in Figure 4.B-2.

Table 4.B-1: $PM_{2.5}$ Emission Benefits from the Proposed Amendments with Forecasted TRU Population Growth (Tons per Year)

Year	BAU Emissions	Emissions Under Proposed Amendments	Emission Benefits††	Percent Emission Reduction††
2019†	247	247	0	0%
2025	182	136	46	25%
2030	177	55	122	69%
2035	187	38	149	80%
2040	201	35	166	83%

† The 2019 BAU emissions reflect the "2019 existing conditions" or "2019 Baseline."
†† The benefits shown are relative to BAU, and the benefit relative to the 2019 existing conditions would be higher.

Table 4.B-2: NOx Emission Benefits from the Proposed Amendments with Forecasted TRU Population Growth (Tons per Year)

Year	BAU Emissions	Emissions Under Proposed Amendments	Emission Benefits††	Percent Emission Reduction††
2019†	6,108	6,108	0	0%
2025	5,378	5,258	120	2%
2030	5,557	5,127	430	8%
2035	5,970	5,505	465	8%
2040	6,462	5,959	503	8%

† The 2019 BAU emissions reflect the "2019 existing conditions" or "2019 Baseline."
†† The benefits shown are relative to BAU, and the benefit relative to the 2019 existing conditions would be higher.

Table 4.B-3: $PM_{2.5}$ Emission Benefits from the Proposed Amendments without Forecasted TRU Population Growth (Tons per Year)

Year	BAU Emissions	Emissions Under Proposed Amendments	Emission Benefits††	Percent Emission Reduction††
2019†	247	247	0	0%
2025	165	124	41	25%
2030	148	47	101	68%
2035	145	29	116	80%
2040	144	25	119	83%

† The 2019 BAU emissions reflect the "2019 existing conditions" or "2019 Baseline."
†† The benefits shown are relative to BAU, and the benefit relative to the 2019 existing conditions would be higher.

Table 4.B-4: NOx Emissions Benefits from the Proposed Amendments without Forecasted TRU Population Growth (Tons per Year)

Year	BAU Emissions	Emissions Under Proposed Amendments	Emission Benefits††	Percent Emission Reduction††
2019†	6,108	6,108	0	0%
2025	4,889	4,781	108	2%
2030	4,667	4,306	361	8%
2035	4,631	4,271	360	8%
2040	4,631	4,270	361	8%

† The 2019 BAU emissions reflect the "2019 existing conditions" or "2019 Baseline."
†† The benefits shown are relative to BAU, and the benefit relative to the 2019 existing conditions would be higher.

Operation of new and modified facilities for manufacturing and fueling zero-emission TRUs would consume fuel over the long-term, emitting criteria air pollutants. Fuel would be consumed, for example, to provide electricity during the manufacturing process and for general building operation (e.g., lighting; heating, ventilation, and air-conditioning

(HVAC) systems). Additionally, vehicle trips for employees and materials would consume fuel. Increased demand for lithium batteries could increase production, lithium mining, and exports from source countries or other states, which would require of fuel consumption for mineral extraction, processing, and transport. The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have air quality impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. However, since there is no substantial evidence that can precisely identify project-specific impacts from potential compliance-response development projects due to the unknown nature of these projects, the identified emissions benefits from the Proposed Amendments cannot be counterweighed, without speculation, against any potential long-term operational air quality impacts from these projects. Therefore, given the substantial reductions of criteria air pollutants from implementation of the Proposed Amendments as compared to the BAU scenario and 2019 existing conditions, there would be a net decrease in criteria pollutant emissions, as discussed above. This decrease in criteria pollutant emissions is expected to result in a reduction in adverse health outcomes, particularly in communities near facilities that are heavily burdened by freight pollution. These reduced adverse health outcomes include cardiopulmonary mortality, hospital admissions for cardiovascular and respiratory illnesses, and emergency room visits for asthma. Thus, long-term operational impacts on air quality would be **beneficial** as identified in the State SIP Strategy EA.

New and modified facilities would not include activities or processes that are associated with major odor sources (e.g., landfills). Thus, implementation of the Proposed Amendments would not create objectionable odors affecting a substantial number of people. Additionally, diesel fuel exhaust from diesel-powered TRUs can create objectionable odors, and the increased use of zero-emissions technology would decrease diesel-fueled exhaust emissions and associated odors over time. As a result, odor impacts could be **beneficial**.

4. Biological Resources

Impact 4-1: Short-Term Construction-Related Effects to Biological Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and

increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 4-1 of the State SIP Strategy EA evaluated short-term construction-related effects to biological resources. Impact 4-1 states that the construction of new manufacturing plants and zero and near-zero emission infrastructure would result in ground disturbance that could adversely affect biological resources, and the biological resources affected would depend on the specific location of the compliance responses. These impacts would occur from modifications to existing habitat including the removal, degradation, and fragmentation of riparian systems, wetlands, and/or other sensitive natural wildlife habitats and plant communities; interference with wildlife movement or wildlife nursery sites; loss of special-status species; and/or conflicts with the provisions of adopted habitat conservation plans, natural community conservation plans, or other conservation plan or policies to protect natural resources.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have biological resources impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related impacts on biological resources would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related impacts on biological resources associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any short-term construction-related impacts on biological resources from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 4-1: Implement State SIP Strategy EA Mitigation Measure 4-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to biological resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize biological resource impacts include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant biological resources impacts of the project.

- Actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

    - Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning will require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.

    - Retain a qualified biologist to prepare a wetland survey of onsite resources. This survey shall be used to establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 404 of the Clean Water Act and is administered by the U.S. Army Corps of Engineers.

    - Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices.

- Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail.

- Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources, and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board.

- Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as appropriate to protect against the inadvertent release of potentially toxic materials.

- Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with "no net loss" requirements.

- Contractor will keep the site and materials organized and store them in a way to prevent attracting wildlife by not creating places for wildlife to hide or nest (e.g., capping pipes, covering trashcans and emptying trash receptacles consistently and promptly when full).

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to biological resources associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

Impact 4-2: Long-Term Operation-Related Effects to Biological Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels,

cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 4-2 of the State SIP Strategy EA summarizes the anticipated operation-related impacts to biological resources from the reasonably foreseeable compliance responses listed above. Adverse operational impacts to biological resources would likely occur primarily from increased mining activity associated with increased demand for lithium batteries to power zero and near-zero technologies. As discussed under State SIP Strategy EA Impact 4-2, hard rock and continental brine mining activities would directly alter the character of a sensitive habitat that may support special-status species or serve as a wildlife corridor. Impacts could include reduction in habitat, loss of special-status species, water contamination, and conflict with a habitat conservation plan or natural community conservation plan.

Additionally, long-term operation of new manufacturing and recycling facilities would often include the presence of workers; movement of automobiles, trucks, and heavy equipment; and operation of stationary equipment. This environment would not be conducive to the presence of biological resources located on-site or nearby. For example, operation of a new facility could deter wildlife from the surrounding habitat or could impede wildlife movement through the area. This impact would be substantial if there is not adequate habitat nearby. Vegetation management may be necessary to comply with fire codes and defensible space requirements, which may require tree trimming and other habitat modification that could, for example, result in species mortality or nest failure.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and use of fueling infrastructure within existing facilities, which would have biological resources impacts similar to new and modified facilities. Thus, long-term operation-related impacts on biological resources would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, long-term operation-related impacts on biological resources associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation, noted below, that lead agencies can and should consider for mitigation of any long-term operation-related impacts on biological resources from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 4-2

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to biological resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize biological resource impacts include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant biological resources impacts of the project.

- Prohibit vegetation management activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring as needed to ensure that project activity does not cause an active nest to fail.
- Maintain site design and development plan features that avoid or minimize disturbance of habitat and wildlife resources and prevents stormwater discharge that could contribute to sedimentation and degradation of local waterways during project operation.

- Maintain and replace, as needed, replacement trees and permanently protected suitable habitat identified during the construction phase of the project.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operation-related impacts to biological resources under the Proposed Amendments would be **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

5. Cultural Resources

Impact 5-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Cultural Resources

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 5-1 of the State SIP Strategy EA evaluated the potential adverse impacts to cultural resources from the construction and operation of the reasonably foreseeable compliance responses. State SIP Strategy EA Impact 5-1 indicates that ground disturbance such as clearing of vegetation, earth movement and grading, trenching for

utility lines, erection of new buildings, and paving of lots and roadway associated with the construction of new infrastructure and facilities could damage cultural, prehistoric and historic sites, tribal cultural resources, paleontological resources, historic buildings, and heritage landscapes. The reasonably foreseeable compliance responses that could entail demolition activity (e.g., the construction of new manufacturing facilities on sites that support existing structures) could result in the loss of a historically or culturally significant structure. Impact 5-1 of the State SIP Strategy EA states that future new facilities could be located in a region where undocumented prehistoric or historic-era cultural resources may be found.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have cultural resources impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related and long-term operation-related impacts on cultural resources would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, impacts on cultural resources associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any impacts on cultural resources from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 5-1: Implement State SIP Strategy EA Mitigation Measure 5-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to cultural resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the

environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize cultural resource impacts include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant cultural resources impacts of the project. Actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

    - Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61.

    - Seek guidance from the State and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes.

    - Provide notice to Native American Tribes of project details to identify potential Tribal Cultural Resources (TCRs). In the case that a TCR is identified, prepare mitigation measures that:

        - Avoid and preserve the resources in place,

        - Treat the resource with culturally appropriate dignity,

        - Employ permanent conservation easements, and

        - Protect the resource.

    - Consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes.

    - Define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or

indirectly cause alterations in the character or use of historic properties. The APE should include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access.

- Retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures (Society of Vertebrate Paleontology 2010).

- Conduct initial scoping assessments to determine whether proposed construction activities would disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment should be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements.

- The project proponent's qualified paleontological resources specialist would determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources management and mitigation plan that addresses the following steps:

    - a preliminary survey (if not conducted earlier) and surface salvage prior to construction;

    - physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries;

    - monitoring and salvage during excavation;

    - specimen preparation;

    - identification, cataloging, curation and storage; and

- a final report of the findings and their significance.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operation-related impacts to cultural resources associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

6. Energy Demand

Impact 6-1: Short-Term Construction-Related Effects on Energy Demand

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 6-1 of the State SIP Strategy EA stated that implementation of the compliance responses would result in temporary increases in energy demand associated with new facilities from the combustion of fuels and natural gas during construction, as well as short-term electricity consumption. As summarized in Impact 6-1 of the State SIP Strategy EA, heavy-duty construction equipment including graders, scrapers, backhoes,

jackhammers, front-end loaders, generators, water trucks, and dump trucks would likely be used to construct new infrastructure and facilities. However, this energy consumption would be short-term in nature and would not be considered inefficient, wasteful, or unnecessary.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in construction of manufacturing facilities and installation of fueling infrastructure within existing facilities, which would require a short-term use of energy similar to new and modified facilities as discussed in the State SIP Strategy EA, in which the short-term energy use was found not to be inefficient, wasteful, or unnecessary. Thus, short-term construction-related energy impacts would remain **less than significant** as identified in the State SIP Strategy EA.

Impact 6-2: Long-Term Operation-Related Effects on Energy Demand

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA include increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

In Impact 6-2, the State SIP Strategy EA identified the following significance criteria derived from Appendix F of the State CEQA Guidelines (CCR, tit. 14, Section 15000 et seq.):

1. Decreasing overall per capita energy consumption;
2. Decreasing reliance on fossil fuel such as coal, natural gas, and oil; and
3. Increasing reliance on renewable energy sources.

Impact 6-2 of the State SIP Strategy stated that implementation of zero-emission vehicles and other technologies would increase the use of electricity and decrease the use of petroleum, which would support wise and efficient uses of energy resulting in beneficial long-term operation impacts on energy demand.

The State SIP Strategy EA does not specifically address cold plates as a compliance response, and the use of cold plate technology would increase electricity consumption. However, it is merely one means of achieving compliance with the Proposed Amendments and therefore, accounted for in the renewable energy consumption contemplated in the State SIP Strategy EA. As a result, the long-term operation-related energy impacts would continue to be **beneficial** as identified in the State SIP Strategy EA.

7. Geology and Soils

Impact 7-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Geology, Seismicity, and Soils

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 7-1 of the State SIP Strategy EA evaluated the short-term construction-related and long-term operation-related impacts to geology, seismicity, and soils from implementation of the reasonably foreseeable compliance responses listed above. Impact 7-1 sates that construction activities such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, mining, and paving of parking lots, delivery areas, and roadways would have the potential to adversely affect soil and geology resources. Impact 7-1 of the State SIP Strategy EA indicates that the location of new infrastructure and facilities constructed could be located on a variety of geologic, soil, and slope conditions; erosion potential; and seismic activity; however, the characteristic of future construction sites and designs of compliance responses are unknown at the time of writing this Draft Supplemental EA.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have geology, soils, and seismicity impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related and long-term operation-related impacts on geology, seismicity, and soils would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, impacts on geology, seismicity, and soils associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any impacts on geology, seismicity, and soils from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 7-1: Implement State SIP Strategy EA Mitigation Measure 7-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to geology and soils. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology, seismicity, and soils include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The

local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant geology and soils impacts of the project. Actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

    - Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, mineral resources, and the presence of hazardous materials.

    - Proponents of new or modified facilities or infrastructure would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible.

    - Disturbed areas outside of the permanent construction footprint would be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e., mulching).

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operation-related impacts to geology, seismicity, and soils associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

8. Greenhouse Gas Emissions and Climate Change

Impact 8-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Greenhouse Gas Emissions and Climate Change

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 8-1 of the State SIP Strategy EA evaluated the short-term construction-related and operation-related GHG emissions associated with the reasonably foreseeable compliance responses and their contribution to global climate change. State SIP Strategy EA Impact 8-1 summarizes the types of construction activity that would result in emissions of GHGs including use of earth-moving heavy-duty equipment such as graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. Additional construction-related sources of GHGs are vehicle emissions from construction worker commute and material transport trips. These GHG emissions are expected to be short-term and limited in their amount. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in construction of manufacturing facilities and installation of fueling infrastructure within existing facilities, which would have GHG emissions similar to new and modified facilities as discussed in the State SIP Strategy EA.

As stated in Impact 8-1 of the State SIP Strategy EA, construction-generated GHG emissions would be short-term in nature and would not be considered substantial when evaluated in the context of the long-term operation-related GHG reductions that would be realized through implementation of the SIP Strategy. With respect to the Proposed Amendments, which were evaluated as a component of the SIP Strategy, construction emissions would occur, and would also be reduced through mitigation efforts for air quality (i.e., TRU Draft Supplemental EA Mitigation Measure 3-1). Construction of these facilities would also ultimately support implementation of the Proposed Amendments,

which would result in long-term operational GHG reduction benefits for the reasons detailed below.

Implementation of the Proposed Amendments could result in an increase in manufacturing and associated facilities to increase the supply of zero-emission TRUs, along with construction of new fueling stations and electric charging stations to support zero-emission TRU operations. Increased deployment of zero-emission TRUs would result in a corresponding decrease in deployment of diesel-fueled TRUs. Likewise, increased deployment of zero-emission TRUs could result in a relatively small increase in production of electricity and cryogenic fuel, reduce rates of oil and gas extraction, and result in associated increases in lithium mining and exports from source countries or other states. This could result in increased rates of disposal of lithium batteries; however, disposal would need to comply with California law, including but not limited to California's Hazardous Waste Control Law and implementing regulations. For lithium-ion batteries, it is anticipated they would still have some useful life at the end of the TRU's life and are likely to be repurposed for a second life. To meet an increased demand of refurbishing or reusing batteries, new facilities or modifications to existing facilities could be constructed to accommodate recycling activities.

As discussed previously, the Proposed Amendments are expected to result in GHG emission reductions. Replacing diesel-powered truck TRUs with zero-emission truck TRUs and the use of lower-GWP refrigerant in newly-manufactured truck TRUs, trailer TRUs, and domestic shipping container TRUs would result in GHG emission reduction benefits. Figure 3 summarizes the GHG emissions in million metric tons of CO_2 equivalent ($MMTCO_2e$) under the 2019 existing conditions, the BAU scenario (which represents the projected emission reductions under the current level of compliance with the TRU ATCM), and the Proposed Amendments.

For the Proposed Amendments, using the current level of compliance of TRUs subject to the TRU ATCM, staff compared the GHG emissions impacts of the Proposed Amendments to the 2019 emission level (referred to as the "2019 existing conditions" or "2019 Baseline"), as well as the BAU scenario, which is a future baseline. The 2019 Baseline does not represent 100 percent compliance with the existing regulation; therefore, staff has determined that the level of emissions under current conditions provides the most accurate and informative baseline for CEQA analyses. Under the BAU scenario, staff used the current level of compliance and included forecasted annual TRU population growth to determine the projected emissions in the future under the existing TRU ATCM. CARB estimates TRU emissions in California using the statewide TRU emission inventory model. The data sources and methodology used in the statewide TRU emission inventory model are described in Appendix H to the Staff Report.

Although the Proposed Amendments are expected to achieve GHG emissions benefits for all TRUs that operate in California, TRUs in California will still generate higher statewide GHG emissions when compared to the 2019 Baseline. The observed increase in GHG emissions is due to TRU population growth, which the statewide TRU emission inventory assumes to be approximately 1.6 percent per year based on historical TRU

trends. Since the Proposed Amendments do not cause this TRU population growth which increases the GHG emissions projections higher than the 2019 baseline, the Proposed Amendments do not cause a GHG impact. Rather, for additional context, assuming the existing TRU population remained the same from 2019 onward, the Proposed Amendments would result in significant GHG emission reductions relative to the 2019 baseline. This is due to a reduction in GHG emissions per TRU unit when comparing the GHG emissions per unit under the 2019 baseline and the Proposed Amendments. In this scenario - using the 2019 TRU population as the basis for determining GHG impacts- the Proposed Amendments result in lower GHG emissions than the GHG emissions per unit under the 2019 Baseline.

The Proposed Amendments also have a GHG emissions benefit compared to a future baseline, identified as the BAU scenario. Even using the projected TRU population increase in California for this operational GHG impact analysis, staff expect the Proposed Amendments to reduce GHG emissions relative to the BAU scenario from 2019 to 2040. Similarly, this GHG emissions benefit is reflective of the per unit GHG reductions under the Proposed Amendments compared to those that would operate under the BAU scenario.

Figure 4.B-5 summarizes the GHG emissions in $MMTCO_2e$ under the 2019 existing conditions, the BAU scenario (which represents the projected emission reductions under the current level of compliance with the TRU ATCM), and the Proposed Amendments, assuming 1.6 percent population growth year-over-year for BAU and Proposed Amendment emissions projections.

Figure 4.B-5: GHG Emissions Projections with Forecasted TRU Population Growth

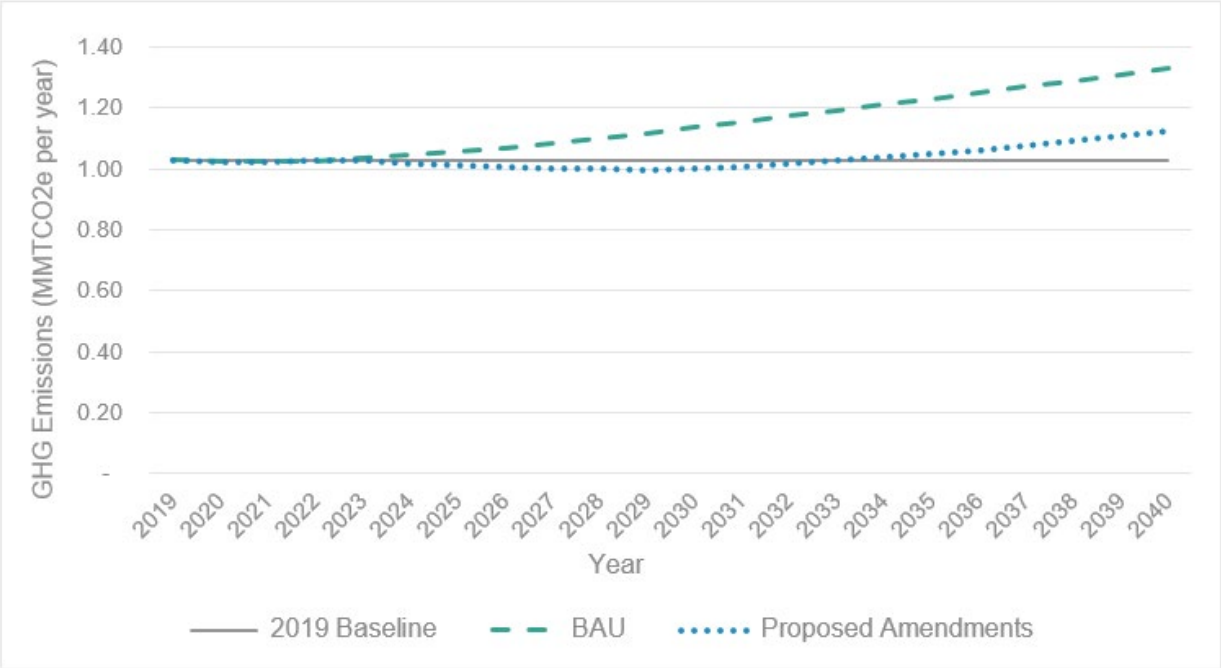


Figure 4.B-6 summarizes the GHG emissions in MMTCO2e under the 2019 existing conditions, the BAU scenario, and the Proposed Amendments without forecasted TRU population growth.

Figure 4.B-6: GHG Emissions Projections without Forecasted TRU Population Growth

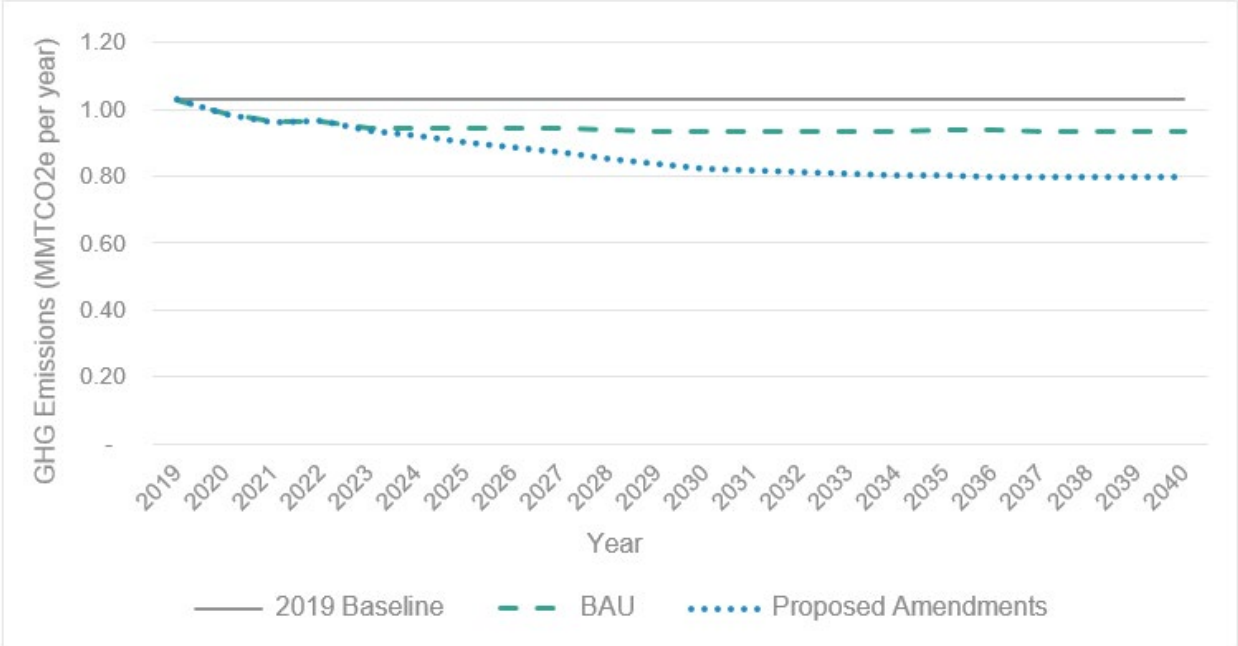


Table 4.B-5 shows the GHG emission benefits from the Proposed Amendments with forecasted TRU population growth for the calendar year 2019, 2025, 2030, 2035, and 2040. Table 4.B-6 shows the GHG emission benefits from the Proposed Amendments without forecasted TRU population growth.

Table 4.B-5: GHG Emission Benefits from Proposed Amendments with Forecasted TRU Population Growth (MMTCO2e per Year)

Year	BAU Emissions	Emissions Under Proposed Amendments	Emission Benefits††	Percent Emission Reduction††
2019†	1.03	1.03	0.00	0%
2025	1.06	1.01	0.05	5%
2030	1.13	1.00	0.13	12%
2035	1.23	1.05	0.18	15%
2040	1.33	1.13	0.20	15%

† The 2019 BAU emissions reflect the "2019 existing conditions" or "2019 Baseline."
†† The benefits shown are relative to BAU.

Table 4.B-6: GHG Emissions Benefits from Proposed Amendments without Forecasted TRU Population Growth (MMTCO2e per Year)

Year	BAU Emissions	Emissions Under Proposed Amendments	Emission Benefits[††]	Percent Emission Reduction[††]
2019[†]	1.03	1.03	0.00	0%
2025	0.94	0.90	0.04	4%
2030	0.93	0.82	0.11	12%
2035	0.94	0.80	0.14	15%
2040	0.93	0.80	0.13	14%

[†] The 2019 BAU emissions reflect the "2019 existing conditions" or "2019 Baseline."
[††] The benefits shown are relative to BAU.

Implementation of the Proposed Amendments could result in decreased demand for fossil fuels and reduce rates of oil and gas extraction and associated emissions. Use of zero-emission TRUs would displace GHG emissions generated from internal combustion engines to emissions generated from the energy sector. However, various regulatory programs (i.e., Renewables Portfolio Standard (RPS), SB 350) would be implemented concurrently with the Proposed Amendments, which would reduce GHG emissions from the energy sector through the transition to renewable energy statewide. For example, as mandated by SB 350, the State must achieve 50 percent renewable energy by 2030. Subsequently, zero-emission TRUs could receive electricity from renewable resources (e.g., solar, wind).

Operation of new and modified facilities for manufacturing, fueling, and recycling would consume fuel over the long term of the program. Fuel would be consumed, for example, to provide electricity during the manufacturing and recycling processes, and for general building operation (e.g., lighting; HVAC systems). Additionally, vehicle trips for employees and materials would consume fuel. Increased demand for lithium batteries could increase production, lithium mining, and exports from source countries or other states, which would require energy use in the form of fuel consumption for mineral extraction, processing, and transport. As more zero-emission TRUs are introduced into the fleet, electricity use would increase, and the use of other liquid or gaseous fuels that emit GHGs would decrease. The higher efficiency of zero-emission TRUs compared to conventional TRUs would reduce total energy use and would provide GHG emissions reductions that are not already attributed to the Low Carbon Fuel Standard (LCFS) regulation. The LCFS program covers the entire on-road vehicle sector and some other transportation fuels in California, which is several magnitudes higher than the fuel volume required by diesel TRUs that would be displaced. It is reasonable to assume that the Proposed Amendments would not be a big enough driver to affect the demand and supply of renewable diesel. Implementing the Proposed Amendments is anticipated to result in a reduction of GHG emissions from more efficient use of energy.

Implementation of the Proposed Amendments would also result in the construction and operation of electric TRU charging stations and hydrogen fueling stations to support the deployment of electric and hydrogen fuel-cell-powered TRUs. The availability of such infrastructure would improve the accessibility and feasibility of using zero-emission TRUs as compared to conventional internal combustion engine-powered TRUs. Zero-emission TRU use coupled with regulatory improvements to increase statewide renewable energy usage (e.g., the RPS, SB 350) would further serve to reduce GHG emissions from the transportation sector. As a greater portion of the State's energy portfolio is sourced from renewable energy, electricity generated from renewable resources will become available to power electric automobiles.

As noted above, since the Proposed Amendments do not cause the TRU population growth identified in the GHG emissions analysis for the BAU scenario, it is more appropriate to rely on the existing TRU population for purposes of determining the full extent of the GHG emissions benefits from the Proposed Amendments. Neither CARB's CRP nor CEQA require that a lead agency forecast GHG emissions not caused by a proposed project. Thus, while CARB elected to provide a picture of the GHG emissions benefits in the future by using an estimate of TRU population growth to compare the GHG emissions under a BAU scenario and the Proposed Amendments, that future GHG emissions picture provides more substantive effect to CARB's SIP commitments rather than to its impact analysis under CEQA. Nonetheless, it's notable that when compared to the future baseline (the BAU scenario), using projected TRU population growth, and the 2019 existing conditions, using the existing TRU population, the overall GHG emissions benefits of the Proposed Amendments would be greater than a comparatively small level of GHG emissions related to construction and operation of facilities associated with the reasonably foreseeable compliance responses, as described above. Therefore, impacts to climate change from GHG emissions resulting from the Proposed Amendments would remain **beneficial** as identified in the State SIP Strategy EA.

9. Hazards and Hazardous Materials

Impact 9-1: Short-Term Construction-Related Effects to Hazards and Hazardous Materials

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies,

fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 9-1 of the State SIP Strategy states the construction of the reasonably foreseeable compliance responses may require the transport, use, and disposal of hazardous materials such as lubricating fluids for heavy-duty equipment. Impact 9-1 states that maintenance of heavy-duty construction equipment presents the potential for the accidental release of hazardous materials due to the location of where maintenance activities would occur. Impact 9-1 states that while precautions would be taken to minimize risk, the potential for accidental upset of a hazardous material during construction still exists.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in construction of manufacturing facilities and installation of fueling infrastructure within existing facilities, which would have hazards and hazardous materials impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related impacts on hazards and hazardous materials would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related impacts on hazards and hazardous materials associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any short-term construction-related impacts on hazards and hazardous materials from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 9-1: Implement State SIP Strategy EA Mitigation Measure 9-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to hazards and hazardous materials. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a “project” under CEQA.

The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to hazards and hazardous materials include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant hazards and hazardous materials impacts of the project.

- Actions required to mitigate potentially significant upset and accident-related hazard impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

- Handling of potentially hazardous materials/wastes should be performed under the direction of a licensed professional with the necessary experience and knowledge to oversee the proper identification, characterization, handling and disposal or recycling of the materials generated as a result of the project. As wastes are generated, they would be placed, at the direction of the licensed professional, in designated areas that offer secure, secondary containment and/or protection from stormwater runoff. Other forms of containment may include placing waste on plastic sheeting (and/or covering with same) or in steel bins or other suitable containers pending profiling and disposal or recycling.

- The temporary storage and handling of potentially hazardous materials/wastes should be in areas away from sensitive receptors such as schools or residential areas. These areas should be secured with chain-link fencing or similar barrier with controlled access to restrict casual contact from non-project personnel. All project personnel that may come into contact with potentially hazardous materials/wastes will have the appropriate health and safety training commensurate with the anticipated level of exposure.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree

of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to hazards and hazardous materials associated with the Proposed Amendments would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

Impact 9-2: Long-Term Operation-Related Effects to Hazards and Hazardous Materials

Reasonably foreseeable compliance responses associated with the Proposed Amendments include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 9-2 of the State SIP Strategy EA evaluates the potential health hazard of exposure to lithium stating that as the lightest solid metal, lithium is easily absorbed into the body through inhalation and ingestion. Impact 9-2 of the State SIP Strategy EA also summarizes the volatility of lithium with other compounds such as oxidants, acids, hydrocarbons, halogens, halons, concrete, sand, and asbestos causing fire and explosion hazards. Impact 9-2 further explains that lithium is a highly flammable substance and presents a potentially substantial environmental hazard. Impact 9-2 of the State SIP Strategy EA states that while lithium in its raw form may result in the aforementioned impacts, lithium metal batteries do not contain toxic metals; the primary hazard posed by lithium batteries is their ability to overheat and ignite. However, when properly packaged and handled, lithium batteries pose no environmental hazard.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Amendments would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates or cryogenic technologies, the impact of associated compliance responses would be similar. Cold plate technology could result in construction of manufacturing facilities and installation of fueling infrastructure within existing facilities, which would have hazards and hazardous materials impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Cryogenic liquids could be spilled in an upset condition, risking physical injury through cold exposure. However, compliance with the appropriate federal and state laws governing the handling of potentially hazardous materials would be sufficient to minimize this risk because, as described in Attachment A, they ensure adequate handling and disposal safeguards to address these risks. Thus, long-term operation-related impacts on hazards and hazardous materials would be **less than significant** as identified in the State SIP Strategy EA.

10. Hydrology and Water Quality

Impact 10-1: Short-Term Construction-Related Effects on Hydrology and Water Quality

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 10-1 of the State SIP Strategy EA describes the short-term construction-related impacts on hydrology and water quality. As discussed in this impact, construction activities could require disturbance of undeveloped areas, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Specific construction projects would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, stormwater pollution prevention plan [SWPPP]). With respect to depleting groundwater supplies, impairing water quality, and polluted runoff issues, construction of new facilities would not be anticipated to result in substantial groundwater demands, water quality, or runoff due to the nature of associated activities. However, depending on the location of construction activities,

there could be adverse effects on drainage patterns and exposure of people or structures to areas susceptible to flood, seiche, tsunami, or mudflow.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in increased manufacturing and installation of fueling infrastructure within existing facilities, which would have impacts similar to new and modified facilities as discussed in the State SIP Strategy EA. Thus, short-term construction-related impacts on hydrology and water quality would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related impacts on hydrology and water quality associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any short-term construction-related impacts on hydrology and water quality from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 10-1: Implement State SIP Strategy EA Mitigation Measure 10-1

The Regulatory Setting in Attachment A includes applicable laws and regulations regarding hydrology and water quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include the following:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The

local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant hydrology and water quality impacts of the project. Actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

- Under the oversight of the lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project would prepare a stormwater drainage and flood control analysis and management plan. The plans would be prepared by a qualified professional and would summarize existing conditions and the effects of project improvements, and would include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protect downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features would be designed to protect existing downstream flow conditions that would result in new or increased severity of offsite flooding.

- Establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design.

- The project proponent would design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs would be approved by the local or State land use agency. The project proponent would also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority.

- As part of subsequent project-level planning and environmental review, the project proponent shall coordinate with the local groundwater management authority and prepare a detailed hydrogeological analysis of the potential project-related effects on groundwater resources prior to issuance of any permits. The proponent shall mitigate for identified adverse changes to

groundwater by incorporating technically achievable and feasible modifications into the project to avoid offsite groundwater level reductions, use alternative technologies or changes to water supply operations, or otherwise compensate or offset the groundwater reductions.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to hydrology and water quality associated with the Proposed Project would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

Impact 10-2: Long-Term Operation-Related Effects to Hydrology and Water Quality

Reasonably foreseeable compliance responses to the Proposed Project include operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

The operation of new plants, stations, and modifications would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, SWPPP). Operation of these facilities would not require additional ground disturbance beyond that already disturbed during construction. With respect to

depleting groundwater supplies, new facilities are not anticipated to result in substantial demands due to the nature of associated activities.

Under the Proposed Project, the demand for oil and gas extraction activities could also decrease. Oil and gas extraction can produce substantial adverse effects to hydrology. For instance, fracking requires the use of millions of liters of water and consequently millions of liters of wastewater, which can contaminate groundwater with toxic chemical compounds (European Parliament 2012). As on June 2015, U.S. EPA had identified 1,173 known chemicals used in the fracking industry. Additionally, accidental release of oil or gas and related wastewater (e.g., spills from pipelines or trucks, leakage from wastewater ponds or tanks) can introduce toxicants, radionuclides, and dissolved metals, and affect the salinity of local drinking water supplies (Environmental Health Perspectives 2016). Through implementation of the Proposed Project, the aforementioned effects to hydrologic resources would be reduced as zero-emission TRUs displace internal combustion engine-powered TRUs. As a result, adverse hydrologic effects associated with oil and gas extraction would be decreased through implementation of the Proposed Project.

Implementation of the Proposed Project would result in increased demand for lithium-ion batteries, which would accelerate the market for mined lithium. Mining of hard rock would require the use of conventional mining practices including the creation of underground mines and open pits, which would result in the removal of organic material (e.g., bedrock, vegetation). Additionally, lithium can be collected from continental brines found in basins. Salty groundwater is pumped into lagoons where it undergoes evaporation, producing salts containing lithium compounds. This process could result in overdrafting of groundwater.

Extraction of lithium has substantial effects on water quality. Due to its high reactivity, lithium is found bound to other elements. To process lithium, toxic chemicals must be used which can cause water pollution through leaching and spills. Further, lithium mining from continental brines is a water-intensive process, which, as mining typically occurs in arid landscapes, could result in the depletion of available for water resources (Friends of the Earth 2013).

Mineral extraction and mining activities within the U.S. would be required to comply with the provisions of the Clean Water Act and the natural resource protection and land reclamation requirements of the appropriate State and federal land managers. For instance, the federal Bureau of Land Management (BLM) and U.S. Forest Service mining permit conditions contain protections for hydrologic resources and require mining reclamation standards. However, lithium is obtained from areas outside of the United States, where State and U.S laws and regulations are not enforced. Thus, water quality impacts related to mining could occur because of implementation of the reasonably foreseeable compliance responses associated with the Proposed Project.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those

identified and evaluated in the State SIP Strategy EA. Although the State SIP Strategy did not specifically discuss, for example, the use of cold plates, the impact of associated compliance responses would be similar. Cold plate technology could result in operation of fueling infrastructure within existing facilities, which would have impacts similar to operation of facilities as discussed in the State SIP Strategy EA. Thus, long-term operational impacts on hydrology and water quality would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, lead agency will have adequate information from which it can determine project-specific, long-term operational impacts on hydrology and water quality associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any long-term operational impacts on hydrology and water quality from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 10-2a: Implement State SIP Strategy EA Mitigation Measure 10-1

Full text of measure previously provided.

TRU Draft Supplemental EA Mitigation Measure 10-2b: Implement State SIP Strategy EA Mitigation Measure 10-2

The Regulatory Setting in Attachment A includes applicable laws and regulations that provide protection of hydrology and water quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to hydrology and water quality:

- Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and geologic structure).

- Identify soil properties, engineering constraints, and facility design criteria.
- Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area.
- Develop an erosion control plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality.
- Design runoff control features to minimize soil erosion.
- Construct drainage ditches only where necessary.
- Use appropriate structures at culvert outlets to prevent erosion.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts to hydrology and water quality associated with the Proposed Project would be **potentially significant and unavoidable**.

11. Land Use Planning

Impact 11-1: Short-Term Construction-Related and Long-Term Operation-Related Impacts on Land Use and Planning

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified

facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 11-1 of the State SIP Strategy EA addresses effects on land use and planning. This impact discusses the potential for an intensification of adverse effects associated with the conversion or modification of natural lands or of existing agriculture to developed uses, such as impacts on sensitive species populations; soil carbon content; annual carbon sequestration losses, depending on the land use; long-term erosion effects; and adverse effects on local or regional water resources. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already disturbed. Planning efforts associated with the implementation of compliance responses would be made in coordination with local, State, or federal jurisdictions. Thus, reasonably foreseeable compliance responses would not be anticipated to conflict with a land use or conservation plan.

The environmental consequences of land use changes are considered in their respective sections of this Draft Supplemental EA. Potential indirect environmental impacts associated with land use change on agriculture and forestry, biology, geology and soils, and hydrology and their related mitigation measures are discussed in further detail under Impacts 2-1, 2-2, 4-1, 4-2, and 10-1.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be the same as those identified and evaluated in the State SIP Strategy EA. Thus, short-term construction-related and long-term operational impacts on land use and planning would be **less than significant** as identified in the State SIP Strategy EA.

12 Mineral Resources

Impact 12-1: Short-Term Construction-Related Effects to Mineral Resources

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

As discussed in the State SIP Strategy EA Impact 12-1, increased demand for zero-emissions technologies would result in increased construction of new

manufacturing plants that specialize in the production of batteries and supporting infrastructure. These types of development would occur in areas where zoning considerations included the availability of mineral resources within the project site. Thus, the availability of known mineral resources would not be lost due to implementation of the Proposed Project.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already disturbed and also would not affect availability of mineral resources. Thus, short-term construction-related impacts on mineral resources would be less than significant as identified in the State SIP Strategy EA.

Impact 12-2: Long-Term Operation-Related Effects to Mineral Resources

Reasonably foreseeable compliance responses to the Proposed Project include operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

Increased demand for lithium batteries could increase production, along with associated increases in lithium mining and exports from source countries or other states. This could result in increased rates of disposal of lithium batteries; however, disposal if such items into landfills is prohibited (Title 22 CCR Chapter 23). As such, lithium batteries could be refurbished or re-used. To meet an increased demand of refurbishing or reusing batteries, new facilities, or modifications to existing facilities, could be constructed to accommodate recycling activities. Fleet turnover largely would be unaffected since the regulation is based on changes at time of normal TRU purchase or contract renewal.

The operation of new plants, stations, and modifications would be required to comply with applicable erosion, water quality standards, and waste discharge requirements (e.g., NPDES, SWPPP). Operation of these facilities would not require additional ground disturbance beyond that already disturbed during construction. With respect to depleting groundwater supplies, new facilities are not anticipated to result in substantial demands due to the nature of associated activities.

Long-term operational compliance responses associated with the Proposed Project include increased mining and processing of rare materials (e.g., lithium) used in batteries. Depending on the magnitude of required materials, implementation of the Proposed Project could affect the availability of known minerals.

The State SIP Strategy EA discussed impacts related to lithium mining. An updated discussion is provided here to include information about lithium mining that has developed since the State SIP Strategy EA. Additionally, analysis is provided for compliance responses not evaluated in the State SIP Strategy EA. The demand for additional mining to meet increased use of batteries could result in the development of new mines and mining of lithium. For the purposes of this document, it would be too speculative to determine if, when, and where a new mine may be located. In the case that new mines are required, they would go through independent environmental review at the appropriate federal, state, or local level (see Attachment A for more information). It is assumed, for the purposes of this analysis that any new mines located within the U.S. or the State would be in areas with appropriate zoning, and subject to Federal, State, and/or local requirements.

Batteries associated with zero-emission TRU technology are primarily lithium-based. Generally, other types of battery options, such as nickel-metal hydride are not as favorable due to challenges related to high cost, high self-discharge, and heat generation at high temperatures. Thus, it is assumed that mineral resource requirements associated with implementation of recommended measures in the Proposed Project would be tied to lithium resources and other lithium-ion battery-related metals (i.e., cobalt).

As of January 2020, the only domestic lithium mine in operation in the United States is a brine operation in Nevada. However, there are current initiatives at the State and federal level that are likely to influence lithium mining domestically, which includes efforts in California. Two companies produced a wide range of downstream lithium compounds in the United States from domestic or imported lithium carbonate, lithium chloride, and lithium hydroxide. Although lithium markets vary by location, global end-use markets are estimated as follows: batteries, 65 percent; ceramics and glass, 18 percent; lubricating greases, 5 percent; polymer production, 3 percent; continuous casting mold flux powders, 3 percent; air treatment, 1 percent; and other uses, 5 percent. Lithium consumption for batteries has increased significantly in recent years because rechargeable lithium batteries are used extensively in the growing market for portable electronic devices and increasingly are used in electric tools, electric vehicles, and grid storage applications. Lithium minerals were used directly as ore concentrates in ceramics and glass applications.

One domestic company has recycled lithium metal and lithium-ion batteries since 1992 at its facility in British Columbia, Canada. In 2015, the company began operating the first U.S. recycling facility for lithium-ion vehicle batteries in Lancaster, Ohio. From 2016 to 2019, the United States imported lithium from Argentina (55 percent), Chile (36 percent), China (5 percent), Russia (2 percent), and others (2 percent) (USGS 2021).

Table 4.B-7: Lithium Mine Production and Reserves[1]

Country	Mine Production in 2019 (Tons)	Mine Production in 2020 (Tons)	Reserve Amount (Tons)
United States	W[2]	W[2]	750,000
Argentina	6,300	6,200	1,900,000
Australia	45,000	40,000	4,700,000
Brazil	2,400	1,900	95,000
Canada	200	—	530,000
Chile	19,300	18,000	9,200,000
China	10,800	14,000	1,500,000
Portugal	900	900	60,000
Zimbabwe	1,200	1,200	220,000
Other	—	—	2,100,000
Worldwide Total (rounded and excluding US production)	86,000	82,000	21,000,000

Source: USGS 2021.

Owing to continuing exploration, identified lithium resources have increased substantially worldwide. Worldwide in 2020, lithium resources are currently estimated to be approximately 82 million tons, including 6.2 million tons in Argentina, 21 million tons in Bolivia, 9.6 million tons in Chile, 6.4 million tons in Australia, 5.1 million tons in China, 3 million tons in the Congo, 2.9 million tons in Canada, 1.7 million tons in Mexico, 1.3 million tons in Czechia, and 1.2 million tons in Serbia. In addition, Peru, Mali, Zimbabwe, Brazil, Spain, Portugal, Ghana, Austria, Finland, Kazakhstan, and Namibia have resources of less than one million each. Further, due to steadily increasing demand for lithium, domestic recycling of lithium has also increased (USGS 2021).

As mentioned, there are efforts to increase domestic supply of lithium. Efforts to address supply chains of mineral commodities has gained substantial interest from the State and federal government, both of which have sought to address mineral independence and security. Examples of efforts include AB 1657 (Garcia), Chapter 271, 2020, which requires the California Energy Commission (CEC) to convene a Blue-Ribbon Commission on Lithium Extraction in California (Lithium Valley Commission) on or before March 1, 2021. The Lithium Valley Commission is charged with reviewing, investigating, and analyzing issues and potential incentives regarding lithium extraction and use in California. This effort includes consultation with the U.S. EPA and the U.S. Department of Energy in performing these tasks. The statute requires the Lithium Valley Commission to submit, on or before October 1, 2022, a report to the Legislature documenting its findings and recommendations. Additionally, the CEC awarded $16 million in grant funding to private companies to investigate feasibility of lithium extraction at Salton Sea geothermal plants. One of the companies is using funding on a pilot project and anticipates constructing a demonstration plant (Cart 2021).

At the federal level, Executive Order (EO) 14017 (86 FR 11849, February 24, 2021) directed federal agencies to perform a 100-day review of "supply chain risks" for four

classes of products, which includes high-capacity batteries, including for electric vehicles, as well as critical and strategic minerals, including rare earths, which shall also update work completed pursuant to EO 13953. The EO additionally directs agencies to perform year-long reviews of supply chains in six critical sectors, which includes transportation and energy. The reviews will seek to identify supply chain risks that leave the United States vulnerable to reductions in the availability and integrity of critical goods, products, and services, and will include policy recommendations for address such risks. The EO indicates that, among other approaches, the current administration will explore how trade policies and agreements can be used to strengthen the resilience of U.S. supply chains.

In summary, while substantial research has been done and there is a clear commitment to increasing domestic supply of lithium, exact actions that will be taken in response to this goal of increasing domestic supply of lithium are yet to be identified with certainty.

While lithium-ion batteries are not reliant on the use of the metal cobalt, other consumer products such as laptops, cell phones, and other electronics use cobalt as a battery component. Cobalt is comparatively rarer than lithium. As such, increased demand for lithium-ion cobalt containing batteries has risen in recent years. As a result, the rate of recycling lithium constituents has also increased.

Appendix G of the CEQA Guidelines considers an impact on mineral resources to be the loss of availability of a known mineral resource that would be of value to a local entity, a region, or the state. This type of impact could result from actions such as building a structure over an area that contains mineral resources, thereby prohibiting access to mining activities. As discussed above, buildings developed in response to implementation of the Proposed Project would be located in areas within existing footprints or in areas with consistent zoning where original permitting and analyses considered these issues. Implementation of the proposed project and associated compliance responses could result in increased mining for lithium and PGMs but would not affect the economic potential related to known mineral resources. However, the Proposed Amendments may increase lithium mining, which would also contribute to the loss of availability of lithium as it is mined and consumed.

While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already disturbed and also would not affect availability of mineral resources.

Thus, long-term operation-related mineral resources effects associated with the Proposed Project would be **potentially significant**.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, long-term operation-related mineral resource impacts associated with these potential compliance-response development projects. Once the lead agency identifies these

project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation, noted below, that lead agencies can and should consider for mitigation of any long-term operation-related mineral resource impacts from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 12-2

The Regulatory Setting in Attachment A includes applicable laws and regulations that provide protection of mineral resources. CARB does not have the authority to require implementation of mitigation related to new or modified infrastructure that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified infrastructure in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation measures may be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to mineral resources include:

- Proponents of construction activities implemented because of reasonably foreseeable compliance responses associated with the Proposed Amendments would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents will implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on mineral resources associated with the project.

- Actions required to mitigate potentially significant mineral resource impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

    - Prior to the issuance of any development permits, proponents of new or modified infrastructure will prepare an investigation/study, which will include an evaluation of the development's impact on the availability of mineral resources valuable to the region and residents of the State or delineated on a local general plan, specific plan, or other land use plan.

- Proponents of new or modified infrastructure will provide a complete site plan showing any overlapping areas between the proposed plan and locally important mineral resources delineated on a local general plan, specific plan, or other land use plan. Proponents will avoid locating infrastructure that would result in the loss of availability of locally important mineral resources, as much as possible.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts to mineral resources associated with the Proposed Project would remain **potentially significant and unavoidable**.

13. Noise

Impact 13-1: Short-Term Construction-Related Noise Effects

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 13-1 of the State SIP Strategy EA describes the potential noise effects associated with construction of new facilities. As discussed in this impact, the effects of construction noise largely depend on the type of construction activities occurring on any given day, noise levels generated by those activities, distances to noise sensitive receptors, and the existing ambient noise environment in the receptor's vicinity. Construction generally

occurs in several discrete stages, each phase requiring a specific complement of equipment with varying equipment type, quantity, and intensity. These variations in the operational characteristics of the equipment change the effect they have on the noise environment of the project site and in the surrounding community for the duration of the construction process.

As further discussed in Impact 13-1 of the State SIP Strategy EA, the site preparation phase typically generates the most substantial noise levels because of the on-site equipment associated with grading, compacting, and excavation, which uses the noisiest types of construction equipment. Site preparation equipment and activities include backhoes, bulldozers, loaders, and excavation equipment (e.g., graders and scrapers). Construction of large structural elements and mechanical systems could require the use of a crane for placement and assembly tasks, which may also generate noise levels. Although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of noise would include backhoes, bulldozers, and excavators. Noise emission levels from typical types of construction equipment can range from approximately 74 to 94 A-weighted decibels (dBA) at 50 feet. Based on these and general attenuation rates, exterior noise levels at noise-sensitive receptors located within thousands of feet from project sites could exceed typical standards (e.g., 50/60 dBA equivalent noise level/maximum noise level (L_{eq}/L_{max}) during the daytime hours and 40/50 dBA L_{eq}/L_{max} during the nighttime hours).

Impact 13-1 of the State SIP Strategy EA goes on to describe how construction activities may result in varying degrees of temporary groundborne noise and vibration, depending on the specific construction equipment used and activities involved. Groundborne noise and vibration levels caused by various types of construction equipment and activities (e.g., bulldozers, blasting) range from 58 to 109 vibration decibels (VdB) and from 0.003 to 0.089 inch per second (in/sec) peak particle velocity (PPV) at 25 feet. Similar to the above discussion, although a detailed construction equipment list is not currently available, based on this project type it is expected that the primary sources of groundborne vibration and noise would include bulldozers and trucks. According to the Federal Transit Administration (FTA), levels associated with the use of a large bulldozer and trucks are 0.089 and 0.076 in/sec PPV (87 and 86 VdB) at 25 feet, respectively. With respect to the prevention of structural damage, construction-related activities would not exceed recommended levels (e.g., 0.2 in/sec PPV). However, based on FTA's recommended procedure for applying a propagation adjustment to these reference levels, bulldozing and truck activities could exceed recommended levels with respect to the prevention of human disturbance (e.g., 80 VdB) within 275 feet.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already used for similar purposes and are unlikely to have sensitive receptors nearby. Thus, short-term

construction-related impacts on noise would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related noise impacts associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any agriculture and forestry impacts from these future projects. Because implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 13-1: Implement State SIP Strategy EA Mitigation Measure 13-1

The Regulatory Setting in Attachment A includes, but is not limited to, applicable laws and regulations that pertain to noise. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that could be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize noise include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant noise and vibration impacts of the project. Actions required to mitigate potentially significant noise impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

- Ensure noise-generating construction activities (including truck deliveries, pile driving, and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors.
- Consider use of noise barriers, such as berms, to limit ambient noise at property lines, especially where sensitive receptors may be present.
- Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment.
- All construction equipment used would be adequately muffled and maintained.
- Consider use of battery-powered forklifts and other facility vehicles.
- Ensure all stationary construction equipment (i.e., compressors, generators) is located as far as practicable from nearby sensitive receptors or shielded.
- Properly maintain mufflers, brakes and all loose items on construction and operation related vehicles to minimize noise and address operational safety issues. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum.
- Use noise controls on standard construction equipment; shield impact tools.
- Consider use of flashing lights instead of audible back-up alarms on mobile equipment.
- Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines.
- Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels.
- Contain facilities within buildings or other types of effective noise enclosures.
- Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due

to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for a compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related impacts to noise associated with the Proposed Project would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

Impact 13-2: Long-Term Operation-Related Noise Effects

Reasonably foreseeable compliance responses to the Proposed Project include operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

As described in the State SIP Strategy EA Impact 13-2, new sources of noise could be associated with manufacturing plants and lithium mining operations (e.g., excavation equipment). However, it would be expected that expansion of existing mines would not involve sensitive receptors given that mines typically are located in areas zoned for such uses. While it would be anticipated that new lithium mines initiated as a compliance response to the State SIP Strategy would be located in areas of consistent zoning and therefore not in close proximity to sensitive receptors, the exact locations are not known at this time.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already disturbed and also

would not appreciably affect the noise environment. Thus, long-term operational impacts on noise would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, long-term operational noise impacts associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any agriculture and forestry impacts from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 13-2: Implement State SIP Strategy EA Mitigation Measure 13-1

Full text of measure previously provided.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operational impacts to noise associated with the Proposed Project would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

14. Population and Housing

Impact 14-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Population and Housing

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar

photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 14-1 of the State SIP Strategy EA describes the potential to affect population and housing due to the demand for construction and operation of new facilities. As described in this impact, there is uncertainty as to the exact location or character of any new facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, it is anticipated that there would not be a need for substantial numbers of construction workers to relocate and that a sufficient construction employment base would likely be available.

As further described under State SIP Strategy EA Impact 14-1, operation of new facilities and lithium mines would generate varying levels of employment opportunity. The numbers of jobs produced would be directly related to the size, capacity, and, in some cases, commodity manufactured. This range could be between twenty (e.g., small feedstock processing facility) to several thousand (e.g., Tesla Gigafactory); however, it would be expected that locations of these facilities would be selected such that an appropriate employment base existed to support operation or where local jurisdictions have planned for increased population and employment growth.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already used for similar activities, would not need a substantial number of new employees, and could be served by the existing workforce. Thus, short-term construction-related and long-term operational impacts on population and housing would be **less than significant** as identified in the State SIP Strategy EA.

15. Public Services

Impact 15-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Public Services

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar

photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

As discussed in Impact 15-1 of the State SIP Strategy EA, facilities associated with the Proposed Project would likely be located in areas with zoning that would permit the development of manufacturing or industrial uses. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, it is anticipated that there would not be a need for substantial numbers of construction workers to relocate and that a sufficient construction employment base would likely be available. Furthermore, operation of plants, mines, and facilities would provide a range of employment opportunities depending on size and capacity. While implementation of the State SIP Strategy, including the Proposed Project, would produce long-term employment, it would be anticipated that a sufficient employment base would be available. Thus, operational activities would not require a substantial amount of new additional housing to accommodate new populations or generate changes in land use and, therefore, would not be expected to increase population levels such that the provisions of public services would be substantially affected.

Thus, the types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already used for similar activities, would not result in a need for new or expanded public services. Thus, short-term construction-related and long-term operational impacts on public services would be **less than significant** as identified in the State SIP Strategy EA.

16. Recreation

Impact 16-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Recreation

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

As discussed in Impact 14-1, "Short-Term Construction-Related and Long-Term Operational Effects on Population and Housing," in the State SIP Strategy EA, operation of plants, mines, and facilities would provide a range of employment opportunity depending on size and capacity. While implementation of State SIP Strategy, including the Proposed Project, would produce long-term employment, it would be anticipated that a sufficient employment base would be available. The minimal increase in employment opportunity would not create an increased demand on recreational facilities within communities containing new plants and facilities, as described in Impact 16-1 of the State SIP Strategy EA.

Thus, the types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be the same as those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, fueling infrastructure would be located within areas that are already used for similar activities, would not need a substantial number of new employees, and could be served by the existing workforce, avoiding any increase in demand for recreational facilities. Thus, short-term construction-related and long-term operational impacts on recreation resources would be **less than significant** as identified in the State SIP Strategy EA.

17. Transportation

Impact 17-1: Short-Term Construction-Related Effects to Transportation

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Section 15064.3 was added to the State CEQA Guidelines effective December 28, 2018, after certification of the State SIP Strategy EA. The section addresses the determination

of significance for transportation impacts, which requires that the analysis be based on vehicle miles travelled (VMT) instead of a congestion metric (such as levels of service [LOS]). The change in the focus of transportation analysis is the result of legislation (SB 743, Statutes of 2013) and is intended to change the focus from congestion to, among other things, reduction in GHG emissions, encouraging mixed use development, and other factors. Pursuant to State CEQA Guidelines Section 15064.3(c), this change in analysis may be implemented now and is mandated to be addressed beginning July 1, 2020.

SB 743 requirements are designed to be most relevant to urban travel related to residential and employment-generating land uses. State CEQA Guidelines Section 15064.3(b) identifies criteria for analyzing the transportation impacts of a project, including land use projects (Section 15064.3[b][1]) and transportation projects (Section 15064.3[b][2]). As discussed under Impact 14-1, construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project) and would not result in unplanned population growth. Therefore, while implementation of the Proposed Project includes development and operation of new facilities, short-term construction would not drive development of urban areas, residential development, major employment generation, or transportation projects. Thus, increased VMT from construction-related activities would not be substantial and would be short-term.

Impact 17-1 of the State SIP Strategy EA described the short-term construction-related impacts on transportation. As discussed in this impact analysis, although detailed information about potential specific construction activities is not currently available, it would be anticipated to result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. The amount of construction activity would vary depending on the particular type, number, and duration of usage for the varying equipment, and the phase of construction. These variations would affect the amount of project-generated traffic for both worker commute trips and material deliveries. Depending on the number of trip generation and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be the same as those identified and evaluated in the State SIP Strategy EA. While the State SIP Strategy EA does not specifically address cold plates fueling installation as a compliance response, installation of fueling infrastructure would not generate a substantial number of trips. Thus, short-term construction-related impacts on transportation would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related impacts on transportation associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any agriculture and forestry impacts from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 17-1: Implement State SIP Strategy EA Mitigation Measure 17-1

The Regulatory Setting in Attachment A includes applicable laws and regulations regarding transportation. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize construction traffic impacts include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant transportation impacts of the project. Actions required to mitigate potentially significant traffic impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

    - Minimize the number and length of access, internal, service, and maintenance roads and use existing roads when feasible.

- Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements.

- If new roads are necessary, prepare a road siting plan and consult standards contained in federal, State, or local requirements. The plans should include design and construction protocols to meet the appropriate roadway standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils.

- Prepare a Construction Traffic Control Plan and a Traffic Management Plan.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that the short-term construction-related transportation impacts associated with the Proposed Project would be **potentially significant and unavoidable** as identified in the State SIP Strategy.

Impact 17-2: Long-Term Operation-Related Effects to Transportation

Reasonably foreseeable compliance responses to the Proposed Project include operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

As discussed under Impact 17-2 in the State SIP Strategy EA, transportation patterns may change in relation to the location and operational shipping needs of new facilities. Depending on the number of trips generated and the location of fuel-related deliveries, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. In addition, new facilities may result in additional egress/ingress points or increased traffic that would result in hazardous conditions on local roadways. Inadequate access may impede emergency vehicle access to new facilities.

As discussed above under Impact 17-1, the CEQA Guidelines have been modified to include consideration of VMT as part of the Appendix G thresholds. Implementation of the Proposed Project would result in increased deployment of zero-emission TRUs as well as infrastructure to support their use (i.e., electric charging and fueling stations). Improved accessibility to infrastructure to support these zero-emission TRUs could introduce new levels of zero-emission VMT, which, as discussed under Impact 8-1, "Short-Term Construction-Related and Long-Term Operation-Related Effects to Greenhouse Gas Emissions and Climate Change," would be supported by regulatory pressure to increase the electrical grid's portion of renewable energy. It is conceivable that new VMT could affect LOS at roadway segments across the State and create potentially hazardous roadway conditions.

These compliance responses could include construction and operation of new or modified manufacturing plants to support zero-emissions TRU technology, recycling centers for disposal or repurposing of high-emission equipment and spent batteries, and new or expanded mining operations in the State, the United States, and globally. With respect to operational activities, it would not be anticipated that a substantial amount of new personnel would be needed to operate new facilities. It is likely that locations of these facilities would be selected such that an appropriate employment base existed to support operations or where local jurisdictions have already planning for increased population and employment growth and that these facilities would be located in appropriately zoned areas that are meant to serve as employment centers. In addition, deliveries associated with long-term operation-related activities would not be anticipated to result in a substantial number of new trips, such that roadway service levels would not be substantially affected; therefore, no hazardous roadway conditions are expected from these trips. However, construction of new manufacturing and recycling facilities may increase VMT. It is conceivable that the operation of new or modified manufacturing facilities could result in expanded supply and transport of

zero-emissions technologies beyond existing baseline levels. For instance, workers and businesses associated with expanded or new recycling centers and battery manufacturing facilities could increase VMT levels on nearby roadways. In addition, new or expanded mining operations, both within the U.S. and internationally, could generate additional VMT, or increase cargo ship activity, as lithium ore is traded and distributed on a global scale. However, it is conceivable that such operations would displace existing levels of VMT associated with oil and gas extraction, production, and transportation.

New facilities would require staff during operations, which would add trips to the new facilities. Pursuant to SB 375, CARB established GHG reduction targets for metropolitan planning organizations that range from 13 to 16 percent by 2035. These reduction targets are based on land use patterns and transportation systems specified in Regional Transportation Plans and Sustainable Community Strategies. Locations of facilities cannot currently be known; therefore, the total change in VMT cannot be assessed. Therefore, it is possible that a compliance response may maintain, increase, or insufficiently reduce VMT considering the general goal of reducing VMT over the long-term. Thus, recognizing uncertainty in future predictions, to meet CEQA's mandate of good-faith disclosure and to not risk understating potential future impacts in light of the uncertainties, there could be a substantial increase to VMT. As a result, long-term operation-related transportation impacts associated with the Proposed Project could be potentially significant.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, long-term operation-related impacts on transportation associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any agriculture and forestry impacts from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 17-2: Implement State SIP Strategy EA Mitigation Measure 17-1

Full text of measure previously provided.

VMT associated with implementation of the Proposed Project is related to the location of new facilities developed to meet the demands of the Proposed Project. The distance required to accommodate new trips is generally related to site-specific conditions, such as the location of facilities in relation to workers' homes and end use of the manufactured product (e.g., transport of newly-manufactured batteries from battery

factories to zero-emission vehicle factories). According to the SB 743 Technical Advisory, potential mitigation measure that can reduce VMT include actions such as improved alternate transportation facilities, land use planning, and disincentives to driving (e.g., roadway pricing, limited parking availability). Land use decisions, including those related to the siting of organic waste recovery facilities, are subject to local jurisdictions (PRC Section 40059). The locations of new facilities are contingent on various influences outside of CARB's control, including local land uses and economics. Other mitigation measures described in the SB 743 Technical Advisory, such as providing improved alternative transportation facilities and establishing disincentives to driving, would not have sufficient nexus with the impact or offer rough proportionality to the impact to be considered feasible mitigation (*Dolan v. City of Tigard, 512 U.S. 374 [1994]; Nollan v. California Coastal Commission, 483 U.S. 8825 [1987]*). Therefore, no feasible mitigation is available for VMT.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that long-term operation-related impacts to transportation associated with the Proposed Project would be **potentially significant and unavoidable**.

18. Utilities and Service Systems

Impact 18-1: Short-Term Construction-Related and Long-Term Operational Impacts on Utilities and Service Systems

Reasonably foreseeable compliance responses associated with the Proposed Project include construction and operation of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); construction and operation of supporting infrastructure, such as electric chargers and fueling stations; increased demand for electricity, requiring more electricity generation; the displacement of fossil fuel extraction, refinement, manufacture, distribution, and combustion; operation of new or modified recycling or refurbishment facilities to accommodate battery disposal; and increased demand for the extraction of raw minerals used in the production of batteries, such as lithium from source countries and states.

The reasonably foreseeable compliance responses discussed in the State SIP Strategy EA included increased infrastructure for zero and near-zero emission technologies, fueling and electric charging stations, increased demand for lithium battery manufacturing and associated increases in lithium mining and exports; new or modified facilities to accommodate increased recycling or refurbishment of lithium batteries and zero-emissions technologies; and increases to lithium mining and exports.

Impact 18-1 of the State SIP Strategy EA describes the short-term construction-related and long-term operational impacts on utilities and service systems. The analysis states that the need for new or expanded manufacturing facilities could result in new demand for water, wastewater, electricity, and gas services for new or modified facilities. Generally, new facilities would be sited in areas with existing utility infrastructure or areas where existing utility infrastructure is easily assessable. New or modified utility installation, connections, and expansion would be subject to the requirements of the applicable utility providers.

As further described under Impact 18-1, any new or modified facilities, regardless of size and location, would be required to seek local or State land use approvals prior to their development. In addition, part of the land use entitlement process for facilities proposed in California requires that each of these projects undergo environmental review consistent with the requirements of CEQA and the CEQA Guidelines. It is assumed that facilities proposed in other states would be subject to comparable federal, State, and/or local environmental review requirements (e.g., CEQA) and that the environmental review process would assess whether adequate utilities and services (i.e., wastewater services, water supply services, solid waste facilities) would be available and whether the project would result in the need to expand or construct new facilities to serve the project. Through the environmental review process, utility and service demands would be calculated; agencies would provide input on available service capacity and the potential need for service-related infrastructure including expansions to waste water treatment plants, new water supply entitlements and infrastructure, storm water infrastructure, and solid waste handling capacity (e.g., landfills). Resulting environmental impacts would also be determined through this process.

The reasonably foreseeable compliance responses associated with the Proposed Project that were not discussed in the State SIP Strategy EA include an increased demand and generation of electricity associated with electric-standby and hybrid-electric TRUs and cold plate technology. Energy suppliers (e.g., Pacific Gas & Electric, Southern California Edison, and Southern California Gas Company) periodically prepare load forecasts to ensure the reliability of electricity distribution systems. As electricity demand would occur over a multi-year period, the projected energy demands would be factored into load forecasts now and in the future. Further, as required by law, all utility connections would be constructed in accordance with all applicable building codes and applicable standards to ensure an adequately sized and properly constructed energy transmission and conveyance system. Any necessary connections would be constructed prior to occupancy and in a manner that would minimize the potential for utility service disruption of existing uses. Thus, increased demands on electricity associated with the

Proposed Project would be met, and impacts on electricity demand would not be of substantially greater severity than described in the State SIP Strategy EA.

As discussed in the State SIP Strategy EA, the specific location and type of construction needs are not known and would be dependent upon a variety of market factors that are not within the control of CARB including: economic costs, product demands, environmental constraints, and other market constraints. Thus, the specific impacts from construction on utility and service systems cannot be identified with any certainty, and individual compliance responses could potentially result in significant environmental impacts, for which it is unknown whether mitigation would be available to reduce the impacts.

The types and severity of impacts associated with the reasonably foreseeable compliance responses related to the Proposed Project would be similar to those identified and evaluated in the State SIP Strategy EA. Since certification of the State SIP Strategy EA, additional details related to the Proposed Amendments have been developed, such as cold plates as a compliance response, and the potential increased electricity consumption related to the use of cold plate technology. However, it is merely one means of achieving compliance with the Proposed Amendments, and therefore accounted for in the increase in energy consumption contemplated in the State SIP Strategy EA. Thus, short-term construction-related and long-term operational impacts on utilities and services systems would be potentially significant as identified in the State SIP Strategy EA.

Once an applicant actually develops the proposed plans for the development, the lead agency will have adequate information from which it can determine project-specific, short-term construction-related and long-term operational impacts on utilities and services systems associated with these potential compliance-response development projects. Once the lead agency identifies these project impacts, it can likely reduce them to a less-than-significant level by adopting feasible mitigation at the time of project approval. Notwithstanding this uncertainty of the impacts due to the equally uncertain nature and scope of potential compliance-response development projects, for the sake of full transparency, CARB identified mitigation in the State SIP Strategy EA, noted below, that lead agencies can and should consider for mitigation of any agriculture and forestry impacts from these future projects. Since implementation and enforcement of this mitigation measure is beyond the authority of CARB, however, CARB finds it legally infeasible to adopt and implement this measure on its own.

TRU Draft Supplemental EA Mitigation Measure 18-1: Implement State SIP Strategy EA Mitigation Measure 18-1

The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to utilities and service systems. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a “project” under CEQA.

The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize utility and service-related impacts include:

- Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.

- Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. Actions required to mitigate potentially significant utility or service-related impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.

    - Comply with local plans and policies regarding the provision of water supply, wastewater treatment, and storm water drainage utilities, and solid waste services.

    - Where an on-site wastewater system is proposed, submit a permit application to the appropriate local jurisdiction.

    - Where appropriate, prepare a Water Supply Assessment consistent with the requirements of Section 21151.9 of the PRC/ Section 10910 et seq. of the Water Code. The water supply assessment would be approved by the local water agency/purveyor prior to construction of the project.

    - Comply with local plans and policies regarding the provision of wastewater treatment services.

Because the authority to determine project-level impacts and require project-level mitigation lies with local land use and/or permitting agencies for individual projects, CARB finds it legally infeasible to implement and enforce this measure. Moreover, due to the programmatic analysis of this EA, which does not allow project-specific details of potential impacts and associated mitigation, there is inherent uncertainty in the degree of mitigation that lead agencies may ultimately implement to reduce the potentially significant impacts if it approves these potential projects.

Consequently, while impacts could likely be reduced to a less-than-significant level with mitigation conditions imposed by land use and/or permitting agency acting as lead

agencies under CEQA, if and when a project applicant seeks a permit for compliance-response related project, this Draft Supplemental EA takes the conservative approach in its post-mitigation significance conclusion and discloses, for CEQA compliance purposes, that short-term construction-related and long-term operational impacts to utilities and service systems associated with the Proposed Project would remain **potentially significant and unavoidable** as identified in the State SIP Strategy EA.

19. Wildfire

Impact 19-1: Short-Term Construction-Related and Long-Term Operation-Related Effects on Wildfire

Reasonably foreseeable compliance responses to the Proposed Project include construction of new or expanded manufacturing facilities for zero-emissions technologies (e.g., lithium-ion batteries, cryogenic fuels, cold plates, solar photovoltaics); the construction of supporting infrastructure, such as electric chargers and fueling stations; and construction of new or modified recycling or refurbishment facilities to accommodate battery disposal.

Appendix G of the State CEQA Guidelines was amended in 2018, after certification of the State SIP Strategy EA, to include several questions related to wildfire. The CEQA Guidelines Appendix G questions address: impairment of an adopted emergency response plan or emergency evaluation plan; the potential to exacerbate wildfire risks and associated pollutants and uncontrolled spread of wildfire; the requirement to install or maintain infrastructure that could exacerbate fire risk; and the exposure of people or structure to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

In the event of an emergency, such as a wildfire, evacuation coordination is dealt with at various levels of government through State, federal, or local agencies as appropriate. The California Department of Forestry and Fire Protection (CAL FIRE) is responsible for coordinating wildfire response and protection within State Responsibility Areas. CAL FIRE does not have responsibility for fire response in Local Responsibility Areas or Federal Responsibility Areas, which are defined based on land ownership, population density, and land use. These areas include densely populated areas, such as cities and towns; agricultural lands; and lands administered by the federal government. In densely populated areas, local fire departments respond to fires and emergencies. Fire response on federal lands is coordinated by the appropriate federal agency. For example, on National Forest System lands, the U.S. Forest Service coordinates fire response; on lands administered by the BLM, the BLM coordinates fire response.

Individual facilities and associated infrastructure would be placed within response areas for various jurisdictions and would be dealt with in the same manner as existing infrastructure. Facilities would be developed in areas that are zoned for industrial or other appropriate uses; therefore, changes or modifications to existing fire response and evacuation plans would not be necessary. Projects implemented under the

Proposed Project would not create growth substantial enough to impede emergency response or affect evacuation route capacity, as discussed under Impact 14-1, above.

Overhead powerlines associated with new infrastructure could increase the risk of wildfire ignition; however, new safety initiatives, development standards, and regulatory oversight for electric utilities have been implemented in response to numerous devastating wildfires in California in recent years. These efforts aim to reduce the risk of wildfire ignition associated with such facilities and include implementation of wildfire mitigation plans, collaboration between utilities and CAL FIRE, and retention by California Public Utilities Commission (CPUC) of independent evaluators that can assess the safety of electrical infrastructure. Additionally, new facilities would be subject to the applicable chapters of the California Fire Code and any additional local provisions identified in local fire safety codes. These factors—adherence to local plans, policies, codes, and ordinances; adherence to the California Fire Code and the provisions of wildfire prevention plans; and oversight by CPUC—would substantially reduce the risk of wildfire ignitions caused by infrastructure development.

As discussed above in Impact 9-2, lithium batteries have caused large explosions due to vehicular accident. These explosions could be a source of ignition for wildland fires. While safety issues occurred early on, those issues have been corrected through improved battery management systems, protection features built into the modules, and methods of communicating battery condition to the system controller (CARB 2015). Thus, the increased use of lithium-based batteries in vehicles would not substantially increase the risk of wildland fire.

Thus, implementation of the Proposed Project would have a **less-than-significant** long-term operational impact on wildfire.

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5.0 Cumulative and Growth-Inducing Impacts

A. Approach to Cumulative Analysis

This section satisfies requirements of CEQA to discuss how the project being analyzed would contribute to cumulative impacts. CARB's certified regulatory program (Title 17 CCR Sections 60000–60008) does not provide specific direction on a cumulative impacts analysis, and while CARB is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the CEQA Guidelines by virtue of its certified program, the Guidelines nevertheless contain useful guidance for preparation of a thorough and meaningful cumulative analysis. The CEQA Guidelines require a lead agency to discuss a cumulative impact if the project's incremental effect combined with the effects of other projects is "cumulatively considerable" (CEQA Guidelines Section 15130(a)). The discussion of cumulative impacts need not provide as much detail as the discussion of effects attributable to the project alone (CEQA Guidelines Section 15130). Where a lead agency is examining a project with an incremental effect that is not "cumulatively considerable," a lead agency need not consider that effect significant but must briefly describe its basis for concluding that the incremental effect is not cumulatively considerable.

In considering cumulative impacts, an agency may choose from two approaches: it can prepare a list of past, present, and probable future projects that will produce related or cumulative impacts; or it can rely on a summary of projections contained in an adopted planning document or an adopted or certified environmental document for the planning document (CEQA Guidelines Section 15130(b)). Further, the CEQA Guidelines state that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference pursuant to provisions for tiering and program EIRs, and that no future cumulative analysis is required when the lead agency determines the regional and area wide impacts have already been addressed in the prior certified EIR for that plan (CEQA Guidelines Section 15130).

The CEQA Guidelines state that a previously approved plan for the reduction of criteria and other air pollutant emissions may be used in cumulative impacts analysis; that the pertinent discussion of cumulative impacts contained in one or more previously certified EIRs may be incorporated by reference (Title 14 CCR Section 15130(d)). Furthermore, no further cumulative impacts analysis is required when a project is consistent with a general, specific, master or comparable programmatic plan where the lead agency determines that the regional or area wide cumulative impacts of the proposed project have already been adequately addressed, as defined in section 15152(f), in a certified EIR for that plan (14 CCR Section 15130(d)). CEQA further directs that a tiered EIR focus on significant environmental effects that were not already analyzed in the previous environmental analysis. (PRC Sections 21068.5; 21093; see also 21094(c).)

For the purposes of this analysis, CARB is relying on the summary of projections contained in the State SIP Strategy (CARB 2017b).

The State SIP Strategy includes a combination of regulatory and programmatic actions that will reduce emissions of ozone precursors and $PM_{2.5}$, pursuant to the federal Clean Air Act. The State SIP Strategy EA provided a program-level review of significant adverse impacts associated with the reasonably foreseeable compliance responses that appeared most likely to occur because of implementing the recommended measures. The impact discussion includes, where relevant, construction-related effects, operational effects of new or modified facilities, and influences of the recommended actions on GHG and air pollutant emissions. The State SIP Strategy EA considered cumulative impacts of a full range of reasonably foreseeable compliance responses to all the recommendations, including the Proposed Amendments and considered the cumulative effect of other "closely related" past, present, and future reasonably foreseeable activities undertaken to address air quality at the State level, as well as other activities with "related impacts" (CEQA Guidelines 15355(b); 15130(a)(1)). CARB has determined that the cumulative effects of the Proposed Amendments have been examined at a sufficient level of detail in the State SIP Strategy. Therefore, CARB has determined that for a cumulative analysis of the Proposed Amendments, it is appropriate to rely on the cumulative analysis contained in the State SIP Strategy EA. The analysis of the State SIP Strategy EA is hereby incorporated by reference. The portions of the State SIP Strategy EA relevant to this discussion are also summarized below.

The analysis of cumulative impacts includes the following:

- A summary of the cumulative impacts found for each resource area in the SIP Strategy EA (certified by the Board in March 2017).
- A discussion of the types of compliance responses associated with the Proposed Amendments, pertinent to each resource area.
- A significance conclusion that determines if the Proposed Amendments could result in a significant cumulative effect or a considerable contribution to an existing significant cumulative impact.

This approach to cumulative impacts analysis is "guided by the standards of practicality and reasonableness" (Title 14 CCR Section 15130(b)) and serves the purpose of providing "a context for considering whether the incremental effects of the project at issue are considerable" when judged "against the backdrop of the environmental effects of other projects." (CBE v. Cal. Res. Agency (2002) 103 Cal.App.4th 98, 119).

1. Summary of the Statewide State Implementation Plan Strategy Compliance Responses

The objectives of the State SIP Strategy are to:

1. Provide the necessary emission reductions for all of California's nonattainment areas to meet federal ambient air quality standards by the attainment dates specified by the U.S. EPA;

2. Support the development and submittal of an approvable SIP to the U.S. EPA. To meet U.S. EPA requirements for approvable SIPs, the measures must include commitments to achieve emission reductions that are real, permanent, quantifiable, verifiable, and enforceable;

3. Complement existing programs and plans – to ensure, to the extent feasible, that activities undertaken pursuant to the measures complement, and do not interfere with, existing planning efforts to reduce GHG emissions, use of petroleum-based transportation fuels, and TAC emissions;

4. Incentivize and support emerging technology that will be needed to achieve CARB's SIP goals;

5. Establish requirements for cleaner technologies (both zero and near-zero emission technologies), coupled with cleaner renewable fuels to achieve CARB's SIP goals;

6. Introduce zero-emission technology in targeted applications to achieve CARB's SIP goals;

7. Ensure the in-use vehicle and engine fleets remain durable, and that in-use vehicles continue to operate at their cleanest possible level to achieve CARB's SIP goals; and

8. Incentivize early introduction of advanced clean technologies to achieve CARB's SIP goals.

The State SIP Strategy includes measures to reduce emissions from six source categories: on-road light-duty vehicles, on-road heavy-duty vehicles, off-road federal and international sources, off-road equipment, fuels, and consumer products. A summary of the measures and their associated reasonably foreseeable compliance responses is provided below.

i. On-Road Light-Duty Vehicles

The on-road light-duty transportation sector consists of light-duty vehicles such as passenger cars, minivans, most sport utility vehicles and pickup trucks, and motorcycles. Measures include the Advanced Clean Cars 2, Lower In-Use Emission Performance Assessment, and Further Deployment of Cleaner Technologies: On-Road Light Duty Vehicles. Reasonably foreseeable compliance responses could include:

- An increase in the demand for lithium-ion batteries and an associated increase in manufacturing facilities, lithium mining and exports, and battery disposal and recycling activities;

- Development of new hydrogen refueling stations and electric vehicle charging stations; technical studies, new testing procedures, and minor facility modifications and new equipment for roadside testing; and

- Recycling or scrapping of old vehicles, or selling vehicles to areas outside of California.

ii. On-Road Heavy-Duty Vehicles

The on-road heavy-duty vehicle (HDV) sector consists of heavy-duty gas and diesel trucks, urban and school buses, and motorhomes. Measures include the Lower In-Use Emission Performance Level, Low-NOx Engine Standard, Medium and Heavy-Duty GHG Phase 2, Innovative Clean Transit, Last Mile Delivery, Innovative Technology Certification Flexibility, Zero-Emission Airport Shuttle Buses, Incentive Funding to Achieve Further Emission Reductions from On-Road HDV, and Further Deployment of Cleaner Technologies: On-Road Heavy-Duty.

Reasonably foreseeable compliance responses could include:

- New or modified testing centers to facilitate a new "smog check" program for heavy-duty trucks;

- Changes in engine manufacturing to include near-zero emission technology;

- Changes in design and manufacturing of heavy-duty trucks and tractor-trailers to improve engine and vehicle efficiency and aerodynamic performance;

- Recycling or scrapping of old vehicles, or selling vehicles to areas outside of California;

- An increase in manufacturing and associated facilities to supply zero-emission vehicles (i.e., buses, last mile delivery trucks, airport shuttle buses) along with construction of new hydrogen fueling stations, natural gas fueling stations, and electric vehicle charging stations;

- An increase in the demand for lithium-ion batteries and an associated increase in manufacturing facilities, lithium mining and exports, and battery disposal and recycling activities;

- Increased advanced technology research as well as increased development and deployment of lower emitting medium and HDVs and engines;

- An increase in the rate of heavy-duty fleet or vehicle component turnover, which may result in recycling or scrapping of old vehicles; and

- Increased use of optionally certified low-NOx engines.

iii. Off-Road Federal and International Sources

The off-road federal and international sources category consists of emissions associated with ships, locomotives, and aircraft. Measures include the More Stringent National Locomotive Emission Standards, Tier 4 Vessel Standards, Incentivize Low-Emission Efficient Ship Visits, amendments to the At-Berth Regulation, and Further Deployment of Cleaner Technologies: Off-Road Federal and International Sources.

Reasonably foreseeable compliance responses could include:

- New locomotive production facilities;
- Transportation and storage of renewable natural gas and hydrogen;
- An increase in the demand for lithium-ion batteries and an associated increase in manufacturing facilities, lithium mining and exports, and battery disposal and recycling activities;
- Adoption of more stringent emissions standards for new vessels and vessel efficiency upgrades;
- The docking of cleaner, more efficient large ships (capacity greater than 14,000 twenty-foot equivalent units) in California's ports; and
- Use of bonnet capture devices at ports, electric system upgrades to ships and terminals.

iv. Off-Road Equipment

The off-road equipment category encompasses lawn and garden equipment, TRUs, vehicles and equipment used in construction and mining, forklifts, cargo handling equipment, commercial harbor craft, and other industrial equipment. Measures include the Zero-Emission Off-Road Forklift Regulation Phase 1, Zero-Emission Off-Road Emission Reduction Assessment, Zero-Emission Off-Road Worksite Emission Reduction Assessment, Zero-Emission Airport Ground Support Equipment, Small Off-Road Engines, Transport Refrigeration Units Used for Cold Storage, and Further Deployment of Cleaner Technologies: Off-Road Equipment.

Reasonably foreseeable compliance responses could include:

- Increase in manufacturing, production, and use of zero-emission technology in forklifts, airport ground support equipment, small off-road engines, TRUs;
- Construction or modification of manufacturing facilities, new hydrogen fueling stations, and electric vehicle and equipment charging stations;

- An increase in the demand for lithium-ion batteries and an associated increase in manufacturing facilities, lithium mining and exports, and battery disposal and recycling activities; and

- An increase in the turnover rate of engines and/or components for off-road equipment, which may result in recycling or scrapping of old engines or components.

v. Fuels

Measures include the Low-Emissions Diesel Requirement, which would reduce emissions from the portion of the heavy-duty fleet that will continue to operate on internal combustion engines, in order to reduce emissions as quickly as possible.

Reasonably foreseeable compliance responses could include:

- Increased demand for renewable diesel, biodiesel, or other Low-Emission Diesel fuel feedstocks, such as oil seeds or forest residues, and/or increased imports of tallow and used cooking oil into California for processing;

- Additional infrastructure to support the collection, processing, and distribution of biomethane may be required; and

- Changes to fuel processing and transport.

vi. Consumer Products

Chemically formulated consumer products such as automotive care products, household care products, and personal care products are the largest source category of ROG emissions in the South Coast, and the fourth largest category statewide. Measures include the Consumer Products Program, which would maintain the success of current consumer products regulations in light of population growth. Reasonably foreseeable compliance responses would include continuing CARB's commitment to reduce ROG emissions from consumer products.

2. Summary of the State SIP Strategy Environmental Impacts

The State SIP Strategy EA evaluated the environmental impacts related to the reasonably foreseeable compliance responses described above. Table 5.2-1 provides a summary of the conclusions of these impacts.

Table 5.A-1: Summary of the State SIP Strategy Environmental Analysis Impacts by Sector

Resource Areas and Impact Categories	Significance Determination
Aesthetics	
Construction-Related and Operational Impacts	PSU

Table 5.A-1: Summary of the State SIP Strategy Environmental Analysis Impacts by Sector

Resource Areas and Impact Categories	Significance Determination
Agriculture and Forest Resources	
Construction-Related and Operational Impacts	PSU
Air Quality	
Construction-Related Impacts	PSU
Operational Impacts	B
Biological Resources	
Construction-Related Impacts	PSU
Operational Impacts	PSU
Cultural Resources	
Construction-Related and Operational Impacts	PSU
Energy Demand	
Construction-Related Impacts	LTS
Operational Impacts	B
Geology, Soils, and Minerals	
Construction-Related and Operational Impacts	PSU
Greenhouse Gas	
Construction-Related and Operational Impacts	B
Hazards and Hazardous Materials	
Construction-Related Impacts	PSU
Operational Impacts	LTS
Hydrology and Water Quality	
Construction-Related Impacts	PSU
Operational Impacts	PSU
Land Use and Planning	
Construction-Related and Operational Impacts	LTS
Mineral Resources	
Construction-Related Impacts	LTS
Operational Impacts	LTS
Noise	
Construction-Related Impacts	PSU
Operational Impacts	PSU

Table 5.A-1: Summary of the State SIP Strategy Environmental Analysis Impacts by Sector

Resource Areas and Impact Categories	Significance Determination
Population and Housing	
Construction-Related and Operational Impacts	LTS
Public Services	
Construction-Related and Operational Impacts	LTS
Recreation	
Construction-Related and Operational Impacts	LTS
Transportation	
Construction-Related Impacts	PSU
Operational Impacts	PSU
Utilities and Service Systems	
Operational Impacts	PSU

B. Significance Determinations and Mitigation

Implementation of the Proposed Amendments was determined to potentially result in cumulatively considerable contributions to significant cumulative impacts to certain resource areas, as discussed below. While suggested mitigation is provided for each potentially cumulatively considerable impact, the mitigation needs to be implemented by lead agencies responsible for permitting compliance-response projects. Where impacts cannot be feasibly mitigated, the Draft Supplemental EA recognizes the impact as significant and unavoidable. The Board will need to adopt Findings and a Statement of Overriding Considerations for any significant and unavoidable environmental effects of the project as part of the approval process.

C. Cumulative Impacts by Resource Area

1. Aesthetics

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could result in impacts to aesthetic resources. As discussed in the State SIP Strategy EA, there is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction and operation of these facilities (although likely to occur in areas zoned or used for manufacturing or industrial purposes that could contain visually similar facilities), could conceivably introduce or increase the presence of artificial elements (e.g., heavy-duty equipment, removal of existing vegetation, buildings) in areas of scenic importance, such as areas visible from State scenic highways. The visual impact of such

development would depend on several variables, including the type and size of facilities, distance and angle of view, visual absorption, and facility placement in the landscape. In addition, facility operation may introduce substantial sources of glare, exhaust plumes, and nighttime glare from lighting for safety and security. Implementation of mitigation measures would not necessarily reduce these impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the SIP Strategy could result in a significant cumulative aesthetics-related impact.

The Proposed Amendments' impacts to aesthetics would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of changes to the visual environment from new permanent structures, introduction of nighttime lighting, increased mining, and ground disturbance and vegetation removal. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on aesthetics.

2. Agriculture and Forestry Resources

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could result in impacts to agriculture and forestry resources. As discussed in the State SIP Strategy EA, there is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction of new facilities could result in the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, Williamson Act conservation contracts, or forest land or timberland, resulting in the loss of these resources. Compliance with existing land use policies, ordinances, and regulations could minimize this impact. Land use impacts would be further addressed for individual projects through the local development review process. Mitigation measures were identified that could likely reduce these impacts. However, because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects, and because of the programmatic nature of this Draft Supplemental EA, impacts were determined to be potentially significant and unavoidable. Thus, the SIP Strategy, which includes the Proposed Amendments, could result in a significant cumulative impact to agriculture and forestry resources.

The Proposed Amendments' impacts to agriculture and forestry resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential for land conversion to non-agricultural and non-forest uses. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on agriculture and forestry resources.

3. Air Quality

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could result in a short-term increase in criteria air pollutants and TACs in proximity to where fuel production or handling facilities are constructed or modified, as well as generate unpleasant odors that could affect sensitive receptors. The short-term emissions would result from the use of heavy- duty construction equipment on a short-term basis. Therefore, the SIP strategy including the Proposed Amendments could generate emission levels that conflict with applicable air quality plans, violate or contribute substantially to an existing or projected ambient air quality standard violation, result in a cumulatively considerable net increase in non-attainment areas, or expose sensitive receptors to substantial pollutant concentrations or odors. Implementation of mitigation measures would not necessarily reduce construction-related air quality impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the SIP Strategy could result in a significant cumulative air quality impact related to these short-term emissions.

The Proposed Amendments' short-term impacts to air quality would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential for emissions from off-road construction equipment, material delivery trips, and construction worker-commute trips as well as fugitive dust emissions. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on air quality in the short term.

Overall, as discussed in the State SIP Strategy EA, the State SIP Strategy would result in substantial long-term reductions in criteria and toxic air pollutants, which is a beneficial long-term operational impact related to air quality. Statewide, implementation of the State SIP Strategy is anticipated to result in emission reductions of 206 tons per day of NOx, 67 tons per day ROG and 2 tons per day of PM2.5. Thus, in the long term, the State SIP Strategy **would not contribute to a cumulative impact**.

4. Biological Resources

The State SIP Strategy EA found that implementation of the recommended measures within the various source categories, which includes the Proposed Amendments, could result in a significant cumulative impact to biological resources from construction and operational activities associated with new or modified facilities or infrastructure. The exact location of these new facilities or the modification of existing facilities is uncertain. Construction could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. These activities would have the potential to adversely affect biological resources (e.g., species, habitat) that may reside or be present in those areas. Because there are biological species that occur, or even thrive, in developed settings, resources could also be adversely affected by construction and operations within disturbed areas at existing manufacturing facilities or at other sites in areas with zoning that would permit the development of manufacturing or industrial uses. Additionally, increased demand for biofuel feedstock production could result in expansion of agricultural lands into undeveloped areas, or areas that otherwise support biological resources. Implementation of mitigation measures would not reduce these impacts to a less-than-significant level because the authority to determine project-level impacts and require project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the State SIP Strategy EA, which includes the Proposed Amendments, could result in a significant cumulative impact.

The Proposed Amendments' impacts to biological resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of effects on habitat, special-status species, wildlife movement, and other aspects. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on biological resources.

5. Cultural Resources

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction activities associated with new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. Construction activities could require disturbance of undeveloped area, such as clearing of vegetation, earth movement and grading, trenching for utility lines, erection of new buildings, and paving of parking lots, delivery areas, and roadways. Demolition of existing structures may also occur before the construction of new buildings and structures. The cultural resources that could potentially be affected by ground disturbance activities could include, but are not limited to, prehistoric and historical archaeological sites, paleontological resources, historic buildings, structures, or archaeological sites associated with agriculture and mining, and heritage landscapes. Properties important to Native American communities and other ethnic groups, including tangible properties possessing intangible traditional cultural values, also may exist. Historic buildings and structures may also be adversely affected by demolition-related activities. Such resources may occur individually, in groupings of modest size, or in districts. Because culturally sensitive resources can also be found in developed settings, historic, archaeological, and paleontological resources, and places important to Native American communities could also be adversely affected by construction of new facilities. Implementation of mitigation measures would not necessarily reduce construction-related cultural resources impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, the SIP Strategy, which includes the Proposed Amendments, could result in a significant cumulative impact on cultural resources.

The Proposed Amendments' impacts to cultural resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential to damage and destroy cultural, prehistoric, historic, tribal cultural, and paleontological resources. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on cultural resources.

6. Energy Demand

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require

construction and operational activities associated with new or modified facilities or infrastructure. Temporary increases in energy demand associated with new facilities would include fuels used during construction, and gas and electric operational demands. Typical earth-moving equipment that may be necessary for construction includes graders, scrapers, backhoes, jackhammers, front-end loaders, generators, water trucks, and dump trucks. While energy would be required to complete construction for any new or modified facilities or infrastructure projects, it would be temporary and limited in magnitude and would not result in sustained increases in demand that would adversely affect energy supplies. Therefore, the SIP Strategy, which includes the Proposed Amendments, would result in a **less-than-significant cumulative impact** related to construction-related energy demand.

7. Geology and Soils

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction and operational activities associated with new or modified facilities or infrastructure. Construction and operation could be located in a variety of relatively high-risk geologic and soil conditions that are considered to be potentially hazardous. For instance, the seismic conditions at the site of a new facility may have high to extremely high seismic-related fault rupture and ground shaking potential associated with earthquake activity. New facilities could also be subject to seismic-related ground failure, including liquefaction and landslides. Construction and operational activities could be located in a variety of geologic, soil, and slope conditions with varying amounts of vegetation that would be susceptible to soil erosion. Strong ground shaking could also trigger landslides in areas where the natural slope is naturally unstable or is over-steepened by the construction of access roads and structures. Construction and operation could also occur in locations that would expose facilities and structures to expansive soil conditions. Development of new facilities could be susceptible to the presence of expansive soils particularly in areas of fine-grained sediment accumulation typically associated with playas, valley bottoms, and local low-lying areas. The specific design details, siting locations, seismic hazards, and geologic, slope, and soil conditions for any particular facilities that could occur as a result of reasonably foreseeable compliance responses are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of this analysis, development of these facilities could expose people and structures to relatively high levels of risk associated with strong seismic ground shaking, including liquefaction and landslides, and instability. These geologic, seismic, and soil-related conditions could result in damage to structures, related utility lines, and access roads, blocking access and posing safety hazards to people. Thus, implementation of the recommended actions in the SIP Strategy could result in a significant cumulative impact related to geology and soils.

The Proposed Amendments' impacts to geology and soils would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential for erosion, unstable slope conditions, and seismic

activity. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on geology and soils.

8. Greenhouse Gases

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction activities associated with new or modified facilities or infrastructure. Specific, project-related construction activities could result in increased generation of short-term GHG emissions in limited amounts associated with the use of heavy-duty off-road equipment, materials transport, and worker commutes. A majority of local agencies (e.g., air pollution control districts) do not recommend or require the quantification of short-term construction-generated GHGs for typical construction projects because these only occur for a finite period of time (e.g., during periods of construction) that is typically much shorter than the operational phase, and agencies generally recommended that GHG analyses focus on operational phase emissions, unless the project is of a unique nature requiring atypical (e.g., large scale, long-term) activity levels (e.g., construction of a new dam or levee) for which quantification and consideration (e.g., amortization of construction emissions over the lifetime of the project) may be recommended. Thus, short-term construction-related GHG emissions impacts associated with reasonably-foreseeable compliance responses for the recommended actions in the SIP Strategy are considered less than significant when considered in comparison to the overall GHG reduction associated with implementation of the SIP Strategy. Cumulative impacts would therefore be **less than significant**.

9. Hazards and Hazardous Materials

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could include construction and operation of new or modified facilities or infrastructure. Construction activities may require the transport, use, and disposal of hazardous materials. Construction activities generally use heavy-duty equipment requiring periodic refueling and lubricating. Large pieces of construction equipment (e.g., backhoes, graders) are typically fueled and maintained at the construction site. However, the transport, use, and disposal of hazardous materials would be required to comply with all applicable federal, State and local laws (see Attachment A of this Draft Supplemental EA). In addition, although there is uncertainty as to the exact locations where new facilities could be constructed or where existing facilities could be reconstructed, these would likely occur within footprints of existing manufacturing facilities, or in areas with zoning

that would permit the development of manufacturing or industrial uses. Implementation of the recommended actions in the SIP Strategy could result in a significant cumulative impact related to hazards and hazardous materials.

The Proposed Amendments' impacts related to hazards and hazardous materials would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of effects of disposal of hazardous materials, the potential for hazardous materials spills, and exposure and environmental effects from lithium. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** related to hazards and hazardous materials.

10. Hydrology and Water Quality

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could include construction and operation of new or modified facilities or infrastructure. Construction activities and long-term operations of new or modified facilities could be located in a variety of conditions with regards to altering drainage patterns, flooding, and inundation by seiche, tsunami, or mudflow. The level of susceptibility varies by location. The specific design details, siting locations, and associated hydrology and water quality issues are not known at this time and would be analyzed on a site-specific basis at the project level. Therefore, for purposes of CEQA disclosure, these potential hydrology and water quality-related impacts could be significant.

Implementation of mitigation measures to reduce these impacts would not necessarily reduce these impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the SIP Strategy could result in a significant cumulative impact to hydrology and water quality.

The Proposed Amendments' impacts to hydrology and water quality would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of effects on drainage patterns and exposure of people or structures to flood, seiche, tsunami, and mudflow. Additionally, lithium mining could result in groundwater overdraft and substantial effects on water quality. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be

cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on hydrology and water quality.

11. Land Use and Planning

Implementation of reasonably foreseeable compliance responses associated with the recommended actions in the SIP Strategy including the Proposed Amendments could require both construction and long-term operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. However, facilities would likely occur within the footprints of existing manufacturing facilities, or in areas with zoning that would permit the development of these facilities. Thus, implementation of the recommended actions would not be anticipated to divide an established community or conflict with a land use or conservation plan. Therefore, the SIP Strategy including the Proposed Amendments **would not result in a significant cumulative land use and planning impact**. As a result, the Proposed Amendments would not make a contribution to a significant cumulative land use and planning impact.

12. Mineral Resources

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. New facilities would likely occur within existing footprints or in areas with consistent zoning, where original permitting and analyses considered these issues; however, implementation of programs under the SIP Strategy could result in a significant cumulative effect.

In addition, some of the recommended actions and associated compliance responses could require the extraction of lithium used to manufacture battery technologies. Implementation of these measures would not substantially deplete the supply of lithium, which is also currently used in auto manufacturing processes; however, there is inherent uncertainty surrounding the level of increased lithium mining and battery production.

The State SIP Strategy EA found that implementation of the recommended measures within the various source categories, which includes the Proposed Amendments, would result in the construction and operation of new or modified facilities or infrastructure. Reasonably foreseeable compliance responses would likely occur within existing footprints or in areas with consistent zoning where original permitting and analyses considered the availability of mineral resources within specific project sites. In addition,

increased manufacturing and use of zero-emission technology and other electric-powered equipment would require increased battery production and increased lithium mining. In the case that new lithium mines are required, they would go through independent environmental review at the appropriate federal, State, or local level, and it is assumed that any new mines would be located in areas with appropriate zoning, and subject to federal, State, and/or local requirements. Worldwide demand of global lithium is estimated to be below 20 million metric tons for the period of 2010 through 2100, which is well-below the estimated worldwide reserves and resources currently known to exist. In addition, lithium battery recycling potential could supplement future increased demands. Appendix G of the CEQA Guidelines considers an impact on mineral resources to be the result in the loss of availability of a known mineral resource that would be of value to a local entity, a region, or the state. This type of impact could result from actions such as building a structure over an area that contains mineral resources, thereby prohibiting access to mining activities. While implementation of the State SIP Strategy could result in an increased demand in lithium, it would not substantially affect the availability of a mineral resource. Thus, the State SIP Strategy, which includes the Proposed Amendments, concludes that impacts to mineral resources would be less than significant. However, this analysis takes the conservative approach that increased demand for lithium could lead to increased development where mining for lithium is feasible, which could conceivably affect the availability of these mineral resources if access to resources becomes impeded. Additionally, increased lithium mining itself would contribute to the loss of availability of lithium as it is mined and consumed. This would be a significant cumulative impact.

The Proposed Amendments' impacts to mineral resources would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of effects on lithium availability. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on mineral resources.

13. Noise

The State SIP Strategy EA found that implementation of recommended actions, which included the recommendation for the Proposed Amendments, could require construction and operation of new or modified facilities or infrastructure. These activities could result in the generation of short-term construction noise in excess of applicable standards or that results in a substantial increase in ambient levels at nearby sensitive receptors, and exposure to excessive vibration levels, which would be potentially

cumulatively significant. Operational noise impacts would not typically be expected due to the fact that typical compliance response activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. However, operational effects of equipment constructed as a result of implementation of recommended actions associated with the Energy Sector and Green Buildings could result in potentially significant impacts. Implementation of mitigation measures would not necessarily reduce these impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the SIP Strategy could result in significant cumulative construction and operational noise impacts.

The Proposed Amendments noise and vibration impacts would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of noise and vibration during construction activities, noise from lithium mining activities, and operation of new facilities. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** related to noise and vibration.

14. Population and Housing

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction and operation of new or modified facilities or infrastructure. Activities related to the construction of these facilities would require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, a substantial amount of construction worker migration would not be likely to occur, and a sufficient construction employment base would likely be available. Construction activities would not require new additional housing or generate changes in land use. It would be expected that the aforementioned facilities would be located within areas of consistent zoning and have sufficient employees and housing to support their operation. Therefore, the SIP Strategy including the Proposed Amendments **would not result in a significant cumulative impact related to population and housing growth**.

15. Public Services

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could include

construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact location of these new facilities or the modification of existing facilities. These would likely occur within footprints of existing facilities, or in areas with zoning that would permit the development of these facilities. Construction activities would be anticipated to require relatively small crews, and demand for these crews would be temporary (e.g., 6 to 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur and that a sufficient construction employment base would likely be available. Construction activities would not require new additional housing to accommodate or generate changes in land use and, therefore, would not affect the provision of public services. It would be expected that the aforementioned facilities would be located within areas of consistent zoning and have sufficient public services to support their operation. Therefore, activities related to the SIP Strategy, which includes the Proposed Amendments, would **not result in a significant cumulative impact related to public services**.

16. Recreation

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction and operation of new or modified facilities or infrastructure. There is uncertainty as to the exact locations of potential new or modified facilities. These activities would likely occur within footprints of existing facilities, or in areas with zoning that would permit their development. In addition, demand for construction of these crews would be temporary (e.g., 6 to 12 months per project). Therefore, it would be anticipated that the need for a substantial amount of construction worker migration would not occur. Thus, construction activities associated with reasonably foreseeable compliance responses would not be anticipated to increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration would be likely to occur. In addition, the demand for new (or expansion of existing) recreational-related facilities would not occur as a result of construction activities. It would be expected that the aforementioned facilities would be located within areas of consistent zoning and have sufficient recreational facilities to support their operation. Therefore, the SIP Strategy including the Proposed Amendments would not result in a **significant cumulative impact related to recreational facilities**.

17. Transportation

The State SIP Strategy EA found that implementation of the recommended measures within the various source categories, which includes the Proposed Amendments, could result in a significant cumulative traffic impact from construction and operational activities associated with new or modified facilities or infrastructure. Although detailed information about potential specific construction activities is not currently available, it would be anticipated to result in short-term construction traffic (primarily motorized) from worker commute- and material delivery-related trips. Implementation of the State SIP Strategy could result in increased demand for Low-Emission Diesel fuels such as

renewable diesel or biomethane, and increased demand for feedstocks and inputs used to produce Low-Emission Diesel. While the total volume of fuel demanded in California is not anticipated to be affected by the proposed Low-Emission Diesel measure, it is anticipated to change the types of fuels consumed, which could result in substantial long-term effects on local routes' traffic patterns due to differences in where feedstocks are sourced, and how the finished fuels are transported. In addition, transportation patterns may change in relation to the location and operational shipping needs of new facilities. Depending on the number of trips generated and the location of new facilities, implementation could conflict with applicable programs, plans, ordinances, or policies (e.g., performance standards, congestion management); and/or result in hazardous design features and emergency access issues from road closures, detours, and obstruction of emergency vehicle movement, especially due to project-generated heavy-duty truck trips. Additionally, as discussed above under Impact 17-1, the CEQA Guidelines have been modified to include consideration of VMT as part of the Appendix G thresholds. This document takes a conservative approach that VMT impacts may also be significant due to increases in VMT across SIP regulations. Implementation of mitigation measures would not necessarily reduce these impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the SIP Strategy could result in a significant cumulative transportation impacts.

The Proposed Amendments impacts to transportation would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the potential for hazardous design features, obstruction of emergency vehicle movement, and increase in VMT. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** on transportation.

18. Utilities and Service Systems

The State SIP Strategy EA found that implementation of the recommended actions, which included the recommendation for the Proposed Amendments, could require construction and operations of new or modified facilities or infrastructure. Newly constructed or modified facilities could generate substantial increases in the demand for water supply, wastewater treatment, storm water drainage, and solid waste services in their local areas. Any new or modified facilities would be required to comply with all applicable laws and regulations, including obtaining any required local or State land use

approvals, prior to their development. The specific location and type of construction needs is not known and would be dependent upon a variety of market factors that are not within the control of CARB, including: economic costs, product demands, environmental constraints, and other market constraints. Thus, the specific impacts from construction on utility and service systems cannot be identified with any certainty. Implementation of mitigation measures would not necessarily reduce these impacts to a less-than-significant level because the ability to determine project-level impacts and impose project-level mitigation lies with land use and/or permitting agencies for individual projects. Thus, implementation of the recommended actions in the SIP Strategy could result in a significant cumulative impact with respect to utilities and service systems.

The Proposed Amendments utilities and service systems impacts would be significant and unavoidable on their own, as concluded in Chapter 4. These impacts would be significant because of the possible need for new or expanded manufacturing facilities that increase the demand for utilities and service systems. Because the Proposed Amendments on its own would result in a significant and unavoidable impact, the project's contribution to the significant cumulative impact would also be cumulatively considerable. Implementation of the project-level mitigation identified in Chapter 4 could likely effectively reduce the incremental contribution from the Proposed Project to a less-than-considerable level, but authority to require that mitigation will rest with other agencies that will be authorizing site-specific projects, and not with CARB. Thus, as noted in Chapter 4, CARB's implementation and enforcement of project-level mitigation is legally infeasible. Therefore, the Proposed Amendments **could result in a cumulatively considerable contribution to a significant cumulative impact** related to utilities and service systems.

19. Wildfire

Appendix G of the State CEQA Guidelines was amended in 2018, after certification of the State SIP Strategy EA, to include several questions related to wildfire. The CEQA Guidelines Appendix G questions address: impairment of an adopted emergency response plan or emergency evaluation plan; the potential to exacerbate wildfire risks and associated pollutants and uncontrolled spread of wildfire; the requirement to install or maintain infrastructure that could exacerbate fire risk; and the exposure of people or structure to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

The State SIP Strategy EA evaluated some fire risks in its discussion of hazards. The State SIP Strategy EA discussed the potential for lithium batteries to overheat and ignite, but also concluded that the risk is increased in the case of poor packaging, damage, or exposure to fire or a heat source. When packaged and handled properly, lithium batteries pose no environmental hazard. Additionally, existing methods and recommendations exist for battery system performance to assure that a single point fault will not result in fire or explosion. The SIP Strategy including the Proposed Amendments would result in less than significant impacts related to hazards.

As discussed for Impact 19-1, individual facilities and associated infrastructure would be placed within response areas for various jurisdictions and would be dealt with in the same manner as existing infrastructure. Facilities would be developed in areas that are zoned for industrial or other appropriate uses; therefore, changes or modifications to existing fire response and evacuation plans would not be necessary. Projects implemented under the Proposed Project would not create growth substantial enough to impede emergency response or affect evacuation route capacity. Therefore, the proposed Amendments would not contribute to cumulative impacts related to these resource areas. As discussed in Impact 19-1, adherence to local plans, policies, codes, and ordinances; adherence to the California Fire Code and the provisions of wildfire prevention plans; and oversight by CPUC—would substantially reduce the risk of wildfire ignitions caused by infrastructure development such as overhead powerlines. Other entities operating and constructing power lines would be subject to similar requirements. Therefore, the SIP Strategy including the Proposed Amendments would **not result in a significant cumulative impact related to wildfire**.

D. Growth-Inducing Impacts

A project would be considered growth-inducing if it removes an obstacle to growth, includes construction of new housing, or establishes major new employment opportunities. The reasonably foreseeable compliance responses associated with the Proposed Amendments would not directly result in any growth in population or housing, as the Proposed Amendments are meant to spur changes in the existing TRU fleet and are not meant to create new TRU fleets where they do not exist. Therefore, the Proposed Amendments would not require substantial relocation of employees.

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6.0 Mandatory Findings of Significance

Consistent with the requirements of the CEQA Guidelines section 15065 and section 18 of the Environmental Checklist, this Draft Supplemental EA addresses the mandatory findings of significance for the Proposed Amendments.

A. Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat for a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory?

A finding of significance is required if a project "has the potential to substantially degrade the quality of the environment" (Title 14 CCR Section 15065(a)). In practice, this is the same standard as a significant impact on the environment, which is defined as "a substantial or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance" (Title 14 CCR Section 15382). As with all of the environmental effects and issue areas, the precise nature and magnitude of impacts would depend on the types of projects authorized, their locations, their aerial extent, and a variety of site-specific factors that are not known at this time but that would be addressed by environmental reviews at the project-specific level. For projects within California, all of these issues would be addressed through project-specific environmental reviews that would be conducted by local land use agencies or other regulatory bodies at such time as the projects are proposed for implementation. Outside of California, other state and local agencies would consider the proposed projects in accordance with their laws and regulations. CARB would not be the agency responsible for conducting the project-specific environmental or approval reviews because it is not the agency with authority for making land use or project implementation decisions.

This Draft Supplemental EA addresses and discloses potential environmental effects associated with implementation of the Proposed Amendments, including direct, indirect, and cumulative impacts. As described in Chapter 4, this Draft Supplemental EA discloses potential environmental impacts, the level of significance prior to mitigation, mitigation measures, and the level of significance after the incorporation of mitigation measures.

B. Does the project have impacts that are individually limited, but cumulatively considerable?

A lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has potential environmental effects that are individually limited, but cumulatively considerable (Title 14 CCR Section 15065). Cumulatively considerable means "that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Title 14 CCR Section 15065(a)(3))." Cumulative impacts are discussed in Chapter 5 in the Draft Supplemental EA.

C. Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?

A lead agency shall find that a project may have a significant effect on the environment where there is substantial evidence that the project has the potential to cause substantial adverse effects on human beings, either directly or indirectly (Title 14 CCR Section 15065(a)(4)). Under this standard, a change to the physical environment that might otherwise be minor must be treated as significant if people would be significantly affected. This factor relates to adverse changes to the environment of human beings generally, and not to effects on particular individuals. While changes to the environment that could indirectly affect human beings would be represented by all of the designated CEQA issue areas, those that could directly affect human beings include air quality, geology and soils, hazards and hazardous materials, hydrology and water quality, noise, population and housing, public services, transportation, and utilities, which are all addressed in Chapter 4, "Impact Analysis" of this Draft Supplemental EA.

7.0 Alternatives Analysis

This chapter of the Draft Supplemental EA provides an overview of the regulatory requirements and guidance for alternatives analyses under CEQA; a description of each of the alternatives to the Proposed Amendments; a discussion of whether and how each alternative meets the objectives of the Proposed Amendments, and an analysis of each alternative's environmental impacts.

A. Approach to Alternatives Analysis

CARB's certified regulatory program (title 17 CCR Sections 60000–60008) requires that, where a contemplated action may have a significant effect on the environment, a staff report shall be prepared in a manner consistent with the environmental protection purposes of CARB's regulatory program and with the goals and policies of CEQA. Among other things, the staff reports must address feasible alternatives to the proposed action that would substantially reduce any significant adverse impact identified.

The certified regulatory program provides general guidance that any action or proposal for which significant adverse environmental impacts have been identified during the review process shall not be approved or adopted as proposed if there are feasible mitigation measures or feasible alternatives available which would substantially reduce such an adverse impact. For purposes of this section, "feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors, and consistent with CARB's legislatively mandated responsibilities and duties (Title 14 CCR Section 15364).

While CARB, by virtue of its certified program, is exempt from Chapters 3 and 4 of CEQA and corresponding sections of the State CEQA Guidelines, the Guidelines nevertheless contain useful information for preparation of a thorough and meaningful alternatives analysis. CEQA Guidelines section 15126.6(a) speaks to evaluation of "a range of reasonable alternatives to the project, or the location of the project, which would feasibly attain most of the basic project objectives but would avoid or substantially lessen any of the significant effects, and evaluate the comparative merits of the alternatives." The purpose of the alternatives analysis is to determine whether different approaches to, or variations of, the project would reduce or eliminate significant project impacts, within the basic framework of the objectives, a principle that is consistent with CARB's regulatory requirements.

Alternatives considered in an environmental document should be potentially feasible and should attain most of the basic project objectives. It is, therefore, critical that the alternatives analysis define the project's objectives. The project objectives are listed below in Section C of this Chapter.

The range of alternatives is governed by the "rule of reason," which requires evaluation of only those alternatives "necessary to permit a reasoned choice" (Title 14 CCR Section 15126.6(f)). Further, an agency "need not consider an alternative whose effect cannot

be reasonably ascertained and whose implementation is remote and speculative" (Title 14 CCR Section 15126.6(f)(3)). The analysis should focus on alternatives that are feasible and that take economic, environmental, social, and technological factors into account. Alternatives that are remote or speculative need not be discussed. Furthermore, the alternatives analyzed for a project should focus on reducing or avoiding significant environmental impacts associated with the project as proposed.

B. Selection of Range of Alternatives

This chapter evaluates a range of alternatives to the Proposed Amendments that could reduce or eliminate significant effects on the environment, while still meeting basic project objectives (Title 14 CCR Section 15126.6(a)). Pursuant to CARB's certified regulatory program, this chapter also contains an analysis of each alternative's feasibility and the likelihood that it would substantially reduce any significant adverse environmental impacts identified in the impact analysis contained in Chapter 4 of this Draft Supplemental EA (Title 17 CCR section 60004.2(a)(5)).

CARB has identified three alternatives that allow the public and Board to contemplate the differences between different approaches. Additionally, CARB has identified but rejected two alternatives from further analysis. CARB has made a good faith effort to identify potentially feasible project alternatives.

For the purposes of this analysis, five alternatives are considered:

1. Alternative 1 (No-Project Alternative)
2. Alternative 2 (Diesel PM Emission Standard Applies to Truck TRUs)
3. Alternative 3 (Shorter Timeline and Reduced Zero-Emission Fleet Percentage for Truck TRUs)
4. Alternative 4 (No Zero-Emission Truck TRU Phase-in Schedule)
5. Alternative 5 (Ultra-Low NOx TRUs)

C. Project Objectives

The primary objectives of the Proposed Amendments include the following:

1. Achieve reductions of NOx, $PM_{2.5}$, GHG, diesel PM, black carbon, and HFC emissions from TRUs to provide public health benefits in communities near facilities that are heavily burdened by freight pollution.
2. Achieve the maximum emission reductions possible from TRUs to attain the NAAQS for criteria air pollutants (Health & Safety Code Sections 43000.5(b), 43018(a)).

3. Develop a regulation that is consistent with and meets the goals of the SIP, providing necessary emission reductions for all of California's nonattainment areas to meet federal ambient air quality standards (Health & Safety Code Sections 39002, 39003, 39602.5, 43018, 43000, 43000.5, 43013, 43018).

4. Reduce the State's dependence on petroleum as an energy resource and support the use of diversified fuels in the State's transportation fleet (Health & Safety Code Section 43000(e), PRC Section 25000.5). In addition, petroleum use as an energy resource contributes substantially to the following public health and environmental problems: air pollution, acid rain, global warming, and the degradation of California's marine environment and fisheries (PRC Section 25000.5(b), (c)).

5. Decrease GHG emissions in support of statewide GHG reduction goals by limiting the use of internal combustion engine-powered TRUs, as identified in the Scoping Plan, which was developed to reduce GHG emissions in California, as directed by AB 32. CARB's 2017 Climate Change Scoping Plan and 2016 Mobile Source Strategy aim to accelerate development and deployment of the cleanest feasible mobile source technologies and to improve access to clean transportation. Implementation of the Proposed Project would also provide further GHG reductions pursuant to AB 1493 (Ch. 200, Stats. of 2002, Pavley).

6. Maintain and continue reductions in emissions of GHGs beyond 2020, in accordance with AB 32 (Health & Safety Code Sections 38551(b), 38562, 38562.5, 38566); pursue measures that implement reduction strategies covering the State's GHG emissions in furtherance of California's mandate to reduce GHG emissions to the 1990 level by 2020 and 40 percent below the 1990 level by December 31, 2030.

7. Decrease HFC emissions through the use of lower-GWP refrigerants in TRUs, in accordance with SB 1383, which requires a 40 percent reduction of HFC emissions below 2013 levels by 2030.

8. Lead the transition of California's off-road sector to zero-emission technology.

9. Complement existing programs and plans to ensure, to the extent feasible, that activities undertaken pursuant to the measures complement, and do not interfere with, existing planning efforts to reduce GHG emissions, criteria pollutants, petroleum-based transportation fuels, and TAC emissions.

10. Achieve emission reductions that are real, permanent, quantifiable, verifiable, and enforceable (Health & Safety Code Sections 38560, 38562(d)(1)).

11. Improve zero-emission technologies for TRUs and fueling infrastructure to guide the acceleration of the development of environmentally superior TRUs that will continue to deliver performance, practicality, and safety demanded by the market.

12. Ensure all Californians can live, work, and play in a healthful environment free from harmful exposure to air pollution. Protect and preserve public health and well-being, and prevent irritation to the senses, interference with visibility, and damage to vegetation and property (Health & Safety Code Section 43000(b)) in recognition that the emission of air pollutants from motor vehicles is the primary cause of air pollution in many parts of the State (Health & Safety Code Section 43000(a)).

D. Description of Alternatives

Detailed descriptions of each alternative are presented below. The analysis that follows the descriptions of the alternatives includes a discussion of the degree to which each alternative meets the basic project objectives, and the degree to which each alternative avoids a potentially significant impact identified in Chapter 4, and any environmental impacts that may result from the alternative.

1. Alternative 1: No-Project Alternative

a) Alternative 1 Description

Alternative 1, the "No-Project Alternative," is included to disclose environmental information that is important for considering the Proposed Amendments. It is useful to include a "No Project Alternative" in this analysis for the same reasons that this type of alternative is called for in the State CEQA Guidelines. As noted in the State CEQA Guidelines, "the purpose of describing and analyzing a no-project alternative is to allow decision-makers to compare the impacts of approving the proposed project with the impacts of not approving the proposed project" (Title 14 CCR Section 15126.6(e)(1)). The No-Project Alternative also provides an important point of comparison to understand the potential environmental benefits and impacts of the other alternatives.

Under Alternative 1, the Proposed Amendments would not be implemented. There would be no requirement for truck TRUs to transition to full zero-emission technology by 2031. There would be no requirement for newly-manufactured trailer TRU, domestic shipping container TRU, railcar TRU, or TRU generator set engines to meet a more stringent PM emission standard. There would also be no requirement to use lower-GWP refrigerants.

b) Alternative 1 Discussion

i) Objectives

The No-Project Alternative would fail to meet many of the project objectives listed in Chapter 2 (and reproduced above). First, there would be no reductions in criteria air pollutants that would provide public health benefits, achieve NAAQS, and meet the goals of the SIP. The alternative also would not reduce the State's dependence on petroleum for energy or support the use of diversified fuels. Additionally, the No-Project Alternative would not decrease GHG emissions in support of AB 32 or reduce HFC emissions. The No-Project Alternative also would not result in improvements to

zero-emission technologies, nor would it lead the transition of California's off-road sector to zero-emission technology.

In summary, the No Project Alternative would not meet most of the basic project objectives.

ii) Environmental Impacts

There would be no new environmental impacts under the No Project Alternative compared to baseline because no compliance responses would occur. It is anticipated that the No Project Alternative would not result in the development of new manufacturing plants that specialize in the production of batteries, or the modification or expansion of existing production facilities. Thus, no impacts related to new or expanded facilities would occur under the No Project Alternative. Additional lithium mining activities also would not occur.

Without implementation of the Proposed Amendments, the beneficial impacts resulting from the Proposed Amendments would not occur. There would be no reductions in criteria air pollutants that would provide public health benefits, achieve NAAQS, and meet the goals of the SIP. Additionally, the No-Project Alternative would not decrease GHG emissions in support of AB 32, or reduce HFC emissions. Therefore, as described above, this alternative would fail to meet most of the basic project objectives.

2. Alternative 2: Diesel PM Emission Standard Applies to Truck TRUs

a) Alternative 2 Description

Under Alternative 2, all newly-manufactured TRU engines (in truck TRUs, trailer TRUs, domestic shipping container TRUs, railcar TRUs, and TRU generator sets) would be required to meet a more stringent PM emission standard. In contrast to the Proposed Amendments, Alternative 2 would not include a requirement for truck TRUs to transition to zero-emission technology. The refrigerant requirement would remain unchanged from the Proposed Amendments.

b) Alternative 2 Discussion

i) Objectives

The requirement to use lower-GWP refrigerants in new equipment would be the same as for the Proposed Amendments. Therefore, Alternative 2 would meet Objective 7 the same as the Proposed Amendments. Alternative 2 would meet Objective 10 because it would result in emissions reductions that are real, permanent, quantifiable, verifiable, and enforceable.

Alternative 2 would partially meet Objective 1, which is to achieve reductions of NOx, $PM_{2.5}$, GHG, diesel PM, black carbon, and HFC emissions from TRUs to provide public health benefits in communities near facilities that are heavily burdened by freight pollution. Alternative 2 would reduce $PM_{2.5}$, GHG, diesel PM, black carbon, and HFC emissions, but not NOx emissions from TRUs. Alternative 2 would also partially meet Objective 3, which is to be consistent with the goals of the SIP. The SIP TRU measure

included a goal to advance zero and near-zero emission technology for TRUs to reduce NOx, PM, and GHG emissions. Alternative 2 would not advance zero-emission technology or reduce NOx emissions, but would reduce PM and GHG emissions. Alternative 2 would meet Objective 6 because it would reduce GHG emissions. However, Alternative 2 would not meet Objective 6 to the same degree as the Proposed Amendments because truck TRUs would continue to use fossil fuels rather than transition to zero-emission technology. Alternative 2 would partially meet Objective 9 because it would reduce GHG emissions and criteria pollutants, but would still require the use of petroleum-based transportation fuels. Alternative 2 would meet Objective 12, though not to the same extent as the Proposed Amendments.

Alternative 2 would not meet Objective 2 because it would not achieve the maximum emission reductions possible from TRUs, since greater emissions reductions are possible under the Proposed Amendments. Alternative 2 would not meet Objective 4 because TRUs would continue to use petroleum-based fuels. Alternative 2 would not meet Objectives 5, 8, or 11 because it would not limit use of internal combustion engine-powered TRUs, would not lead the transition of the off-road sector to zero-emission technology, and would not improve zero-emission technology for TRUs. In total, Alternative 2 would not meet five of the twelve objectives of the Proposed Amendments. Of the seven objectives Alternative 2 would meet, Alternative 2 meets some partially or to a lesser degree than the Proposed Amendments. Therefore, Alternative 2 could meet most of the basic objectives of the Proposed Amendments.

ii) Environmental Impacts

Under Alternative 2, impacts associated with manufacturing and operating zero-emission technologies would likely not occur. As a result, environmental impacts related to zero-emission TRU manufacturing would not occur or would be substantially reduced. Some impacts would likely occur, however, due to an increased production demand in TRU engines that meet the more stringent PM emission standard, resulting in similar impacts as the Proposed Amendments. These impacts would occur through the development of new or expanded facilities to accommodate new TRU products at TRU manufacturing centers. Impacts related to lithium mining and battery recycling would decrease, given no batteries are needed for TRU engines that meet more stringent PM standards. It is expected, however, that beneficial air quality, GHG, and energy effects would be much less than those that would likely occur with implementation of the Proposed Amendments, because TRUs would not be replaced with zero-emission TRUs. Given these substantially reduced beneficial effects from zero-emission TRUs, it is possible that the construction and operation of new or expanded facilities for the TRUs that meet the more stringent PM emission standard would result in significant adverse GHG and air quality impacts. Therefore, although Alternative 2 would avoid or substantially reduce impacts related to zero-emission TRU manufacturing, it would result in a substantial decrease in beneficial effects compared to the Proposed Amendments.

3. Alternative 3: Shorter Timeline and Reduced Zero-Emission Fleet Percentage for Truck TRUs

a) Alternative 3 Description

Under Alternative 3, the truck TRU compliance timeline would be shorter; however, the ultimate requirement for transitioning to zero-emission would be less than the Proposed Amendments. Under Alternative 3, truck TRU fleets, beginning in 2024, would be required to transition 50 percent of their fleet to zero-emission by 2030. Compared to the Proposed Amendments, this is one year sooner but requires only half of the zero-emission transition. This would result in approximately half of the infrastructure installations that would be expected under the Proposed Amendments. The refrigerant and more stringent diesel PM emission standard requirements would be the same as the Proposed Amendments.

b) Alternative 3 Discussion

i) Objectives

Alternative 3 meets most of the basic project objectives, though it does so to a lesser extent than the Proposed Amendments in some cases because it would not require as many truck TRUs to transition to zero-emission. For example, Alternative 3 meets Objective 1, which is to achieve reductions of NOx, $PM_{2.5}$, GHG, diesel PM, black carbon, and HFC emissions from TRUs to provide public health benefits in communities near facilities that are heavily burdened by freight pollution. However, the emission reductions achieved by Alternative 3 would be less than those under the Proposed Amendments.

Alternative 3 would not meet Objective 2 because it would not achieve the maximum emission reductions possible from TRUs, since greater emissions reductions are possible under the Proposed Amendments.

Alternative 3 would meet Objectives 4 and 6 to reduce the State's dependence on petroleum fuels and decrease GHG emissions, but to a lesser extent than the Proposed Amendments since fewer truck TRUs would transition to zero-emission technology. Alternative 3 would also meet Objectives 5, 8, and 11 to limit use of internal combustion engine-powered TRUs, lead the transition of the off-road sector to zero-emission technology, and improve zero-emission technology for TRUs, but to a lesser extent than the Proposed Amendments.

The requirement to use lower-GWP refrigerant would be the same as for the Proposed Amendments. Therefore, Alternative 3 would meet Objective 7 the same as the Proposed Amendments. Alternative 3 would meet most of the basic project objectives in accordance with CEQA's requirement, but largely not to the same degree as the Proposed Amendments.

ii) Environmental Impacts

Alternative 3 would result in lower overall demand for zero-emission TRUs and supporting infrastructure, such as electric chargers and fueling stations. Alternative 3 would therefore have reduced environmental impacts related to manufacturing of zero-emission TRUs and construction and operation of supporting infrastructure. Decreased environmental impacts would be related to fewer manufacturing facilities and infrastructure installations needed with the smaller scope reducing construction-related activities. As a result, Alternative 3 would lessen short-term construction-related impacts to resource areas such as biological resources, geology and soils, cultural resources, and hydrology and water quality associated with facility construction. Alternative 3 would also produce fewer operational impacts compared to the Proposed Amendments because of the reduced number of manufactured zero-emission TRUs at any potential new or expanded manufacturing facility; however, it is expected that, although impacts would be reduced, potentially significant and unavoidable impacts could still occur as they would under the Proposed Amendments since many of the compliance responses remain the same, albeit at a potentially reduced scale.

It is expected that beneficial air quality, GHG, and energy effects would be less than those that would be likely to occur with implementation of the Proposed Amendments because fewer diesel-powered TRUs would be replaced with zero-emission TRUs.

E. Alternatives Considered but Rejected

Additional alternatives were considered during development of alternatives to the Proposed Project. CEQA Guidelines Section 15126.6(c) includes three factors that may be used to eliminate alternatives from detailed consideration in an EIR: (1) failure to meet most of the basic project objectives; ii. Infeasibility, or iii. Inability to avoid a significant environmental impact.

1. Alternative 4: No Zero-Emission Truck TRU Phase-in Schedule

a) Alternative 4 Description

Alternative 4 would have the same requirements as the Proposed Amendments except for the phase-in schedule for the zero-emission truck TRU element. Under Alternative 4, there would be no annual zero-emission percentage requirement for truck TRUs. Instead, there would be a requirement for all truck TRUs to be zero-emission by December 31, 2029.

b) Alternative 4 Discussion

i) Objectives

Alternative 4 would meet the objectives of the Proposed Amendments because it ultimately would result in the same results as the Proposed Amendments.

ii) Environmental Impacts

The type and character of environmental impacts under Alternative 4 would be the same as for the Proposed Amendments, but could occur at a different speed when compared to the Proposed Amendments. Under Alternative 4, only the truck TRU requirement would be different, and the sole difference is that transitioning to 100 percent zero-emission truck TRU technology can take place at any annual rate under Alternative 4. Ultimately, although the impacts could occur at a different rate, they would be the same in magnitude and type. Therefore, Alternative 4 would not avoid or substantially reduce any significant impacts of the Proposed Project and is rejected for further consideration.

iii) Feasibility

This alternative is potentially feasible taking into account legal, environmental, and technological factors. Without a defined schedule for implementation, there may be concerns about industry meeting the 2031 compliance deadline. For example, should there be procrastination in fleet replacement such that most compliance occurs close to 2031, manufacturers may not have enough capacity to produce all units needed for full compliance.

2. Alternative 5: Ultra-Low NOx Truck TRUs

a) Alternative 5 Description

Alternative 5 would have the same requirements as the Proposed Amendments except for the truck TRU element. Under Alternative 5, truck TRUs would need to use low-NOx engines instead of ultimately transitioning to zero-emission technology, transitioning on the same timeline as for the Proposed Amendments (i.e., 15 percent per year).

b) Alternative 5 Discussion

i) Objectives

This alternative would meet most of the project objectives because it would include all of the types of emissions reductions as the Proposed Amendments, but to a lesser extent because it would only require low-NOx engines instead of zero-emission technology for truck TRUs. Alternative 5 would not meet Objective 2 because it would not achieve the maximum emission reductions possible from TRUs, since greater emissions reductions are possible under the Proposed Amendments. It meets other objectives, but to a lesser extent than the Proposed Amendments. For example, Alternative 5 meets Objective 1, which is to achieve reductions of NOx, $PM_{2.5}$, GHG, diesel PM, black carbon, and HFC emissions from TRUs to provide public health benefits in communities near facilities that are heavily burdened by freight pollution.

Alternative 5 would not meet Objectives 5, 8, and 11 to limit use of internal combustion engine-powered TRUs, lead the transition of the off-road sector to zero-emission technology, and improve zero-emission technology for TRUs, since combustion engines would still be used for truck TRUs. The requirement to use lower-GWP refrigerants in new equipment would be the same as for the Proposed Amendments. Because a

transition to zero-emission technology and promoting zero-emission technology is a critical goal in addition to emissions reductions goals, Alternative 5 would not meet most of the basic project objectives.

ii) Environmental Impacts

Alternative 5 would result in lower overall demand for zero-emission TRUs and would therefore have reduced environmental impacts related to manufacturing of zero-emission truck TRUs. However, such demand may then increase for ultra-low NOx truck TRUs, resulting in similar impacts as the Proposed Amendments. Impacts related to lithium mining and battery recycling may decrease, given no batteries are needed for ultra-low NOx truck TRUs. However, it is uncertain how big of a decrease in impacts that would be. It is expected that beneficial air quality, GHG, and energy effects would be less than those that would likely occur with implementation of the Proposed Amendments, because fewer TRUs would be replaced with zero-emission TRUs. Therefore, Alternative 5 would not avoid or substantially decrease significant impacts of the Proposed Amendments and can be dismissed from further consideration.

iii) Feasibility

Ultra-low NOx TRUs are not yet available, which would make the implementation of 15 percent truck TRU per year infeasible and, should this technology not be developed at a commercial level, could make the ultimate goal of 100 percent transition infeasible. Therefore, this alternative can also be dismissed based on infeasibility.

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Draft Supplemental Environmental Analysis Attachment A: Environmental and Regulatory Setting

For the Proposed

Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

California Air Resources Board
1001 I Street
Sacramento, California 95814

Date of Release: July 27, 2021

Table of Contents

List of Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AB	Assembly Bill
ACEC	Area of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
BLM	Bureau of Land Management
BMP	best management practice
Btu	British thermal units
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAL FIRE	California Department of Forestry and Fire Protection
CalEPA	California Environmental Protection Agency
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CARB	California Air Resources Board
CBSC	California Building Standards Code
CCA	California Coastal Act
CCAA	California Clean Air Act
CDFW	California Department Fish and Wildlife
CEC	California Energy Commission
Census	U.S. Census Bureau
CFCP	California Farmland Conservatory Program
CFR	Code of Federal Regulations

CGS	California Geological Survey
CHP	combined heat and power
CNEL	Community Noise Equivalent Level
CO_2	carbon dioxide
CO_2e	CO_2 equivalent
CPUC	California Public Utilities Commission
CVP	Central Valley Project
CWA	Clean Water Act
dB	decibels
DOC	California Department of Conservation
DOGGR	California Division of Oil, Gas, and Geothermal
DWR	Resources California Department of Water Resources
ENSO	El Niño-Southern Oscillation
EO	Executive Order
EPCA	Energy Policy and Conservation Act
ESA	Federal Endangered Species Act
FAA	Federal Aviation Administration
FERC	Federal Energy Regulatory Commission
FLPMA	Federal Land Policy and Management Act of 1976
FMMP	Farmland Mapping and Monitoring Program
FPPA	Farmland Protection Policy Act
FR	Federal Register
FTA	Federal Transit Administration
GWP	global warming potential

HCP	habitat conservation plan
IPCC	Intergovernmental Panel on Climate Change
L_{dn}	Day-Night Noise Level
L_{eq}	Equivalent Noise Level
LOS	level of service
MBTA	Migratory Bird Treaty Act
MMPA	Marine Mammal Protection Act
$MMTCO_2e$	million metric tons of CO_2 equivalent
mph	miles per hour
MPO	metropolitan planning organizations
MRZ	Mineral Resource Zone
MW	megawatts
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act of
NCCP	1990 Natural Community Conservation Planning
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NGPL	Natural gas plant liquid
NHPA	Natural Historic Preservation Act
NO	nitric oxide
NO_2	nitrogen dioxide
NO_x	oxides of nitrogen
NPDES	National Pollution Discharge Elimination System

OEHHA	Office of Environmental Health and Hazard Assessment
PFC	perfluorocarbon
PM_{10}	Respirable particulate matter
$PM_{2.5}$	fine particulate matter
PPV	peak particle velocity
RMS	root mean square
ROG	reactive organic gases
RTP	regional transportation plans
RWQCB	regional water quality control board
SBE	State Board of Education
SCS	sustainable community strategies
SDWA	Safe Drinking Water Act
SHPO	State Historic Preservation Officer
SLCP	short-lived climate pollutant
SMARA	Surface Mining and Reclamation Act
SO_2	Sulfur dioxide
SWP	State Water Project
SWPPP	Storm Water Pollution Prevention Plan
SWRCB	State Water Resources Control Board
U.S. EPA	U.S. Environmental Protection Agency
U.S.	United States
UIC	Federal Underground Injection
USACE	Control U.S Army Corps of Engineers

USBR	U.S. Bureau of Reclamation
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
VdB	vibration decibels
VMT	vehicle miles traveled
VOC	volatile organic compounds

1. Aesthetics

A. Existing Conditions

1. U.S.

The United States (U.S.), by its size, setting, and topographic and climate variation, exhibits tremendous scenic diversity. The varied landscape ranges from coastal to desert and valley to mountain. Innumerable natural features and settings combine to produce scenic resources that are treasured by residents and visitors alike.

Aesthetic value can be affected by visibility, which is directly related to the presence of airborne particles. Visibility-reducing particles consist of suspended particulate matter, a complex mixture of tiny particles consisting of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. Particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials such as metals, soot, soil, dust, inorganic salts, and organic compounds.

2. California

Like the U.S., the visual character of California varies greatly related to topography and climate. The foothills form a transitional landform from the valley floor to the higher Sierra Nevada, Cascade, and Coast Ranges. The valley floor is cut by two rivers that flow west out of the Sierra Nevada and east out of the Coast Ranges. Irrigated agriculture land is the primary landscape in the Sacramento and San Joaquin Valleys, and the foothill landscape has been altered by grazing, mining, reservoir development, and residential and commercial development. The visual character of the State also varies dramatically from the north, which is dominated by forestlands, and the south, which is primarily residential and commercial development.

B. Regulatory Setting

Applicable laws and regulations associated with aesthetics and scenic resources are discussed in Table 1.

Table 1: Applicable Laws and Regulations for Aesthetic Resources

Applicable Regulations	Description
Federal	
Federal Land Policy and Management Act of 1976 (FLPMA)	FLPMA is the enabling legislation establishing the Bureau of Land Management's (BLM's) responsibilities for lands under its jurisdiction. Section 102 (a) of the FLPMA states that "…the public lands be managed in a manner that will protect the quality of scientific, scenic, historical, ecological, environmental, air and atmospheric, water resources, and archeological values…" Section 103(c) identifies "scenic values" as one of the resources for which public land should be managed.
BLM Contrast Rating System	The contrast rating system is a systematic process used by BLM to analyze visual impacts of proposed projects and activities. It is primarily intended to assist BLM personnel in the resolution of visual impact assessment.
Natural Historic Preservation Act (NHPA)	Under regulations of the NHPA, visual impacts to a listed or eligible National Register property that may diminish the integrity of the property's "setting … [or] … feeling" in a way that affects the property's eligibility for listing may result in a potentially significant adverse effect. "Examples of adverse effects … include…: Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features." Title 36 Code of Federal Regulations (CFR) Part 800.5)
National Scenic Byways Program	Title 23, Sec 162 outlines the National Scenic Byways Program. This program is used to recognize roads having outstanding scenic, historic, cultural, natural, recreational, and archaeological qualities through designation of road as: National Scenic Byways; All-American Roads; or America's Byways. Designation of the byways provides eligibility for Federal assistance for safety improvement, corridor management plans, recreation access, or other projects that protect scenic, historical, recreational, cultural, natural, and archaeological resources.

Applicable Regulations	Description
State	
Ambient Air Quality Standard for Visibility-Reducing Particles	Extinction coefficient (measure of absorption of light in a medium) of 0.23 per kilometer — visibility of 10 miles or more (0.07 per kilometer — visibility of 30 miles or more for Lake Tahoe) due to particles when relative humidity is less than 70 percent.
California Streets and Highway Code, Section 260 through 263 – Scenic Highways	The State Scenic Highway Program promotes protection of designated State scenic highways through certification and adoption of local scenic corridor protection programs that conform to requirements of the California Scenic Highway Program.
Local	
County and City Controls	Most local planning guidelines to preserve and enhance the visual quality and aesthetic resources of urban and natural areas are established in the jurisdiction's general plan. This includes planning guidelines developed by ports. The value attributed to a visual resource generally is based on the characteristics and distinctiveness of the resource and the number of persons who view it. Vistas of undisturbed natural areas, unique or unusual features forming an important or dominant portion of a viewshed, and distant vistas offering relief from less attractive nearby features are frequently considered to be scenic resources. In some instances, a case-by-case determination of scenic value may be needed, but often there is agreement within the relevant community about which features are valued as scenic resources. In addition to federal and State designations, counties and cities have their own scenic highway designations, which are intended to preserve and enhance existing scenic resources. Criteria for designation are commonly included in the conservation/open space element of the city or county general plan.

2. Agriculture and Forestry Resources

A. Existing Conditions

1. U.S.

Forests in the U.S. are very diverse in composition and distribution, including oak-hickory and maple-beech-birch forests, as well as fir, pine, and redwood forests. It is estimated that, at the beginning of European settlement (circa 1630), the area of forestland in the current boundaries of the U.S. was approximately 423 million hectares, or about 46 percent of the total land area. By 1907, the area of forestland had declined to an estimated 307 million hectares, or 34 percent of the total land area. Forest area has been relatively stable since 1907. In 1997, 302 million hectares or 33 percent of the total land area of the U.S. was in forestland. As of 2000, forestland area amount to approximately 70 percent of the area that was forested in 1630. Since 1630, approximately 120 million hectares of forestland have been converted to other uses, primarily agriculture (USFS 2000).

U.S. land area amounts to nearly 2.3 billion acres, with nearly 1.2 billion acres in agricultural lands. The proportion of the land base in agricultural uses declined from 63 percent in 1949 to 51 percent in 2007, the latest year for which data are available. Gradual declines have occurred in cropland and pasture/range, while grazed forestland has decreased more rapidly. In 2007, 408 million acres of agricultural land were in cropland (-17 percent from 1949), 614 million acres were in pasture and range (-3 percent), 127 million acres were in grazed forestland (-52 percent), and 12 million acres were in farmsteads and farm roads (-19 percent) (USDA 2016).

The 2012 Census of Agriculture recorded 2,109,303 farms in the U.S. The top five states, based on the value of agricultural products sold and on their percentage of the total value are: California (10.8 percent), Iowa (7.8 percent), Texas (6.4 percent), Nebraska (5.8 percent) and Minnesota (5.4 percent). Most states have laws in place to support agriculture and protect agricultural land.

2. California

The State maps and classifies farmland through the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP). Classifications are based on a combination of physical and chemical characteristics of the soil and climate that determine the degree of suitability of the land for crop production. The classifications under the FMMP are as follows:

- Prime Farmland—land that has the best combination of features to produce agricultural crops;
- Farmland of Statewide Importance—land other than Prime Farmland that has a good combination of physical and chemical features to produce agricultural crops, but that has more limitations than Prime Farmland, such as greater slopes or less ability to store soil moisture;

- Unique Farmland—land of lesser quality soils used to produce the state's leading agricultural cash crops;
- Farmland of Local Importance—land of importance to the local agricultural economy;
- Grazing Land—existing vegetation that is suitable for grazing;
- Urban and Built-Up Land—land occupied by structures in density of at least one dwelling unit per 1.5 acres;
- Land Committed to Nonagricultural Use—vacant areas; existing land that has a permanent commitment to development but has an existing land use of agricultural or grazing lands; and
- Other Land— land not included in any other mapping category, common examples of which include low-density rural developments, brush, timber, wetland, and vacant and nonagricultural land surrounded on all sides by urban development.

CEQA Section 21095 and CEQA Guidelines Appendix G, together, define Prime, Unique, and Farmland of Statewide Importance as "Important Farmland," whose conversion may be considered significant. Local jurisdictions can further consider other classifications of farmland as important and can also use an agricultural land evaluation and site assessment model to determine farmland importance and impacts from conversion.

As of 2012, California contained approximately 5 million acres of Prime Farmland; approximately 2.6 million acres of Farmland of Statewide Important; approximately 1.3 million acres of Unique Farmland; approximately 3.2 million acres of Farmland of Local Importance; and approximately 19.2 million acres of grazing land (FMMP 2015).

In 2019, California produced 61 percent of the vegetables and 54 percent of the fruits and nuts in the U.S. California supplies 99 percent or more of the following to the U.S.: almonds, artichokes, celery, figs, garlic, raisin grapes, kiwifruit, honeydew melons, nectarines, olives, clingstone peaches, pistachios, plums, dried plums, sweet rice, ladino clover seed, and walnuts. In 2019, 69,900 farms operated in California, which is 0.7 percent more than in 2018. Almost 29 percent of California farms generated commodity sales over $100,000, greater than the national average of 18.5 percent. The amount of land devoted to farming and ranching in California was 24.3 million acres in 2019, the same as in 2018. The average farm size was 348 acres in 2019, slightly smaller than the 2018 average farm size and below the national average of 444 acres (CDFA n.d.).

a) Williamson Act

The California Land Conservation Act of 1965--commonly referred to as the Williamson Act--enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space use. In return, landowners receive property tax assessments which are much lower than normal because they are based upon farming and open space uses as opposed to full market value. The Open Space Subvention Act of 1971 provided local governments an annual subvention of

forgone property tax revenues from the State through the year 2009; these payments have been suspended in more recent years due to revenue shortfalls.

Of California's 58 counties, 52 have executed contracts under the Land Conservation Act Program. The 12.7 million acres reported as enrolled in Land Conservation Act contracts statewide as of December 2017 represent approximately 40 percent of California's farmland total of about 31.4 million acres (DOC 2019).

b) Forestry Resources

Forestland is defined as land that can support 10 percent native tree cover of any species, including hardwoods, under natural conditions, and that allows for management of one or more forest resources, including timber, aesthetics, fish and wildlife, biodiversity, water quality, recreation, and other public benefits (PRC Section 12220[g]). There are approximately 32,101,515 acres of forests within California (CDFW 2021).

Timberland is privately-owned land, or land acquired for State forest purposes, which is devoted to and used for growing and harvesting timber, or for growing and harvesting timber and compatible uses, of, at minimum 15 cubic feet per acre (Government Code Section 51104[f]). Forest managed for harvest is called timberland and includes 2,932,000 acres in private ownership; 146,000 acres in State ownership; 10,130,000 acres in federal ownership; and 4,551,000 acres of non-industrial timberland in private ownership (CDFW 2017).

B. Regulatory Setting

Table 2 below provides a general description of applicable laws and regulations that may pertain to agriculture and forest resources.

Table 2: Applicable Laws and Regulations for Agriculture and Forest Resources

Applicable Regulations	Description
Federal	
Farmland Protection Policy Act (FPPA)	The FPPA directs federal agencies to consider the effects of federal programs or activities on farmland, and ensure that such programs, to the extent practicable, are compatible with state, local, and private farmland protection programs and policies. The rating process established under the FPPA was developed to help assess options for land use on an evaluation of productivity weighed against commitment to urban development.
National Forest Management Act (NFMA) of 1976	The NFMA is the primary statute governing the administration of national forests. The NFMA requires the Secretary of Agriculture to assess forestlands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource

Applicable Regulations	Description
	management plan for each unit of the National Forest System. Goal 4 of the U.S. Forest Service's (USFS) National Strategic Plan for the National Forests states that the nation's forests and grasslands play a significant role in meeting America's need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development, and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.
State	
The California Land Conservation Act, also known as the Williamson Act (Government Code Section 51200 et seq.)	The California Department of Conservation's (DOC) Division of Land Resource Protection administers the Williamson Act program, which permits property tax adjustments for landowners who contract with a city or county to keep their land in agricultural production or approved open space uses for at least 10 years. Lands covered by Williamson Act contracts are assessed based on their agricultural value instead of their potential market value under nonagricultural uses. In return for the preferential tax rate, the landowner is required to contractually agree to not develop the land for a period of at least 10 years. Williamson Act contracts are renewed annually for 10 years unless a party to the contract files for nonrenewal. The filing of a non-renewal application by a landowner ends the automatic annual extension of a contract and starts a 9-year phase-out of the contract. During the phase-out period, the land remains restricted to agricultural and open-space uses, but property taxes gradually return to levels associated with the market value of the land. At the end of the 9-year non-renewal process, the contract expires, and the owner's uses of the land are restricted only by applicable local zoning. The Williamson Act defines compatible use of contracted lands as any use determined by the county or city administering the agricultural preserve to be compatible with the agricultural, recreational, or open space use of land within the preserve and subject to contract (Government Code, Section 51201 (e)). However, uses deemed compatible by a county or city government must be consistent with the principles of compatibility set forth in Government Code, Section 51238.1.

Applicable Regulations	Description
	Approximately 16 million acres of farmland (about 50 percent of the State's total farmland) are enrolled in the program.
California Farmland Conservancy Program (CFCP) (PRC Section 10200 et seq.)	The CFCP provides grant funding for agricultural conservation easements. Although the easements are always written to reflect the benefits of multiple resource values, there is a provision in the CFCP statute that prevents easements funded under the program from restricting husbandry practices. This provision could prevent restricting those practices to benefit other natural resources.
FMMP (Government Code Section 65570, PRC Section 612)	Under the FMMP, DOC assesses the location, quality, and quantity of agricultural lands and conversion of these lands over time. Agricultural designations include the categories of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, Farmland of Local Importance, Grazing Land, Urban and Built-Up Land, and Other Land.
State Lands Commission Significant Land Inventory	The State Lands Commission is responsible for managing lands owned by the State, including lands that the State has received from the federal government. These lands total more than 4 million acres and include tide and submerged lands, swamp and overflow lands, the beds of navigable waterways, and State School Lands. The State Lands Commission has a legal responsibility for, and a strong interest in, protecting the ecological and Public Trust values associated with the State's sovereign lands, including the use of these lands for habitat preservation, open space, and recreation. Projects located within these lands would be subject to the State Lands Commission permitting process.
Local	
Open Space Element (Government Code Section 65300 et seq.)	State law requires each city and county to adopt a general plan containing at least seven mandatory elements including an open space element. The open space element identifies open space resources in the community and strategies for protection and preservation of these resources. Agricultural and forested lands are among the land use types identified as open space in general plans.
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different

Applicable Regulations	Description
	land uses and identifies which land uses (e.g., agriculture, residential, commercial, industrial) are allowed in the various zoning districts of the jurisdiction. Since 1971, State law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.

3. Air Quality

A. Existing Conditions

1. U.S.

At the federal level, the U.S. Environmental Protection Agency (U.S. EPA) has oversight of state programs. In addition, U.S. EPA has established emission standards for mobile sources such as vessels, trains, and airplanes. U.S. EPA has set National Ambient Air Quality Standards (NAAQS) for six principal pollutants, which are called criteria air pollutants. Periodically, the standards are reviewed and may be revised. The current standards are listed below in Table A1-1. Units of measure for the standards are parts per million by volume, parts per billion by volume, and micrograms per cubic meter of air.

2. California

The California Air Resources Board (CARB) is California's lead air agency and controls emissions from mobile sources, fuels, and consumer products, as well as air toxics. CARB also coordinates local and regional emission reduction measures and plans that meet the NAAQS and California Ambient Air Quality Standards (CAAQS). CARB is charged with developing the State's SIP, which details the State's plan to achieve the NAAQS and is submitted to U.S. EPA for review.

a) Criteria Air Pollutants

Concentrations of emissions of criteria air pollutants are used to indicate the quality of the ambient air because these are the most prevalent air pollutants known to be deleterious to human health. A brief description of each criteria air pollutant is provided below. Emission source types and health effects are summarized in Table 3.

Table 3: Sources and Health Effects of Criteria Air Pollutants

Pollutant	Sources	Health Effects
Ozone	Secondary pollutant resulting from reaction of reactive organic gases	Cough, pain, shortness of breath, lung inflammation. Aggravation of lung

Pollutant	Sources	Health Effects
	(ROG) and oxides of nitrogen (NOx) in presence of sunlight. ROG emissions result from incomplete combustion and evaporation of chemical solvents and fuels; NOx results from the combustion of fuels	diseases including asthma. Possibly a main cause of developing asthma.
Carbon monoxide	Combustion of fossil fuels by vehicles and other machinery. Some household appliances such as gas heaters.	Headache, dizziness, fatigue, nausea, vomiting, death Permanent heart and brain damage
Nitrogen dioxide (NO_2)	Combustion devices, such as cars and other vehicles, off-road equipment, and power generation	Coughing, difficulty breathing, possible development of asthma and increased vulnerability to respiratory infections.
Sulfur dioxide (SO_2)	Industrial facility and power plant combustion of fossil fuels.	Difficulty breathing, particularly for people with asthma.
Respirable particulate matter (PM_{10}) and fine particulate matter ($PM_{2.5}$)	Fugitive dust from construction sites, unpaved roads, and fields. Smokestacks and fires. Formation in the atmosphere by condensation and/or transformation of SO_2 and NO_X emitted from power plants, industrial sources, and vehicles.	Decreased lung function, coughing, difficulty breathing, aggravation of asthma, premature death.
Lead	Metal processing	Adverse effects to the nervous systems, kidneys, immune system, cardiovascular system, and reproductive systems.

Source: U.S. EPA 2016a, 2016b, 2019, 2021a, 2021b, 2021c, 2021d, 2021e.

b) Ozone

Ozone is a gas composed of three atoms of oxygen (O_3). Ozone occurs both in the Earth's upper atmosphere (stratospheric) and at ground level (tropospheric). Stratospheric ozone occurs naturally in the upper atmosphere, where it forms a protective layer that shields us from the sun's harmful ultraviolet rays. Tropospheric, or ground level ozone, is not emitted directly into the air, but is created by chemical reactions between NOx and volatile organic

compounds (VOCs). This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight. Ozone at ground level is a harmful air pollutant, because of its effects on people and the environment, and it is the main ingredient in "smog" (U.S. EPA 2021b).

c) Nitrogen Dioxide

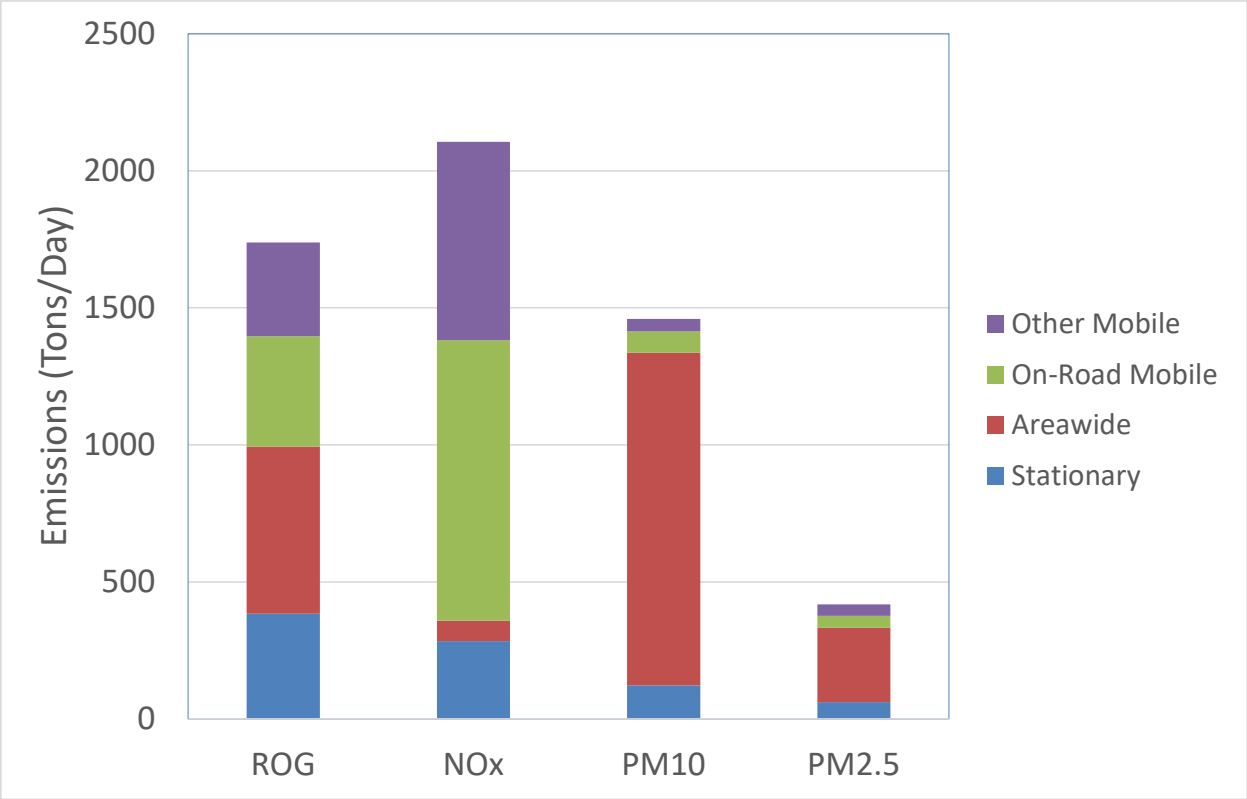
NO_2 is a brownish, highly reactive gas that is present in all urban environments. The major human-made sources of NO_2 are combustion devices, such as boilers, gas turbines, and mobile and stationary reciprocating internal combustion engines. Combustion devices emit primarily nitric oxide (NO), which reacts through oxidation in the atmosphere to form NO_2. The combined emissions of NO and NO_2 are referred to as NOx and are reported as equivalent NO_2. (U.S. EPA 2016b).

d) Particulate Matter

Respirable particulate matter with an aerodynamic diameter of 10 micrometers or less is referred to as PM_{10}. PM_{10} consists of particulate matter emitted directly into the air, such as fugitive dust, soot, and smoke from mobile and stationary sources, construction equipment, fires and natural windblown dust, and particulate matter formed in the atmosphere by reaction of gaseous precursors. $PM_{2.5}$ includes a subgroup of smaller particles that have an aerodynamic diameter of 2.5 micrometers or less. PM_{10} emissions in California are dominated by emissions from area sources, primarily fugitive dust from vehicle travel on unpaved and paved roads, farming operations, construction and demolition, and particles from residential fuel combustion. Direct emissions of PM_{10} have increased slightly in California over the last 20 years and are projected to continue. $PM_{2.5}$ emissions have remained relatively steady over the last 20 years and are projected to increase slightly through 2020. Emissions of $PM_{2.5}$ are dominated by the same sources as emissions of PM_{10} (CARB 2013).

e) Emissions Inventory

Figure 1 summarizes emissions of criteria air pollutants within California for various source categories. According to California's emissions inventory, mobile sources are the largest contributor to the estimated annual average for air pollutant levels of ROG and NOx accounting for approximately 43 percent and 83 percent, respectively, of the total emissions. Area wide sources account for approximately 83 percent and 65 percent of California's PM_{10} and $PM_{2.5}$ emissions, respectively (CARB 2013).



Source: CARB 2013.

Figure 1 California 2012 Emissions Inventory

f) Toxic Air Contaminants

Concentrations of TACs are also used to indicate the quality of ambient air. A TAC is defined as "an air pollutant that may cause or contribute to an increase in mortality or in serious illness, or that may pose a hazard to human health...." (HSC, section 39655, subd. (a).) TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations.

Today, the emissions from combustion of fuel in motor vehicles and off-road equipment are the primary source of air toxics risk in California. Particulate matter (PM) from diesel-fueled engines is a TAC and diesel PM accounts for approximately 60 percent of the current estimated inhalation cancer risk for background ambient air. Some examples of sources that contribute to higher potential health impacts from mobile diesel PM include freight hubs, like ports, rail yards and distribution centers. Because diesel PM cannot be directly measured in the ambient air, we use surrogate compounds and the emission inventory to estimate the ambient concentration. Both the combustion and evaporation of gasoline used in vehicles, lawn and garden equipment, recreational watercraft, and others produce other prevalent air toxics. Examples of stationary sources that also contribute to increased health risks to nearby

residents include metal finishing/manufacturing, chrome plating facilities, various product manufacturing (e.g., food, chemical, material, etc.), stationary diesel engines (e.g., emergency backup generators), and refineries (CARB and CAPCOA 2015).

B. Regulatory Setting

Applicable laws and regulations associated with air quality are discussed in Table 4.

Table 4: Applicable Laws and Regulations for Air Quality

Regulation	Description
Federal	
Clean Air Act (CAA) (42 U.S. Code [USC] Section 7401 et seq.; 40 CFR (e.g., Subchapter C- Air Programs, Subpart U- Air Emission Controls))	The CAA, which was last amended in 1990, requires U.S. EPA to set NAAQS for pollutants considered harmful to public health and the environment. The CAA established two types of NAAQS: primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly; and secondary standards set limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings. The U.S. EPA Office of Air Quality Planning and Standards has set NAAQS for criteria air pollutants. Title III of the CAA directed U.S. EPA to promulgate national emissions standards for Hazardous Air Pollutants. The CAA also required U.S. EPA to promulgate vehicle or fuel standards containing reasonable requirements that control TAC emissions, at a minimum to benzene and formaldehyde. Performance criteria were established to limit mobile-source emissions of toxics, including benzene, formaldehyde, and 1,3-butadiene. In addition, Section 219 required the use of reformulated gasoline in selected areas with the most severe ozone nonattainment conditions to further reduce mobile-source emissions.
SmartWay	SmartWay is a U.S. EPA program that reduces transportation-related emissions by creating incentives to improve supply chain fuel efficiency. It aims to increase the availability and market penetration of fuel-efficient technologies and strategies that help freight companies save money while also reducing adverse environmental impacts.
U.S. EPA Final Rule for Control of Air	In 2004, the U.S. EPA finalized Tier 4 emission standards for nonroad diesel engines and sulfur reductions in nonroad diesel

Regulation	Description
Pollution from Nonroad Diesel Engines and Fuel	fuel, including diesel fuel for large recreational vessels, locomotives, and harbor craft. The intent of this rule is to further reduce harmful emissions and assist State and local areas designated as 8-hour ozone non-attainment improve air quality. This rule includes the introduction of increasingly strict emission standards for new non-road diesel engines to phase out old engine standards as new engines are manufactured.
State	
California Clean Air Act (CCAA) (Health and Safety Code, e.g., Division 26, (commencing with Section 39000 et seq.); CCR Title 13, Division 3 (commencing with Section 1900 et seq.) and Title 17, Division 3 (commencing with Section 60000 et seq.)	CARB is the agency responsible for coordination and oversight of State and local air pollution control programs in California and for implementing the CCAA. The CCAA, which was adopted in 1988, required CARB to develop and enforce the CAAQS.
Waste Heat and Carbon Emissions Reduction Act (Public Utilities Code Section 2840 et seq.)	The Waste Heat and Carbon Emissions Reduction Act is designed to encourage the development of new combined heat and power (CHP) systems in California with a generating capacity of not more than 20 megawatts (MW). Section 2843 of the act provides that the California Energy Commission's (CEC) guidelines require that CHP systems: be designed to reduce waste energy; have a minimum efficiency of 60 percent; have NOx emissions of no more than 0.07 pounds per megawatt-hour; be sized to meet the eligible customer generation thermal load; operate continuously in a manner that meets the expected thermal load and optimizes the efficient use of waste heat; be cost effective, technologically feasible, and environmentally beneficial.
CARB 2006 Emission Reduction Plan for Ports and Goods Movement Plan	The plan was developed with the intent of reducing community exposure to air pollution and to meet new federal air quality standards for ozone and fine particulate matter ($PM_{2.5}$). The plan includes the implementation of the Goods Movement Action Plan, which includes policies and programs aimed at reducing

Regulation	Description
	congestion and addressing the environmental impacts resulting from the increased movement of goods in California.
CARB 2004 Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate	Diesel PM was identified in 1998 as a TAC. This regulation implemented provisions of the Diesel Risk Reduction Plan, adopted by CARB in October 2000. The ATCM for TRUs, TRU generator sets, and facilities where TRUs and TRU generator sets operate used a phased approach to reduce the diesel PM emissions from in-use TRUs and TRU generator set equipment used to power electrically driven refrigerated shipping containers and trailers that are operated in California.
Other Applicable State-Level Regulations	This includes all other applicable regulations at the State level for portions of the project area that are outside of California (e.g., Toxic Air Contaminant Identification and Control Act (Assembly Bill [AB] 1807) Tanner, Ch. 1047, Statutes of 1983 and Air Toxics "Hot Spots" Information and Assessment (AB 2588), Connelly, Ch.1252, Stats. of 1987.).
Local	
Air Districts	Air Districts have primary responsibility for preparation, adoption, and implementation of stationary and area emission control measures and for the preparation of the SIP and any amendments.

4. Biological Resources

A. Existing Conditions

1. U.S.

The U.S. is composed of many different biological provinces, or biomes, including tundra, coniferous and deciduous forest, grassland, and desert. Each biome provides a sanctuary to a diverse variety of biological species. Scientists have documented more than 200,000 species in the U.S., representing more than 10 percent of the species worldwide (The Nature Conservancy 2002).

2. California

The State's geography and topography have created distinct local climates ranging from high rainfall in northwestern mountains to the driest place in North America, Death Valley. North to south, the State extends for almost 800 miles, bridging the temperate rainforests in the Pacific Northwest and the subtropical arid deserts of Mexico. Many parts of the State experience Mediterranean weather patterns, with cool, wet winters and hot, dry summers. Summer rain is indicative of the eastern mountains and deserts, driven by the western margin of the North American monsoon. Along the northern coast abundant precipitation and ocean air produces foggy, moist conditions. High mountains have cooler conditions, with a deep winter snow pack in normal climate years. Desert conditions exist in the rain shadow of the mountain ranges (CDFW 2015).

While the State is largely considered to have a Mediterranean climate, it can be further subdivided into six major climate types: Desert, Marine, Cool Interior, Highland, Steppe, and Mediterranean. California deserts, such as the Mojave, are typified by a wide range of elevation with more rain and snow in the high ranges, and hot, dry conditions in valleys. Cool Interior and Highland climates can be found on the Modoc Plateau, Klamath, Cascade, and Sierra ranges. Variations in slope, elevation, and aspect of valleys and mountains result in a range of microclimates for habitats and wildlife. For example, the San Joaquin Valley, exhibiting a Mediterranean climate, receives sufficient springtime rain to support grassland habitats, while remaining hot and relatively dry in summer. Steppe climates include arid, shrub-dominated habitats that can be found in the Owens Valley, east of the Sierra Nevada, and San Diego, located in coastal southern California (CDFW 2015).

The Marine climate has profound influence over terrestrial climates, particularly near the coast. Additionally, the State is known for variability in precipitation because of the El Niño-Southern Oscillation (ENSO) and the Pacific Decadal Oscillation. Oscillations are the cyclical shifting of high and low-pressure systems, as evidenced by the wave pattern of the jet stream in the northern hemisphere. The ENSO is the cycle of air pressure systems influenced by the location of warm and cold sea temperatures. El Niño events occur when waters are warmer in the eastern Pacific Ocean, typically resulting in greater precipitation in southern California and less precipitation in northern California, and La Niña events occur when waters are colder in the eastern Pacific resulting in drier than normal conditions in southern California and wetter conditions in northern California during late summer and winter. The warmer ocean temperatures associated with El Niño conditions also result in decreased upwelling in the Pacific Ocean (CDFW 2015).

California has the highest numbers of native and endemic plant species of any state, with approximately 6,500 species, subspecies, and varieties of plants, representing 32 percent of all vascular plants in the United States. Nearly one-third of the state's plant species are endemic, and California has been recognized as one of 34 global hotspots for plant diversity. Within the California Floristic Province, which encompasses the Mediterranean area of Oregon, California, and northwestern Baja, 2,124 of the 3,488 species are endemic, representing a 61 percent rate of endemism. Over 200 species, subspecies, and varieties of

native plants are designated as rare, threatened, or endangered by State law, and over 2,000 more plant taxa are considered to be of conservation concern (CDFW 2015).

California has a large number of animal species, representing a substantial proportion of the wildlife species nationwide. The state's diverse natural communities provide a wide variety of habitat conditions for wildlife. The state's wildlife species include approximately 100 reptile species, 75 amphibian species, 650 bird species, and 220 mammal species. Additionally, 48 mammals, 64 birds, 72 amphibians and reptiles, and 20 freshwater fish live in California and nowhere else (CDFW 2015).

California exhibits a wide range of aquatic habitats from the Pacific Ocean to isolated hillside seeps, to desert oases that support both water-dependent species and provide essential seasonal habitat for terrestrial species. Perennial and ephemeral rivers and streams, riparian areas, vernal pools, and coastal wetlands support a diverse array of flora and fauna, including 150 animal and 52 plant species that are designated special-status species. The California Natural Diversity Database identifies 123 different aquatic habitat-types in California, based on fauna. Of these, 78 are stream habitat-types located in seven major drainage systems: Klamath, Sacramento-San Joaquin, North/Central Coast, Lahontan, Death Valley, South Coast, and Colorado River systems. These drainage systems are geologically separated and contain distinctive fishes and invertebrates. California has approximately 70 native resident and anadromous fish species, and 72 percent of the native freshwater fishes in California are either listed, or possible candidates for listing as threatened or endangered, or are extinct (CDFW 2015).

B. Regulatory Setting

Applicable laws and regulations associated with biological resources are discussed in Table 5.

Table 5: Applicable Laws and Regulations for Biological Resources

Applicable Law	Description
Federal	
Federal Endangered Species Act (ESA) (16 USC Section 1531 et seq.)	The ESA designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat. Two sections of the ESA address take of threatened and endangered species. Section 7 covers actions that would result in take of a federally listed species and have a federal discretionary action. Section 10 regulates actions that would result in take of threatened or endangered species and a non-federal agency is the lead agency for the action. Section 10 of the ESA requires preparation of a habitat conservation plan (HCP). More than 430 HCPs have been approved nation-wide (USFWS 2005).

Applicable Law	Description
Marine Mammal Protection Act (MMPA) of 1972 (Updated in 1994)	The MMPA prohibits, with certain exceptions, the take of marine mammals in U.S. waters and by U.S. citizens on the high seas, and the importation of marine mammals and marine mammal products into the U.S. Proposed projects located adjacent to marine areas with the potential to disrupt marine mammals must be analyzed under the MMPA to ensure marine mammals would not be harassed or injured by project activities. Any project activities that may result in harassment, injury, or mortality of marine mammals would require consultation with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service (USFWS).
Migratory Bird Treaty Act (MBTA) (16 USC Section 703 et seq.)	The MBTA makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird) as designated under the MBTA.
Clean Water Act (CWA) (33 USC Section 1251 et seq.)	The CWA requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants. By federal law, every applicant for a federal permit or license for an activity that may result in a discharge into a California water body, including wetlands, must request State certification that the proposed activity would not violate State and federal water quality standards.
Rivers and Harbors Act of 1899	The Rivers and Harbors Act requires a permit or letter of permission from USACE prior to any work being completed within navigable waters.
U.S. EPA Section 404 (b)(1) Guidelines	Section 404 requires USACE to analyze alternatives in a sequential approach such that USACE must first consider avoidance and minimization of impacts to the extent practicable to determine whether a proposed discharge can be authorized.
California Desert Conservation Area (CDCA) Plan	The CDCA Plan comprises one of two national conservation areas established by Congress in 1976. The FLPMA outlines how BLM would manage public lands. Congress specifically provided guidance for the management of the CDCA Plan and directed the development of the 1980 CDCA Plan.

Applicable Law	Description
Federal Noxious Weed Act of 1974 (P.L. 93-629) (7 USC 2801 et seq.; 88 Stat. 2148)	The Federal Noxious Weed Act establishes a federal program to control the spread of noxious weeds. Authority is given to the Secretary of Agriculture to designate plants as noxious weeds by regulation, and the movement of all such weeds in interstate or foreign commerce was prohibited except under permit.
Executive Order (EO) 13112, "Invasive Species," February 3, 1999	EO 13112 mandates that federal agencies take actions to prevent the introduction of invasive species, provide for their control, and minimize the economic, ecological, and human health impacts that invasive species cause.
EO 11988, "Floodplain Management," May 24, 1977	EO 11988 requires federal agencies to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of flood plains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.
EO 11990, "Protection of Wetlands," May 24, 1977	EO 11990 requires all federal agencies to consider wetland protection as an important part of their policies and take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands.
EO 13186, "Responsibilities of Federal Agencies to Protect Migratory Birds," January 10, 2001	EO 13186 requires that each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations develop and implement a Memorandum of Understanding with USFWS that shall promote the conservation of migratory bird populations.
Bald and Golden Eagle Protection Act (16 USC Section 668 et seq.)	The Bald and Golden Eagle Protection Act declares it is illegal to take, possess, sell, purchase, barter, offer to sell or purchase or barter, transport, export or import a bald or golden eagle, alive or dead, or any part, nest or egg of these eagles unless authorized. Active nest sites are also protected from disturbance during the breeding season.
BLM Manual 6840 — Special Status Species Management	This policy establishes special status species policy on BLM land for plant and animal species and the habitats on which they depend. The policy refers to species designated by the BLM State Director as sensitive.

Applicable Law	Description
Listed Species Recovery Plans and Ecosystem Management Strategies	These plans and strategies provide guidance for the conservation and management of sufficient habitat to maintain viable populations of listed species and ecosystems. Relevant examples include, but are not limited to, the Desert Tortoise Recovery Plan, Flat-tailed Horned Lizard Rangewide Management Strategy; Amargosa Vole Recovery Plan; and Recovery Plan for Upland Species of the San Joaquin Valley.
State	
California Endangered Species Act of 1984 (Fish and Game Code, section 2050 et seq.)	Protects California's rare, threatened, and endangered species.
California Coastal Act (CCA), 1976	The CCA of 1976 recognizes California ports, harbors, and coastline beaches as primary economic and coastal resources and as essential elements of the national maritime industry. Decisions to undertake specific development projects, where feasible, are to be based on consideration of alternative locations and designs to minimize any adverse environmental impacts. The CCA is implemented by the California Coastal Commission.
Natural Community Conservation Planning (NCCP) Act 1991 (Fish and Game Code, section 2800 et seq.)	The primary objective of the NCCP Act is to conserve natural communities at the ecosystem level while accommodating compatible land use. An NCCP identifies and provides for the regional or area-wide protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. There are currently 23 NCCPs that have been adopted or are in progress in California (CDFW 2017).
Porter-Cologne Water Quality Control Act (Water Code Sections 13000 et seq.)	The Porter-Cologne Water Quality Control Act requires that each of the nine RWQCBs prepare and periodically update basin plans for water quality control. Each basin plan sets forth water quality standards for surface water and groundwater and actions to control nonpoint and point sources of pollution to achieve and maintain these standards.

Applicable Law	Description
Keene-Nejedly California Wetlands Preservation Act (PRC Section 5810 et seq.)	California has established a successful program of regional, cooperative efforts to protect, acquire, restore, preserve, and manage wetlands. These programs include, but are not limited to, the Central Valley Habitat Joint Venture, the San Francisco Bay Joint Venture, the Southern California Wetlands Recovery Project, and the Inter-Mountain West Joint Venture.
California Wilderness Act (PRC Section 5093.30 et seq.)	The California Wilderness Act establishes a California wilderness preservation system that consists of State-owned areas to be administered for the use and enjoyment of the people in such manner as will leave them unimpaired for future use and enjoyment as wilderness, provide for the protection of such areas, preserve their wilderness character, and provide for the gathering and dissemination of information regarding their use and enjoyment as wilderness.
Significant Natural Areas (Fish and Game Code section 1930 et seq.)	This policy designates certain areas such as refuges, natural sloughs, riparian areas, and vernal pools as significant wildlife habitat.
Protection of Birds and Nests (Fish and Game Code sections 3503 and 3503.5)	These policies protect California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. Raptors (e.g., hawks and owls) are specifically protected.
Migratory Birds (Fish and Game Code section 3513)	This policy protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame birds.
Fur-bearing Mammals (Fish and Game Code sections 4000 and 4002)	This policy lists fur-bearing mammals require a permit for take.
Fully Protected Species (Fish and Game Code sections 3511, 4700, 5050, and 5515)	These policies identify several amphibian, reptile, fish, bird, and mammal species that are Fully Protected. The California Department Fish and Wildlife (CDFW) cannot issue a take permit for these species, except for take related to scientific research.
CEQA Guidelines Section 15380	CEQA defines rare species more broadly than the definitions for species listed under the State and federal Endangered Species Acts. Under Section 15830, species not protected through State

Applicable Law	Description
	or federal listing but nonetheless demonstrable as "endangered" or "rare" under CEQA should also receive consideration in environmental analyses. Included in this category are many plants considered rare by the California Native Plant Society and some animals on the CDFW's Special Animals List.
Oak Woodlands (PRC Section 21083.4)	This policy requires counties to determine if a project within their jurisdiction may result in conversion of oak woodlands that would have a significant adverse effect on the environment. If the lead agency determines that a project would result in a significant adverse effect on oak woodlands, mitigation measures to reduce the significant adverse effect of converting oak woodlands to other land uses are required.
Lake and Streambed Alteration Agreement (Fish and Game Code section 1600 et seq.)	This policy regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFW in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process.
California Desert Native Plants Act of 1981 (Food and Agricultural Code Section 80001 et seq. and California Fish and Game Code sections 1925-1926)	The California Desert Native Plants Act protects non-listed California desert native plants from unlawful harvesting on both public and private lands in Imperial, Inyo, Kern, Los Angeles, Mono, Riverside, San Bernardino, and San Diego counties. Unless issued a valid permit, wood receipt, tag, and seal by the commissioner or sheriff, harvesting, transporting, selling, or possessing specific desert plants is prohibited.
Food and Agriculture Code Section 403	California Department of Food and Agriculture is designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.
Noxious Weeds (Title 3, CCR Section 4500)	List of plant species that are considered noxious weeds.
Nonindigenous Aquatic Nuisance Prevention and Control Act as amended by the National Invasive	The California Marine Invasive Species Act of 2003 renewed and expanded on the Ballast Water Management for Control of Nonindigenous Species Act of 1999 to address the threats posed by the introduction of nonindigenous species. The law

Applicable Law	Description
Species Act (Ballast Water Discharge Regulations)	charged the California State Lands Commission with oversight and administration of the State's program to prevent or minimize the release of nonindigenous species from vessels that are 300 gross register tonnage and above. Both the U.S. Coast Guard (USCG), Ballast Water Management, and U.S. EPA, Vessel General Permit, regulate ballast water discharges, and both agencies currently require ballast water exchange for most vessels operating in U.S. waters. California requires ballast water exchange on coastwise voyages; however, at present, the discharge standards in California are more stringent than federal regulations.
Local	
Various City and County General Plans	General plans typically designate areas for land uses, guiding where new growth and development should occur while providing a plan for the comprehensive and long-range management, preservation, and conservation of and natural resources and open-space lands.
Various Local Ordinances	Local ordinances provide regulations for proposed projects for activities such as grading plans, erosion control, tree removal, protection of sensitive biological resources and open space.

5. Cultural Resources

A. Existing Conditions

1. U.S.

Cultural resources include archaeological sites of prehistoric or historic origin, built or architectural resources older than 50 years, traditional or ethnographic resources, and fossil deposits of paleontological importance. America has a cultural heritage that dates to some 25,000–60,000 years ago, when the first known inhabitants of the land that would eventually become the U.S. crossed the Bering Land Bridge into Alaska.

All areas within the U.S. have the potential for yielding yet undiscovered archaeological and paleontological resources and undocumented human remains not interred in cemeteries or marked formal burials. These resources have the potential to contribute to our knowledge of the fossil record or local, regional, or national prehistory or history.

Archaeological resources include both prehistoric and historic remains of human activity. Built environment resources include an array of historic buildings, structures, and objects serving as a physical connection to America's past. Traditional or ethnographic cultural resources may include Native American sacred sites and traditional resources of any ethnic community that are important for maintaining the cultural traditions of any group. "Historical resources" is a term with defined statutory meaning and includes any prehistoric or historic archaeological site, district, built environment resource, or traditional cultural resource recognized as historically or culturally significant (PRC Section 21084.1; CEQA Guidelines Section 15064.5(a)). Paleontological resources, including mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains, are more than 5,000 years old and occur mainly in Pleistocene or older sedimentary rock units.

2. California

a) Prehistoric Overview

California was occupied by different prehistoric cultures dating to at least 12,000 to 13,000 years ago. Evidence for the presence of humans during the Paleoindian Period prior to about 8,000 years ago is relatively sparse and scattered throughout the state; most surface finds of fluted Clovis or Folsom projectile points or archaeological sites left by these highly mobile hunter-gatherers are associated with Pleistocene lakeshores, the Channel Islands, or the central and southern California coast (Rondeau et al. 2007). Archaeological evidence from two of the Northern Channel Islands located off the coast from Santa Barbara indicates the islands were colonized by Paleoindian peoples at least 12,000 years ago, likely via seaworthy boats (Erlandson et al. 2007). By 10,000 years ago, inhabitants of this coastal area were using fishhooks, weaving cordage and basketry, hunting marine mammals and sea birds, and producing ornamental shell beads for exchange with people living in the interior of the State (Erlandson et al. 2007). This is the best record of early maritime activity in the Americas, and combined with the fluted points, indicates California was colonized by both land and sea during the Paleoindian period (Jones and Klar 2007).

With climate changes between 10,000 and 7,000 years ago at the end of the Pleistocene and into the early Holocene, Lower Archaic peoples adjusted to the drying of pluvial lakes, rise in sea level, and substantial alterations in vegetation communities. Approximately 6,000 years ago, vegetation communities like those of the present were established in the majority of the state, while the changes in sea level also affected the availability of estuarine resources (Jones and Klar 2007). The archaeological record indicates subsistence patterns during the Lower Archaic and subsequent Middle Archaic Period shifted to an increased emphasis on plant resources, as evidenced by an abundance of milling implements in archaeological sites dating between 8,000 and 3,000 years ago.

Approximately 3,000 years ago, during the Upper Archaic and Late Prehistoric Periods, the complexity of the prehistoric archaeological record reflects increases in specialized adaptations to locally available resources such as acorns and salmon, in permanently occupied settlements, and in the expansion of regional populations and trade networks

(Moratto 1984; Chartkoff and Chartkoff 1984; Jones and Klar 2007). During the Upper Archaic, marine shell beads and obsidian continue to be the hallmark of long-distance trade and exchange networks developed during the preceding period (Hughes and Milliken 2007). Large shell midden/mounds at coastal and inland sites in central and southern California, for example, attest to the regular reuse of these locales over hundreds of years or more from the Upper Archaic into the Late Prehistoric period. In the San Francisco Bay region alone, over 500 shell mounds were documented in the early 1900s (Moratto 1984).

Changes in the technology used to pursue and process resources are some of the hallmarks of the Late Prehistoric period. These include an increase in the prevalence of mortars and pestles, a diversification in types of watercraft and fishhooks, and the earliest record for the bow and arrow in the State that occurs in both the Mojave Desert and northeast California nearly 2,000 years ago (Jones and Klar 2007). The period also witnessed the beginning of ceramic manufacture in the southeast desert region, southwest Great Basin, and parts of the Central Valley.

During the Late Prehistoric period, the development of social stratification and craft specialization accompanied the increase in sedentism, as indicated by the variety of artifacts, including bone tools, coiled and twined basketry, obsidian tools, marine shell beads, personal ornaments, pipes, and rattles, by the use of clamshell disk beads and strings of dentalium shell as a form of currency, and by variation in burial types and associated grave goods (Moratto 1984; Chartkoff and Chartkoff 1984; Jones and Klar 2007). Pictographs, painted designs that are likely less than 1,000 years old, and other non-portable rock art created during this period likely had a religious or ceremonial function (Gilreath 2007). Osteological evidence points to intergroup conflict and warfare in some regions during this period, and there also appears to have been a decline or disruption in the long-distance trade of obsidian and shell beads approximately 1,200 years ago in parts of the State (Jones and Klar 2007; Hughes and Milliken 2007).

b) Ethnographic Overview

At the time of European contact, California was the home of approximately 310,000 indigenous peoples with a complex of cultures distinguished by linguistic affiliation and territorial boundaries (Kroeber 1925; Cook 1978; Heizer 1978; Ortiz 1983; d'Azevedo 1986). At least 70 distinct native Californian cultural groups, with even more subgroups, inhabited the vast lands within the state. The groups and subgroups spoke between 74 and 90 languages, plus a large number of dialects (Shipley 1978:80).

In general, these mainly sedentary, complex hunter-gatherer groups of indigenous Californians shared similar subsistence practices (hunting, fishing, and collecting plant foods), settlement patterns, technology, material culture, social organization, and religious beliefs (Kroeber 1925; Heizer 1978; Ortiz 1983; d'Azevedo 1986). Permanent villages were situated along the coast, interior waterways, and near lakes and wetlands. Population density among these groups varied, depending mainly on availability and dependability of local resources, with the highest density of people in the northwest coast and Santa Barbara Channel areas and the least in the state's desert region (Cook 1976). Networks of foot trails were used to

connect groups to hunting or plant gathering areas, rock quarries, springs or other water sources, villages, ceremonial places, or distant trade networks (Heizer 1978).

The social organization of California's native peoples varied throughout the state, with villages or political units generally organized under a headman who was also the head of a lineage or extended family or achieved the position through wealth (Bean 1978). For some groups, the headman also functioned as the religious ceremonial leader. Influenced by their Northwest Coast neighbors, the differential wealth and power of individuals was the basis of social stratification and prestige between elites and commoners for the Chilula, Hupa, Karok, Tolowa, Wiyot, and Yurok in the northwest corner of the state. Socially complex groups were also located along the southern California coast where differential wealth resulted in hierarchical classes and hereditary village chiefs among the Chumash, Gabrielino, Juaneño, and Luiseño (Bean and Smith 1978; Arnold and Graesch 2004).

At the time of Spanish contact, religious practices among native Californian groups varied, but ethnographers have recognized several major religious systems (Bean and Vane 1978:662-669). Many of the groups in the north-central part of the State practiced the Kuksu cult, primarily a ceremonial and dance organization, with a powerful shaman as the leader. Log drums, flutes, rattles, and whistles accompanied the elaborate ceremonial dances. The World Renewal cult in the northwestern corner of the State extended as far north as Alaska, entailed a variety of annual rites to prevent natural disasters, maintain natural resources and individual health, and were funded by the wealthy class. The Toloache cult was widespread in central and southern California and involved the use of narcotic plant (commonly known as datura or jimsonweed) materials to facilitate the acquisition of power. On the southern coast among Takic-speaking groups, the basis of Gabrielino, Juaneño, and Luiseño religious life was the Chinigchinich cult, which appeared to have developed from the Toloache cult. Chinigchinich, the last of a series of heroic mythological figures, gave instruction on laws and institutions, taught people how to dance, and later withdrew into heaven where he rewarded the faithful and punished those who disobeyed his laws. The Chinigchinich religion seems to have been relatively new when the Spanish arrived, and could have been influenced by Christianity.

Trade and exchange networks were a significant part of the economy and social organization among California's Native American groups (Heizer 1978). Obsidian, steatite, beads, acorns, baskets, animal skins, and dried fish were among the variety of traded commodities. Inland groups supplied obsidian from sources along the Sierra Nevada Mountains, in Napa Valley, and in the northeast corner of the state. Coastal groups supplied marine shell beads, ornaments, and marine mammal skins. In addition to trading specific items, clamshell disk beads made from two clam species available on the Pacific coast were widely used as a form of currency (Kroeber 1922). In northwestern California, groups used strings of dentalium shell as currency.

The effect of Spanish settlement and missionization in California marks the beginning of a devastating disruption of native culture and life ways, with forced population movements, loss of land and territory (including traditional hunting and gathering locales), enslavement, and decline in population numbers from disease, malnutrition, starvation, and violence during

the historic period (Castillo 1978). In the 1830s, foreign disease epidemics swept through the densely populated Central Valley, adjacent foothills, and North Coast Ranges decimating indigenous population numbers (Cook 1978). By 1850, with their lands, resources and way of life being overrun by the steady influx of non-native people during the Gold Rush, California's native population was reduced to about 100,000. By 1900, there were only 20,000 or less than seven percent of the pre-contact number. Existing reservations were created in California by the federal government beginning in 1858 but encompass only a fraction of native lands.

In 2017, the Native American population in California was estimated at over 672,123 (Census 2018). Although acknowledged as non-federally recognized California Native American tribes on the contact list maintained by the Native American Heritage Commission (NAHC), many groups continue to await federal tribal status recognition. There are currently 164 federally and non-federally recognized tribes within the State (NAHC 2018:15). Members of these tribes have specific cultural beliefs and traditions with unique connections to areas of California that are their ancestral homelands.

c) Historic Overview

Post-contact history for the State is generally divided into the Spanish period (1769–1822), Mexican period (1822–1848), and American period (1848–present). The establishment of Fort Ross by Alaska-based Russian traders also influenced post-contact history for a short period (1809–1841) in the region north of San Francisco Bay. Although there were brief visits along the Pacific coast by European explorers (Spanish, Russian, and British) between 1529 and 1769 of the territory claimed by Spain, the expeditions did not journey inland.

i) Spanish Period (1769–1822)

Spain's colonization of California began in 1769 with the overland expeditions from San Diego to San Francisco Bay by Lt. Colonel Gaspar de Portolá, and the establishment of a mission and settlement at San Diego. Between 1769 and 1823, the Spanish and the Franciscan Order established a series of 21 missions paralleling the coast along El Camino Real between San Diego and Sonoma (Rolle 1969). Between 1769 and 1782, Spain built four presidios (i.e., San Diego, Monterey, San Francisco, and Santa Barbara) to protect the missions, and by 1871 had established two additional pueblos at Los Angeles and San José.

Under Spanish law, large tracts of land, including cattle ranches and farms, fell under the jurisdiction of the missions. Native Americans were removed from their traditional lands, converted to Christianity, concentrated at the missions, and used as labor on the mission farms and ranches (Castillo 1978). Since the mission friars had civil as well as religious authority over their converts, they held title to lands in trust for indigenous groups. The lands were to be repatriated once the native peoples learned Spanish laws and culture.

ii) Russian Period (1809–1841)

In 1809, Alaska-based Russians started exploring the northern California coast with the goal of hunting otter and seal and feeding their Alaskan colonies. The first Russian settlement was

established in 1811–1812 by the Russian–American Fur Company to protect the lucrative marine fur trade and to grow produce for their Alaskan colonies. In 1841, because of the decline in local sea otter population and the failure of their agricultural colony, combined with a change in international politics, the Russians withdrew from California (Schuyler 1978).

iii) Mexican Period (1822–1848)

Following independence from Spain in 1822, the economy during the Mexican period depended on the extensive rancho system, carved from the former Franciscan missions and at least 500 land grants awarded in the State's interior to Mexican citizens (Beck and Haase 1974; Staniford 1975). Captain John Sutter, who became a Mexican citizen, received the two largest land grants in the Sacramento Valley. In 1839, Sutter founded the trading and agricultural empire named New Helvetia that was headquartered at Sutter's Fort, near the confluence of the Sacramento and American Rivers in today's City of Sacramento (Hoover et al. 2002).

Following adoption of the Secularization Act of 1833, the Mexican government privatized most Franciscan lands, including holdings of their California missions. Although secularization schemes had called for redistribution of lands to Native American neophytes who were responsible for construction of the mission empire, the vast mission lands and livestock holdings were instead redistributed by the Mexican government through several hundred land grants to private, non-indigenous ranchers (Castillo 1978; Hoover et al. 2002). Most Native American converts returned to traditional lands that had not yet been colonized or found work with the large cattle ranchos being carved out of the mission lands.

iv) American Period (1848–present)

In 1848, shortly after California became a territory of the U.S. with the signing of the Treaty of Guadalupe Hidalgo ending Mexican rule, gold was discovered on the American River at Sutter's Mill in Coloma. The resulting Gold Rush era influenced the history of the State, the nation, and the world. Thousands of people flocked to the gold fields in the Mother Lode region that stretches along the western foothills of the Sierra Nevada Mountains, and to the areas where gold was also discovered in other parts of the State, such as the Klamath and Trinity River basins (Caltrans 2008). In 1850, California became the 31st state, largely as a result of the Gold Rush.

d) Paleontological Setting

California's fossil record is exceptionally prolific with abundant specimens representing a diverse range of marine, lacustrine, and terrestrial organisms recovered from Precambrian rocks as old as 1 billion years to as recent as 6,000-year-old Holocene deposits (refer to geologic timescale in Table 6). These fossils provide key data for charting the course of the evolution or extinction of a variety of life on the planet, both locally and internationally. Paleontological specimens also provide key evidence for interpreting paleoenvironmental conditions, sequences and timing of sedimentary deposition, and other critical components of the earth's geologic history. Fossils are considered our most significant link to the biological prehistory of the earth (Jefferson 2004).

Table 6: Divisions of Geologic Time

Era	Period	Time in Millions of Years Ago (approximately)	Epoch
Cenozoic	Quaternary	< 0.01	Holocene
		2.6	Pleistocene
	Tertiary	5.3	Pliocene
		23	Miocene
		34	Oligocene
		56	Eocene
		65	Paleocene
Mesozoic	Cretaceous	145	
	Jurassic	200	
	Triassic	251	
Paleozoic	Permian	299	
	Carboniferous	359	
	Devonian	416	
	Silurian	444	
	Ordovician	488	
	Cambrian	542	
Precambrian		2,500	

Source: USGS 2010

Because the majority of the State was underwater until the Tertiary period, marine fossils older than 65 million years are not common and are exposed mainly in the mountains along the border with Nevada and the Klamath Mountains, and Jurassic shales, sandstones, and limestones are exposed along the edges of the Central Valley, portions of the Coast, Transverse, and Peninsular Ranges, and the Mojave and Colorado Deserts. Some of the oldest fossils in the state, extinct marine vertebrates called conodonts, have been identified

at Anza-Borrego Desert State Park in Ordovician sediments dating to circa 450 million years ago. Limestone outcrops of Pennsylvanian and Permian in the Providence Mountains State Recreation Area contain a variety of marine life, including brachiopods, fusulinids, crinoids, that lived some 300 to 250 million years ago.

Fossils from the Jurassic sedimentary layers in San Joaquin, San Luis Obispo, and Stanislaus counties include ammonites, bivalves, echinoderms, and marine reptiles, all of which were common in the coastal waters. Gymnosperms (seed-bearing plants) such as cycads, conifers, and ginkgoes are preserved in terrestrial sediments from this period, evidence that the Jurassic climate was warm and moderately wet. In the great Central Valley, marine rocks record the position of the Cretaceous shoreline as the eroded ancestral Sierra Nevada sediments were deposited east of the rising Coast Ranges and became the rock layers of the Sacramento and San Joaquin valleys. These Cretaceous sedimentary deposits have yielded abundant fossilized remains of plants, bivalves, ammonites, and marine reptiles (Paleontology Portal 2003).

Along coastal southern California where steep coastal mountains plunged into the warm Pacific Ocean an abundance of fossil marine invertebrates, such as ammonites, nautilus, tropical snails, and sea stars, have been found in today's coastal and near-coastal deposits from the Cretaceous Period. A rare, armored dinosaur fossil dated to about 75 million years ago during the Cretaceous was discovered in San Diego County during a highway project. It is the most complete dinosaur skeleton ever found in California (San Diego Natural History Museum n.d.). The lack of fossil remains of the majority of earth's large vertebrates, particularly terrestrial, marine, and flying reptiles (dinosaurs, ichthyosaurs, mosasaurs, plesiosaurs, and pterosaurs), as well as many species of terrestrial plants, after the end of the Cretaceous and the start of the Tertiary periods 65 million years ago (the K-T boundary) attests to their abrupt extinction.

B. Regulatory Setting

Applicable laws and regulations associated with cultural resources are discussed in Table 7.

Table 7: Applicable Laws and Regulations for Cultural Resources

Applicable Regulation	Description
Federal	
NHPA of 1966	The NHPA requires federal agencies to consider the preservation of historic and prehistoric resources. The NHPA authorizes the Secretary of the Interior to expand and maintain a National Register of Historic Places (NRHP), and it establishes an Advisory Council on Historic Preservation (ACHP) as an independent federal entity. Section 106 of the NHPA requires federal agencies to consider the effects of their undertakings on historic properties and afford the

Applicable Regulation	Description
	ACHP a reasonable opportunity to comment on the undertaking prior to licensing or approving the expenditure of funds on any undertaking that may affect properties listed, or eligible for listing, in the NRHP.
National Environmental Policy Act (NEPA) of 1969	NEPA requires federal agencies to foster environmental quality and preservation. Section 101(b)(4) declares that one objective of the national environmental policy is to "preserve important historic, cultural, and natural aspects of our national heritage." For major federal actions significantly affecting environmental quality, federal agencies must prepare, and make available for public comment, an environmental impact statement.
Archaeological Resources Protection Act of 1979 (16 USC Sections 470aa-470ll)	The NRPA requires a permit for any excavation or removal of archaeological resources from public lands or Indian lands. The statute provides both civil and criminal penalties for violation of permit requirements and for excavation or removal of protected resources without a permit.
Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) (PL 101–601) (25 USC Section 3001 et seq.)	The NAGPRA vests ownership or control of certain human remains and cultural items excavated or discovered on federal or tribal lands, in designated Native American tribes, organizations, or groups. The NAGPRA further requires notification of the appropriate Secretary or other head of any federal agency upon the discovery of Native American cultural items on federal or tribal lands; proscribes trafficking in Native American human remains and cultural items; requires federal agencies and museums to compile an inventory of Native American human remains and associated funerary objects, and to notify affected Indian tribes of this inventory; and provides for the repatriation of Native American human remains and specified objects possessed or controlled by federal agencies or museums.
Advisory Council Regulation, Protection of Historic Properties (36 CFR Part 800)	This regulation establishes procedures for compliance with Section 106 of the NHPA. These regulations define the Criteria of Adverse Effect, define the role of State Historic Preservation Officer (SHPO) in the Section 106 review process, set forth documentation requirements, and describe procedures to be followed if significant historic properties are discovered during implementation of an undertaking. Prehistoric and historic resources deemed significant (i.e., eligible for listing in the NRHP, per 36 CFR 60.4) must be considered in project planning and construction. The responsible

Applicable Regulation	Description
	federal agency must submit any proposed undertaking that may affect NRHP-eligible properties to the SHPO for review and comment prior to project approval.
National Park Service Regulations, NRHP (36 CFR Part 60)	These regulations set forth procedures for nominating properties to the NRHP and present the criteria to be applied in evaluating the eligibility of historic and prehistoric resources for listing in the NRHP.
Archaeology and Historic Preservation; Secretary of the Interior's Standards and Guidelines (Federal Register [FR] 190:44716–44742)	Non-regulatory technical advice about the identification, evaluation, documentation, study, and other treatment of cultural resources. Notable in these Guidelines are the "Standards for Archaeological Documentation" (p. 44734) and "Professional Qualifications Standards for Archaeology" (pp. 44740–44741).
American Indian Religious Freedom Act of 1978	The American Indian Religious Freedom Act pledges to protect and preserve the traditional religious rights of American Indians, Aleuts, Eskimos, and Native Hawaiians. Before the act was passed, certain federal laws interfered with the traditional religious practices of many American Indians. The act establishes a national policy that traditional Native American practices and beliefs, sites (and right of access to those sites), and the use of sacred objects shall be protected and preserved.
Department of Transportation Act of 1966 Section 4(f)	Section 4(f) of the Department of Transportation Act requires a comprehensive evaluation of all environmental impacts resulting from federal-aid transportation projects administered by the Federal Housing Administration, Federal Transit Administration (FTA), and Federal Aviation Administration (FAA) that involve the use—or interference with use—of several types of land: public park lands, recreation areas, and publicly or privately owned historic properties of federal, state, or local significance. The Section 4(f) evaluation must be sufficiently detailed to permit the U.S. Secretary of Transportation to determine that there is no feasible and prudent alternative to the use of such land, in which case the project must include all possible planning to minimize harm to any park, recreation, wildlife and waterfowl refuge, or historic site that would result from the use of such lands. If there is a feasible and prudent alternative, a proposed project using Section 4(f) lands cannot be approved by the Secretary. Detailed inventories of the locations and

Applicable Regulation	Description
	likely impacts on resources that fall into the Section 4(f) category are required in project-level environmental assessments.
State	
Health and Safety Code Sections 7052 and 7050.5 and PRC Section 5097.98	Disturbance of human remains without the authority of law is a felony (Health and Safety Code Section 7052). According to State law (Health and Safety Code Section 7050.5; PRC Section 5097.98), if human remains are discovered or recognized in any location other than a dedicated cemetery, there shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until 1) the coroner of the county has been informed and has determined that no investigation of the cause of death is required; 2) and if the remains are of Native American origin, and if the descendants from the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work for means of treating or disposing of with appropriate dignity the human remains and any associated grave goods as provided in PRC Section 5097.98; or the Native American Heritage Commission was unable to identify a descendent or the descendent failed to make a recommendation within 24 hours after being notified by the Commission. According to the Health and Safety Code, six or more human burials at one location constitute a cemetery (Health and Safety Code Sections 8100 and 7003), and disturbance of Native American cemeteries is a felony (Health and Safety Code Section 7052). Section 7050.5 requires that construction or excavation be stopped near discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the Native American Heritage Commission, who has jurisdiction over Native American remains (Health and Safety Code 7050.5(c); PRC Section 5097.98).

Applicable Regulation	Description
CEQA (Guidelines Section 15380)	CEQA requires that public agencies financing or approving public or private projects must assess the effects of the project on cultural resources. Furthermore, it requires that, if a project results in significant impacts on important cultural resources, alternative plans or mitigation measures must be considered; only significant cultural resources, however, need to be addressed. Thus, prior to the development of mitigation measures, the importance of cultural resources must be determined.
AB 52 (Statutes of 2014)	AB 52 (Gatto, Chapter 532, Statutes of 2014) recognizes that tribal sovereignty and the unique relationship of California local governments and public agencies with California Native American tribal governments, while respecting the interests and roles of project proponents. This requires specific consultation processes for project review and approval.
Local	
City/County General Plans	Policies, goals, and implementation measures in county or city general plans may contain measures applicable to cultural and paleontological resources. In addition to the enactment of local and regional preservation ordinances, CEQA requires that resources included in local registers be considered (local register of historical resources is defined in PRC Section 5020.1(k)). Therefore, local county and municipal policies, procedures, and zoning ordinances must be considered in the context of project-specific undertakings. Cultural resources are generally discussed in either the open space element or the conservation element of the general plan. Many local municipalities include cultural resources preservation elements in their general plans that include some mechanism pertaining to cultural resources in those communities. In general, the sections pertaining to archaeological and historical properties are put in place to afford the cultural resources a measure of local protection. The policies outlined in the individual general plans should be consulted prior to any undertaking or project.
Cooperative Agreements Among Agencies	Cooperative agreements among land managing agencies (BLM, National Park Service, USFS, California State Parks, Bureau of Indian Affairs, Department of Defense, and others) the SHPO and ACHP may exist and will need to be complied with on specific projects. In addition, certain agencies have existing Programmatic Agreements

Applicable Regulation	Description
	requiring permits (California Public Utilities Commission [CPUC], BLM) to complete archaeological investigations and employ the Secretary of Interior's Professional Qualification Standards and Guidelines (36 CFR Part 61).

6. Energy Demand

A. Existing Conditions

1. United States

Petroleum, natural gas, coal, nuclear energy, and renewable energy are the primary energy sources of the United States. Electricity is a secondary energy source that is generated from primary energy sources. In 2020, the U.S. energy mix was (EIA 2021a):

- Petroleum: 35 percent,
- Natural gas: 34 percent,
- Renewable energy: 12 percent,
- Coal: 10 percent, and
- Nuclear electric power: 9 percent.

Energy sources are measured in different physical units: liquid fuels in barrels or gallons, natural gas in cubic feet, coal in short tons, and electricity in kilowatts and kilowatt-hours. In the United States, British thermal units (Btu), a measure of heat energy, are commonly used to compare different types of energy to each other. In 2020, total U.S. primary energy consumption was equal to approximately 93 quadrillion (or one thousand trillion) Btu (EIA 2021a).

In 2020, the shares of total primary energy consumption for the four end-use energy-consuming sectors were (EIA 2021a):

- Industrial—36 percent,
- Transportation—35 percent,
- Residential—17 percent, and
- Commercial—12 percent.

Fossil fuels have dominated the U.S. energy mix for more than 100 years, but the mix has changed over time. Energy production trends and current production are summarized as follows (EIA 2021a):

- Coal production peaked in 2008 and trended down through 2020. Coal production in 2020 was the lowest amount since 1965. The primary reason for the general decline in coal production in recent years is the decrease in coal consumption for electricity generation.
- Natural gas production reached a record high in 2019. More efficient drilling and production techniques have resulted in increased production of natural gas from shale and tight geologic formations.
- Crude oil production generally decreased each year between 1970 and 2008. In 2009, the trend reversed, and production began to rise. U.S. crude oil production reached a record high in 2019. More cost-effective drilling and production technologies helped to boost production, especially in Texas and North Dakota. Crude oil production was lower in 2020 than in 2019 because the demand for U.S. petroleum dropped substantially in March and April 2020 in response to the COVID-19 pandemic.
- Natural gas plant liquids (NGPLs) are hydrocarbon gas liquids extracted from natural gas before the natural gas is put into pipelines for transmission to consumers. NGPL production has generally increased since 2005 alongside increases in natural gas production. In 2020, NGPL production reached a record high.
- Nuclear energy production in the United States generally leveled off after 2000. Although fewer nuclear reactors operated in 2020 than in 2000, the amount of nuclear energy production in 2020 was the second highest (behind 2019)—the result of increased capacity from power plant upgrades and shorter refueling and maintenance cycles.
- Total renewable energy production and consumption both reached record highs in 2020 primarily because of record-high solar and wind energy production. Hydroelectric power production in 2020 was about 1 percent higher than in 2019 but about 9 percent below the 50-year average. Total biomass production and consumption in 2020 were both 10 percent lower than the highest levels, which were recorded in 2018. Geothermal energy use was nearly the same in 2020 as it was in 2014, when the highest annual level of geothermal energy production and consumption was recorded.

2. California

In 2018, California's total energy consumption was second-highest in the nation, but the state's per capita energy consumption ranked 47th, attributable in part to its mild climate and energy efficiency programs. California is the largest consumer of both jet fuel and motor gasoline among the 50 states, and it is the second-largest consumer of all petroleum products combined, accounting for 10 percent of the U.S. total. California was the seventh-largest producer of crude oil among the 50 states in 2019 and, as of January 2020, third in oil refining capacity with foreign suppliers providing more than half of the crude oil refined in the state in 2019. In 2019, California ranked second in the nation in conventional hydroelectric power generation and first as a producer of electricity from solar, geothermal,

and biomass resources. In 2019, California was the fourth-largest electricity producer in the nation, but it also was the nation's largest importer of electricity, receiving approximately 28 percent of its electricity supply from generating facilities outside of California, including imports from Mexico (EIA 2021b).

In 2018, California's power mix consisted of 34.23 percent from natural gas, 31.70 percent from renewable sources (i.e., solar, wind, biomass, geothermal, and small hydropower), 14.62 percent from large hydropower; 8.98 percent from nuclear energy production, 7.5 percent from miscellaneous nonrenewable sources (i.e., oil, waste heat/petroleum coke, and unspecified), and 2.96 percent from coal (CEC 2021). Approximately 72 percent of total electricity generation was from in-state sources, with the remaining electricity coming from out-of-state imports from the Pacific Northwest (9 percent) and the Southwest (19 percent) (CEC 2021).

B. Regulatory Setting

Applicable laws and regulations associated with energy resources are discussed in Table 8.

Table 8: Applicable Laws and Regulations for Energy Resources

Regulation	Description
Federal	
Energy Policy and Conservation Act of 1975	The Energy Policy and Conservation Act of 1975 sought to ensure that all vehicles sold in the U.S. would meet certain fuel economy goals. Through this Act, Congress established the first fuel economy standards for on-road motor vehicles in the U.S. Pursuant to the Act, the National Highway Traffic and Safety Administration (NHTSA), which is part of the U.S. Department of Transportation (DOT), is responsible for establishing additional vehicle standards and for revising existing standards. From 1986 to 2012, fuel economy standards for passenger vehicles remained nearly stagnant at between 20.7 miles per gallon (mpg) for trucks and 27.5 mpg for light-duty cars. In 2010, U.S. EPA adopted new passenger vehicle standards starting with the 2012 model year that incorporates GHG emissions standards on a vehicle-footprint basis and to accommodate the efficiencies of electric and other alternatively fueled vehicles. Additional standards for model years through 2025 were adopted in 2012. Translating the GHG standards to mpg equivalents, the projected fuel economy standard for new passenger cars and light trucks combined would increase from 30.1 to 54.5 between 2012 and 2025 model years. Until 2010, heavy-duty vehicles (i.e., vehicles and

Regulation	Description
	trucks over 8,500 pounds gross vehicle weight) were not subject to fuel economy standards. In 2011, NHTSA and U.S. EPA released fuel economy standards for medium- and heavy-duty vehicles (over 8,500 pounds gross vehicle weight) for 2014 through 2018 model years. Fuel economy standards for these vehicles vary by vehicle profession and include explicit mpg goals as well as percent reduction targets. In 2016, NHTSA and U.S. EPA adopted new standards for medium- and heavy-duty vehicles for 2018 through 2027 that would achieve GHG emissions reductions of approximately 1.1 billion metric tons (U.S. EPA 2016c). Compliance with federal fuel economy standards is determined based on each manufacturer's average fuel economy for the portion of its vehicles produced for sale in the U.S. The Corporate Average Fuel Economy (CAFE) program, administered by U.S. EPA, was created to determine vehicle manufacturers' compliance with the fuel economy standards. U.S. EPA calculates a CAFE value for each manufacturer based on city and highway fuel economy test results and vehicle sales. Based on the information generated under the CAFE program, DOT is authorized to assess penalties for noncompliance.
Energy Policy Act (EPAct) of 1992	The EPAct was passed to reduce the country's dependence on foreign petroleum and improve air quality. The EPAct includes several parts intended to build an inventory of alternative fuel vehicles (AFVs) in large, centrally fueled fleets in metropolitan areas. The EPAct requires certain federal, state, and local government and private fleets to purchase a percentage of light-duty AFVs capable of running on alternative fuels each year. In addition, financial incentives are included in the EPAct. Federal tax deductions will be allowed for businesses and individuals to cover the incremental cost of AFVs. States are also required by the act to consider a variety of incentive programs to help promote AFVs.
Energy Policy Act of 2005	The Energy Policy Act of 2005 was signed into law on August 8, 2005. Generally, the act provides for renewed and expanded tax credits for electricity generated by qualified energy sources, such as landfill gas; provides bond financing, tax incentives, grants, and loan guarantees for a clean renewable energy and rural community electrification; and establishes a federal purchase requirement for renewable energy.

Regulation	Description
State	
Warren-Alquist State Energy Resources Conservation and Development Act of 1974 (PRC Section 25000 et seq.)	The Warren-Alquist Act is the legislation that created and gives statutory authority to CEC (formally called the State Energy Resources Conservation and Development Commission).
Integrated Energy Policy Reports (Senate Bill [SB] 1389)	SB 1389 (Bowen, Chapter 568, Statutes of 2002) requires CEC to prepare a biennial integrated energy policy report that contains an assessment of major energy trends and issues facing the state's electricity, natural gas, and transportation fuel sectors and provides policy recommendations to conserve resources; protect the environment; ensure reliable, secure, and diverse energy supplies; enhance the state's economy; and protect public health and safety (PRC Section 25301(a)). CEC prepares these assessments and associated policy recommendations every 2 years, with updates in alternate years, as part of the Integrated Energy Policy Report (IEPR). Preparation of the IEPR involves close collaboration with federal, state, and local agencies and a wide variety of stakeholders in an extensive public process to identify critical energy issues and develop strategies to address those issues (CEC 2012).
California Long-Term Energy Efficiency Strategic Plan	On September 18, 2008, CPUC adopted California's first Long Term Energy Efficiency Strategic Plan, presenting a single roadmap to achieve maximum energy savings across all major groups and sectors in California. This comprehensive plan for 2009 to 2020 is the state's first integrated framework of goals and strategies for saving energy, covering government, utility, and private sector actions, and holds energy efficiency to its role as the highest priority resource in meeting California's energy needs. The plan was updated in January 2011 to include a lighting chapter.
Energy Action Plan	The first Energy Action Plan emerged in 2003 from a crisis atmosphere in California's energy markets. The State's three major energy policy agencies (CEC, CPUC, and the Consumer Power and

Regulation	Description
	Conservation Financing Authority [established under deregulation and now defunct]) came together to develop one high-level, coherent approach to meeting California's electricity and natural gas needs. It was the first time that energy policy agencies formally collaborated to define a common vision and set of strategies to address California's future energy needs and emphasize the importance of the impacts of energy policy on the California environment.
California Building Energy Efficiency Standards (24 CCR Part 6)	California's Building Energy Efficiency Standards (Title 24, Part 6 of the CCR) serve to conserve electricity and natural gas in new building construction and are administered by CEC. Local governments enforce the standards through local building permitting and inspections. CEC updates these standards on a triennial basis. The 2016 Building Energy Efficiency Standards, which took effect on January 1, 2017, are approximately 28 percent more efficient than previous standards (2013) for residential land uses and 5 percent more efficient for nonresidential land uses. On May 9, 2018, CEC adopted the 2019 Building Energy Efficiency Standards, which contain new requirements to further improve the energy efficiency of new buildings and will go into effect on January 1, 2020.
Comprehensive Energy Efficiency Plan for Existing Buildings (AB 758)	AB 758 (Skinner, Chapter 470, Statutes 2009) requires CEC, in collaboration with CPUC and stakeholders, to develop a comprehensive program to achieve greater energy efficiency in the state's existing buildings.
California Renewable Energy Portfolio Standard (RPS) (SB X1-2)	In 2011, Governor Brown signed SB X1-2, which requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 33 percent of their electricity supply (portfolio) from renewable sources by 2020. CPUC and CEC jointly implement the statewide RPS program through rulemakings and monitoring the activities of electric energy utilities in the state.
California Qualifying Facility and CHP Program Settlement	In December 2010, CPUC approved California's Qualifying Facility and CHP Program Settlement, which established a CHP framework for the state's investor-owned utilities. The settlement established a near-term target of 3,000 MW of CHP for entities under the jurisdiction of CPUC, although this target includes not just new CHP, but capacity from renewal of contracts due to expire in the

Regulation	Description
	next three years. CPUC has also adopted a settlement agreement that includes reforms to the Rule 21 interconnection process to provide a clear, predictable path to interconnection of distributed generation while maintaining the safety and reliability of the grid (CEC 2012).
California Strategy to Reduce Petroleum Dependence (AB 2076)	AB 2076 (Chapter 936, Statutes of 2000) requires CEC and CARB to develop and submit to the Legislature a strategy to reduce petroleum dependence in California. The statute requires the strategy to include goals for reducing the rate of growth in the demand for petroleum fuels. In addition, the strategy is required to include recommendations to increase transportation energy efficiency as well as the use of non-petroleum fuels and advanced transportation technologies including alternative fuel vehicles, hybrid vehicles, and high-fuel efficiency vehicles. The strategy, "Reducing California's Petroleum Dependence," was adopted by CEC and CARB in 2003. The strategy recommends that California reduce inroad gasoline and diesel fuel demand to 15 percent below 2003 demand levels by 2020 and maintain that level for the foreseeable future; the Governor and Legislature work to establish national fuel economy standards that double the fuel efficiency of new cars, light trucks, and sport utility vehicles; and increase the use of nonpetroleum fuels to 20 percent of on-road fuel consumption by 2020 and 30 percent by 2030.
Alternative and Renewable Fuel and Vehicle Technology Program (AB 118)	AB 118 (Statutes of 2007) created the CEC's Alternative and Renewable Fuel and Vehicle Technology Program. The statute, subsequently amended by AB 109 (Statutes of 2008), authorizes CEC to develop and deploy alternative and renewable fuels and advanced transportation technologies to help attain the state's climate change policies.
Alternative Fuels Plan (AB 1007)	AB 1007 requires CEC to prepare a State plan to increase the use of alternative fuels in California. Any environmental document prepared for a strategic growth plan, regional blueprint general plan metropolitan planning or transportation plan should include an evaluation of alternative fuels for emissions or criteria pollutants, TACs, GHGs, water pollutants, and other harmful substances, and their impacts on petroleum consumption, and set goals for increased alternative fuel use in the State for the next decades, and recommend policies to ensure the alternative fuel goals are attained, including standards on transportation fuels and vehicle

Regulation	Description
	and policy mechanisms to ensure vehicles operating on alternative fuels use those fuels to the maximum extent feasible.
Bioenergy Action Plan (EO S-06-06)	EO S-06-06 establishes targets for the use and production of biofuels and biopower and directs State agencies to work together to advance biomass programs in California while providing environmental protection and mitigation. The EO establishes the following target to increase the production and use of bioenergy, including ethanol and biodiesel fuels made from renewable resources: produce a minimum of 20 percent of its biofuels within California by 2010, 40 percent by 2020, and 75 percent by 2050. The EO also calls for the State to meet a target for use of biomass electricity.
Governor's Low Carbon Fuel Standard (LCFS) (EO S-01-07)	EO S-01-07 establishes a statewide goal to reduce the carbon intensity of California's transportation fuels by at least 10 percent by 2020 through establishment of the LCFS. The EO requires LCFS to be incorporated into the State Alternative Fuels Plan required by AB 1007 and is one of the proposed discrete early action GHG reduction measures identified by CARB pursuant to AB 32. In January 2010, the Office of Administrative Law approved the LCFS regulation, and approved amendments to the LCFS in January 2019.
SB 100	SB 100, approved on September 10, 2018, amends the California Renewables Portfolio Standard. This bill revises the legislative findings and declarations of the statewide goal of achieving 50 percent renewable resources by December 31, 2030 as mandated by the Renewables Portfolio Standard Program to a 60 percent target by December 31, 2030. The bill would require that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent and 60 percent of retail sales by the target dates stated above, respectively. This bill would also require that the State supply 100 percent of retail sales of electricity to California end-use customers from renewable energy resources and zero-carbon resources by December 31, 2045.

Regulation	Description
The Sustainable Communities and Climate Protection Act of 2008 (SB 375)	SB 375 augments the existing federal requirement for metropolitan planning organizations (MPOs) to prepare regional transportation plans (RTPs) by requiring RTPs to include sustainable community strategies (SCSs). SCSs contain land use, transportation, and housing strategies to reduce vehicle miles traveled (VMT)-related GHG emissions from the automobile and light-duty truck sector. In 2010, CARB released the first round of GHG reduction targets for each of California's 18 MPOs. Strategies to reduce GHGs include incentive programs for the use of zero-emission vehicles and plug-in hybrid electric vehicles and the construction of infrastructure for these types of vehicles. In March 2018, CARB released and adopted the second round of GHG reduction targets for the state's 18 MPOs.
Clean Energy and Pollution Reduction Act of 2015 (SB 350)	The Clean Energy and Pollution Reduction Act of 2015 (SB 350) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources to be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers through energy efficiency and conservation by December 31, 2030.
Local	
City/County General Plans	Many cities and counties have general plan elements and policies that specifically address energy use and conservation. Those energy conservation measures outlined in the various county and city general plans contain goals, objectives, and policies aimed at reducing energy consumption. Proponents of specific projects would be required to consult the applicable general plans and design the projects consistent with the guidelines of those general plans in which the projects are located.

7. Geology and Soils

A. Existing Conditions

1. U.S.

The U.S. has a diverse, complex, and seismically active geology that includes a vast array of landforms. Soils are as diverse as America's geology, and are described and characterized individually and collectively with other soils, and their various compatible uses in soil surveys published by U.S. Department of Agriculture (USDA). Soils are fundamental and largely non-renewable resources that are the basis for high-level sustained yields of agricultural commodities, forest products, and provide support to the wide variety of ecological communities throughout the state.

The geology of the U.S. is very complex and can be divided into roughly five physiographic provinces: the American cordillera, the Canadian shield, the stable platform, the coastal plain, and the Appalachian orogenic belt. In Alaska, the geology is typical of the cordillera, whereas in Hawaii the major islands consist of Neogene volcanic erupted over a hotspot.

2. California

The State's topography is highly varied and includes 1,340 miles of seacoast, as well as high mountains, inland flat valleys, and deserts. Elevations in California range from 282 feet below sea level in Death Valley to 14,494 feet at the peak of Mount Whitney. The mean elevation of California is approximately 2,900 feet. The climate of California is as highly varied as its topography. Depending on elevation, proximity to the coast, and altitude, climate types include temperate oceanic, highland, sub-arctic, Mediterranean, steppe, and desert (USGS 1995). Precipitation in California is highly variable year-to-year and across the state. The southeast deserts typically receive less than 5 inches a year and the north coast can often receive up to 100 inches per year, averaging about 50 inches across the state. Approximately 75 percent of the state's annual precipitation falls between October and April, primarily in the form of rain, except for high mountain elevations (DWR 2014). Overall, northern California is wetter than southern California with most of the State's annual precipitation occurring in the northern coastal region.

a) Geology

Plate tectonics and climate have played major roles in forming California's dramatic landscape. California is located on the active western boundary of the North American continental plate in contact with the oceanic Pacific Plate and the Gorda Plate north of the Mendocino Triple Junction. The dynamic interactions between these three plates and California's climate are responsible for the unique topographic characteristics of California, including rugged mountain ranges, long and wide flat valleys, and dramatic coastlines (Harden 1997). Tectonics and climate also have a large effect on the occurrence natural environmental hazards, such as earthquakes, landslides, and volcanic formations.

b) Landslides

Landsliding or mass wasting is a common erosional process in California and has played an integral part in shaping the State's landscape. Typically, landslides occur in mountainous regions of the state, but they can also occur in areas of low relief, including coastal bluffs, along river and stream banks, and inland desert areas. Landsliding is the gravity-driven downhill mass movement of soil, rock, or both and can vary considerably in size, style and rate of movement, and type depending on the climate of a region, the steepness of slopes, rock type and soil depth, and moisture regime (Harden 1997).

c) Earthquakes

Earthquakes are a common and unpredictable occurrence in California. The tectonic development of California began millions of years ago by a shift in plate tectonics that converted the passive margin of the North American plate into an active margin of compressional and translational tectonic regimes. This shift in plate tectonics continues to make California one of the most geomorphically diverse, active, and picturesque locations in the U.S. While some areas of California are more prone to earthquakes, such as northern, central, and southern coastal areas of California, all areas of California are prone to the effects of ground shaking due to earthquakes. While scientists have made substantial progress in mapping earthquake faults where earthquakes are likely to occur and predicting the potential magnitude of an earthquake in any particular region, they have been unable to predict precisely where or when an earthquake will occur and what its magnitude will be.

d) Tsunamis

Coastal communities around the circum-Pacific have long been prone to the destructive effects of tsunamis. Tsunamis are a series of long-period, high-magnitude ocean waves that are created when an outside force displaces large volumes of water. Throughout time, major subduction zone earthquakes in both the Northern and Southern Hemispheres have moved the Earth's crust at the ocean bottom sending vast amounts of waters into motion and spreading tsunami waves throughout the Pacific Ocean.

Tsunamis can also occur from subaerial and submarine landslides that displace large volumes of water. Subaerial landslide-generated tsunamis can be caused by seismically generated landslides, rock falls, rock avalanches, and eruption or collapse of island or coastal volcanoes. Submarine landslide-generated tsunamis are typically caused by major earthquakes or coastal volcanic activity. In contrast to a seismically generated tsunami, seismic seiches are standing waves that are caused by seismic waves traveling through a closed (lake) or semi-enclosed (bay) body of water. Due to the long-period seismic waves that originate after an earthquake, seiches can be observed several thousand miles away from the origin of the earthquakes. Small bodies of water, including lakes and ponds, are especially vulnerable to seismic seiches.

e) Volcanoes

A volcano is an opening in the Earth's crust through which magma escapes to the surface where it is extruded as lava. Volcanism may be spectacular, involving great fountains of

molten rock, or tremendous explosions that are caused by the build-up of gases within the volcano (Ritchie and Gates 2001). Some of the most active volcanic areas in California are located within the Cascade Range – a volcanic chain that is a result of compressional tectonics along the Cascadia subduction zone.

f) Active Faults

A fault is defined as a fracture or zone of closely associated fractures along rocks that on one side have been displaced with respect to those on the other side. Most faults are the result of repeated displacement that may have taken place suddenly or by slow creep. A fault is distinguished from fractures or shears caused by landsliding or other gravity-induced surficial failures. A fault zone is a zone of related faults that commonly are braided and subparallel but may be branching and divergent. A fault zone has significant width (with respect to the scale of the fault being considered, portrayed, or investigated), ranging from a few feet to several miles (CGS 2018).

In the State of California earthquake faults have been designated as being active through a process that has been described by the 1972 Alquist-Priolo Earthquake Fault Zoning Act. An active fault is defined by the State as one that has "had surface displacement within Holocene time (about the last 11,000 years)." This definition does not, of course, mean that faults lacking evidence for surface displacement within Holocene time are necessarily inactive. A fault may be presumed to be inactive based on satisfactory geologic evidence; however, the evidence necessary to prove inactivity sometimes is difficult to obtain and locally may not exist.

B. Regulatory Setting

Applicable laws and regulations associated with geology and soils are discussed in Table 9.

Table 9: Applicable Laws and Regulations for Geology and Soils

Regulation	Description
Federal	
Safe Drinking Water Act (SDWA) - Federal Underground Injection Control (UIC) Class VI Program for Carbon Dioxide Geology Sequestration Wells	Under the SDWA, the UIC Class VI Program for Carbon Dioxide Geologic Sequestration Wells requires states and owners or operators to submit all permit applications to the appropriate U.S. EPA Region for a Class VI permit to be issued. These requirements, also known as the Class VI rule, are designed to protect underground sources of drinking water. The Class VI rule builds on existing UIC Program requirements, with extensive tailored requirements that address carbon dioxide (CO_2) injection for long-term storage to ensure that wells used for geologic sequestration are appropriately sited, constructed, tested, monitored, funded,

Regulation	Description
	and closed. The rule also affords owners or operators injection depth flexibility to address injection in various geologic settings in the U.S. in which geologic sequestration may occur, including very deep formations and oil and gas fields that are transitioned for use as CO_2 storage sites.
SDWA - Federal UIC Class II Program for Oil and Gas Related Injection Wells	The Class II Program for Oil and Gas Related Injection Wells requires states to meet U.S. EPA's minimum requirements for UIC programs including strict construction and conversion standards and regular testing and inspection. Enhanced oil and gas recovery wells may either be issued permits or be authorized by rule. Disposal wells are issued permits.
CWA (40 CFR 112)	The CWA was enacted to restore and maintain the chemical, physical, and biological integrity of the nation's waters by regulating point and nonpoint pollution sources, helping publicly owned treatment works for the improvement of wastewater treatment, and maintaining the integrity of wetlands. This includes the creation of a system that requires states to establish discharge standards specific to water bodies (National Pollution Discharge Elimination System [NPDES]), which regulates storm water discharge from construction sites through the implementation of Storm Water Pollution Prevention Plans (SWPPPs). In California, the state's NPDES permit program is implemented and administered by the local RWQCBs.
Earthquake Hazards Reduction Act and National Earthquake Hazards Reduction Program Act	This Act established the National Earthquake Hazards Reduction Program to reduce the risks to life and property from future earthquakes. This program was significantly amended in November 1990 by the National Earthquake Hazards Reduction Program Act by refining the description of agency responsibilities, program goals and objectives.
Mining and Mineral Policy Act	The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.

Regulation	Description
State	
Seismic Hazards Mapping Act (PRC Section 2690 et seq.)	The Seismic Hazards Mapping Act of 1990 (PRC, Chapter 7.8, Division 2) directs the DOC Division of Mines and Geology (now called California Geological Survey [CGS]) to delineate Seismic Hazard Zones. The purpose of the act is to reduce the threat to public health and safety and to minimize the loss of life and property by identifying and mitigating seismic hazards. These include areas identified that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Cities, counties, and state agencies are directed to use seismic hazard zone maps developed by CGS in their land-use planning and permitting processes. The act requires that site-specific geotechnical investigations be performed prior to permitting most urban development projects within seismic hazard zones.
Alquist-Priolo Earthquake Fault Zoning Act (PRC Section 2621 et seq.)	California's Alquist-Priolo Act (PRC Section 2621 et seq.), originally enacted in 1972 as the Alquist-Priolo Special Studies Zones Act and renamed in 1994, is intended to reduce the risk to life and property from surface fault rupture during earthquakes. The Alquist-Priolo Act prohibits the location of most types of structures intended for human occupancy across the traces of active faults and strictly regulates construction in the corridors along active faults (Earthquake Fault Zones). It also defines criteria for identifying active faults, giving legal weight to terms such as "active," and establishes a process for reviewing building proposals in and adjacent to Earthquake Fault Zones. Under the Alquist-Priolo Act, faults are zoned, and construction along or across them is strictly regulated if they are "sufficiently active" and "well-defined." A fault is considered sufficiently active if one or more of its segments or strands shows evidence of surface displacement during Holocene time (defined for the purposes of the act as within the last 11,000 years). A fault is considered well-defined if its trace can be clearly identified by a trained geologist at the ground surface or in the shallow subsurface, using standard professional techniques, criteria, and judgment.
California Division of Oil, Gas, and Geothermal	PRC Section 3106 mandates the supervision of drilling, operation, maintenance, and abandonment of oil wells for preventing: damage to life, health, property, and natural resources; damage to

Regulation	Description
Resources (DOGGR) (PRC Section 3106).	underground and surface waters suitable for irrigation or domestic use; loss of oil, gas, or reservoir energy; and damage to oil and gas deposits by infiltrating water and other causes. In addition, the DOGGR regulates drilling, production, injection, and gas storage operations in accordance with Title 14 CCR Chapter 4, Subchapter 1 (commencing with Section 1710 et seq.).
Landslide Hazard Identification Program (PRC Section 2687(a))	The Landslide Hazard Identification Program requires the State Geologist to prepare maps of landslide hazards within urbanizing areas. According to PRC Section 2687(a), public agencies are encouraged to use these maps for land use planning and for decisions regarding building, grading, and development permits.
California Building Standards Code (CBSC) (24 CCR)	California's minimum standards for structural design and construction are given in the CBSC (24 CCR). The CBSC is based on the Uniform Building Code, which is used widely throughout U.S. (generally adopted on a state-by-state or district-by-district basis) and has been modified for California conditions with numerous, more detailed, or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
Surface Mining and Reclamation Act (SMARA) (PRC Section 2710 et seq.)	The intent of the SMARA of 1975 was to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using Mineral Resource Zones (MRZs) to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits.

Regulation	Description
Local	
Geotechnical Investigation	Local jurisdictions typically regulate construction activities through a process that may require the preparation of a site-specific geotechnical investigation. The purpose of a site-specific geotechnical investigation is to provide a geologic basis for the development of appropriate construction design. Geotechnical investigations typically assess bedrock and Quaternary geology, geologic structure, soils, and the previous history of excavation and fill placement. Proponents of specific projects that require design of earthworks and foundations for proposed structures will need to prepare geotechnical investigations on the physical properties of soil and rock at the site prior to project design.
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of best management practices similar to those contained in a SWPPP.
City/County General Plans	Most city and county general plans include an element that covers geology and soil resources within that jurisdiction.

8. Greenhouse Gases

A. Existing Conditions

1. U.S. and California

a) Existing climate

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas weather is defined as the condition of the atmosphere at any particular time and place (Ahrens 2003). Like its topography, California's climate is varied and tends toward extremes. Generally, there are two seasons in California: 1) a long, dry summer, with low humidity and cool evenings, and 2) a mild, rainy winter, except in the high mountains, where

four seasons prevail, and snow lasts from November to April. The one climatic constant for the State is summer drought.

California has four main climatic regions. Mild summers and winters prevail in central coastal areas, where temperatures are more equable than virtually anywhere else in the U.S. For example, differences between average summer and winter temperatures between San Francisco and Monterey for example are seldom more than 10 degrees Fahrenheit (°F) (6 degrees Celsius [°C]). During the summer, there are heavy fogs in San Francisco and all along the coast. Mountainous regions are characterized by milder summers and colder winters, with markedly low temperatures at high elevations. The Central Valley has hot summers and cool winters, while the Imperial Valley and eastern deserts are marked by very hot, dry summers, with temperatures frequently exceeding 100°F (38°C).

Average annual temperatures for the State range from 47°F (8°C) in the Sierra Nevada to 73°F (23°C) in the Imperial Valley. The highest temperature ever recorded in the U.S. was 134°F (57°C), registered in Death Valley on July 10, 1913. Death Valley has the hottest average summer temperature in the Western Hemisphere, at 98°F (37°C). The state's lowest temperature was -45°F (-43°C), recorded on January 20, 1937 at Boca, near the Nevada border.

Among the major population centers, Los Angeles has an average annual temperature of 63°F (17°C), with an average January minimum of 48°F (9°C) and an average July maximum of 75°F (24°C). San Francisco has an annual average of 57°F (14°C), with a January average minimum of 42°F (6°C) and a July average maximum of 72°F (22°C). The annual average in San Diego is 64°F (18°C), with an average January minimum of 49°F (9°C), and an average July maximum 76°F (24°C). Sacramento's annual average temperature is 61°F (16°C), with January minimums averaging 38°F (3°C) and July maximums averaging 93°F (34°C).

Annual precipitation varies from only 2 inches (5 centimeters [cm]) in the Imperial Valley to 68 inches (173 cm) at Blue Canyon, near Lake Tahoe. San Francisco had an average annual precipitation (1971–2000) of 20 inches (51 cm), Sacramento 17.9 inches (45.5 cm), Los Angeles 13.2 inches (33.5 cm), and San Diego 10.8 inches (27.4 cm). The largest one-month snowfall ever recorded in the U.S., 390 inches (991 cm), fell in Alpine County in January 1911. Snow averages between 300 and 400 inches (760 to 1,020 cm) annually in the high elevations of the Sierra Nevada, but is rare in the Central Valley and coastal lowlands.

Sacramento has the greatest percentage (73 percent) of possible annual sunshine among the state's largest cities; Los Angeles has 72 percent and San Francisco 71 percent. San Francisco is the windiest, with an average annual wind speed of 11 miles per hour (mph) (18 kilometers per hour). Tropical rainstorms occur often in California during the winter.

b) Attributing Climate Change—The Physical Scientific Basis

Climate change is a long-term shift in the climate of a specific location, region, or planet. The shift is measured by changes in features associated with average weather, such as temperature, wind patterns, and precipitation. According to the Intergovernmental Panel on Climate Change (IPCC), the scientific body established by the World Meteorological

Organization and by the United Nations Environment Programme, available scientific evidence supports the conclusion that most of the increased average global temperatures since the mid-20th century is very likely due to human-induced increases in GHG concentrations. GHGs, which are emitted from both natural and anthropogenic sources, include water vapor, CO_2, methane, nitrous oxide (N_2O), halocarbons, and ozone. These gases play a role in the "greenhouse effect" that helps regulate the temperature of the earth.

The current post-industrial warming trend differs alarmingly from past changes in the Earth's climate due to higher concentrations of GHGs in the Earth's atmosphere. As a result, global climate warming is occurring faster than at any other time on record within the past 650,000 years. Long-term, decadal, and inter-annual fluctuations in the Earth's climate have historically resulted from natural processes such as plate tectonics, the Earth's rotational orbit in space, solar radiation variability, and volcanism. The current trend derives from an added factor: human activities, which have greatly intensified the natural greenhouse effect, causing global warming. Anthropogenic activities that result in emissions of GHGs include the burning of fossil fuels such as coal, oil, and natural gas, cutting down trees (i.e., deforestation), and land-use changes. The burning of fossil fuels emits GHGs into the atmosphere, while deforestation and land-use changes remove trees and other kinds of vegetation that sequester CO_2. Emissions of GHGs associated with human activities have increased globally since pre-industrial times, with an increase of 70 percent between 1970 and 2004 (IPCC 2007).

A growing recognition of the wide-ranging impacts of climate change has fueled efforts over the past several years to reduce GHG emissions. In 1997, the Kyoto Protocol set legally binding emissions targets for industrialized countries and created innovative mechanisms to assist these countries in meeting these targets. The Kyoto Protocol took effect in 2004, after 55 parties to the Convention had ratified it (The United Nations Climate Change Convention and the Kyoto Protocol). Six major GHGs have been the focus of efforts to reduce emissions and are included in the California Global Warming Solutions Act (AB 32): CO_2, methane, N_2O, HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). They are regulated under the Kyoto Protocol. Nitrogen trifluoride was later added to the list of important GHGs to reduce and codified in California statute.

The "global warming potential" (GWP) metric is used to convert all GHGs into "CO_2-equivalent" (CO_2e) units. Importantly, metrics such as GWP have been used as an exchange rate in multi-gas emissions policies and frameworks. Each gas's GWP is defined relative to CO_2. For example, using values from the IPCC's Fourth Assessment Report, N_2O's GWP is 298, meaning a unit mass of N_2O warms the atmosphere 298 times more than a unit mass of CO_2. SF_6 and PFCs have extremely long atmospheric lifetimes, resulting in their essentially irreversible accumulation in the atmosphere once emitted. However, in terms of quantity of emissions, CO_2 dominates world and U.S. GHG emissions.

Because the major GHGs have longer lives, they build up in the atmosphere so that past, present, and future emissions ultimately contribute to total atmospheric concentrations. Thus, while reducing emissions of conventional air pollutants decreases their concentrations in the atmosphere in a relatively short time, atmospheric concentrations of the major GHGs

can only be gradually reduced over years and decades. More specifically, the rate of emission of CO_2 currently greatly exceeds its rate of removal, and the slow and incomplete removal implies that small to moderate reductions in its emissions would not result in stabilization of CO_2 concentrations, but rather would only reduce the rate of its growth in coming decades. Many of the same activities that emit conventional air pollutants also emit GHGs (e.g., the burning of fossil fuels to produce electricity, heat or drive engines and the burning of biomass). Some conventional air pollutants also have greenhouse effects; for example, soot/black carbon and tropospheric ozone (see Short-Lived Climate Pollutants below).

c) Attributing Climate Change—Greenhouse Gas Emission Sources

Emissions of GHGs contributing to global climate change are attributable in large part to human activities associated with the transportation, industrial/manufacturing, utility, residential, commercial, and agricultural sectors. In California, the transportation sector is the largest emitter of GHGs, followed by electricity generation. Anthropogenic emissions of CO_2 are byproducts of fossil fuel combustion. Methane, a potent GHG, resulting primarily from off-gassing (the release of chemicals from nonmetallic substances under ambient or greater pressure conditions), is largely associated with fugitive emissions from oil and gas operations, natural gas transmission, agricultural practices, and landfills. N_2O is also largely attributable to agricultural practices nitrogen-based fertilizers) and soil management. CO_2 sinks, or reservoirs, include vegetation, soils, and the ocean, which absorb CO_2 through sequestration and dissolution, respectively, two of the most common processes of CO_2 sequestration.

CO_2e is a measurement used to account for the fact that different GHGs have different potential to retain infrared radiation in the atmosphere and contribute to the greenhouse effect (i.e., GWP). The GWP is dependent on the lifetime, or persistence, of the gas molecule in the atmosphere. For example, as described in Appendix C, "Calculation References," of the General Reporting Protocol of the California Climate Action Registry 1 ton of methane has the same contribution to the greenhouse effect as approximately 34 tons of CO_2 (IPCC 2013; CCAR 2008). Therefore, methane is a much more potent GHG than CO_2. Expressing emissions in CO_2e takes the contributions of all GHG emissions to the greenhouse effect and converts them to a single unit equivalent to the effect that would occur if only CO_2 were being emitted.

The California GHG inventory compiles statewide anthropogenic GHG emissions and sinks. It includes estimates for CO_2, methane, N_2O, SF_6, nitrogen trifluoride, HFCs, and PFCs. The current inventory covers years 2000 to 2018 (CARB 2020).

Between 2000 and 2018, California's emissions of GHGs decreased by 9 percent, from 468.2 million metric tons of CO_2 equivalent ($MMTCO_2e$) in 2000 to 425.3 $MMTCO_2e$ in 2018, with a maximum of 490.9 $MMTCO_2e$ in 2004. During the same period, California's population grew by 17 percent. As a result, California's per capita GHG emissions have decreased over the same time period from 13.8 to 10.7 $MTCO_2e$ per person. In 2018, emissions decreased for the transportation sector since the prior year. Emissions from the other sectors (i.e., electric power, industrial, commercial and residential, agriculture, high GWP, and recycling and waste) remained relatively flat or increased slightly from 2017 (CARB 2020).

d) Short-Lived Climate Pollutants

Climate policy and research have mainly concentrated on long-term climate change and controlling the long-lived GHGs. However, there is growing recognition within the scientific community that efforts to address climate change should also focus on near-term actions to reduce climate-warming substances with much shorter atmospheric lifetimes. These non-CO_2 pollutants, known as short-lived climate pollutants (SLCPs), include methane, fluorinated gases including HFCs, and black carbon.

From a global perspective, SLCPs represent nearly 40 percent of the total climate pollutant emissions. In California, their contribution is smaller at around 30 percent. SLCPs have relatively short lifetimes in the atmosphere, but have significant GWP, which represent the ability to trap heat relative to CO_2. Since SLCPs remain in the atmosphere for periods of only a few days to a few decades, reducing their emissions results in immediate benefits. Thus, controlling sources of SLCPs is a critical climate strategy for reducing the near-term rate of global warming, particularly in regions most vulnerable to climate change.

California has established a strong track record with significant SLCP reductions as a co-benefit to its long-standing programs to clean up the air and protect public health. These include diesel engine controls, advanced clean cars, restrictions on burning, development of a refrigerant management program, and landfill controls. In March 2017, CARB adopted the SLCP Reduction Strategy to further reduce SLCP emissions as a component of achieving statewide GHG reduction goals. The SLCP Reduction Strategy aims to reduce emissions of methane from the solid waste, agricultural, wastewater, and oil and gas sectors; reduce emissions of carbon dioxide through forest management practices; and reduce emissions of fluorinated gases through more stringent protocols regarding the use and manufacturing of refrigerants (CARB 2017).

i) Tropospheric Ozone

Ozone is a highly reactive and unstable gas. Stratospheric ozone, a layer of ozone high up in the atmosphere, is beneficial and absorbs ultraviolet radiation. Tropospheric (ground-level) ozone is a major air and climate pollutant. Tropospheric ozone is the main component of smog and causes serious health effects such as asthma and lung disease. Tropospheric ozone also affects sensitive vegetation and ecosystems, including forests, parks, wildlife refuges and wilderness areas. Tropospheric ozone can act as a direct GHG and as an indirect controller of GHG lifetimes. As a strong oxidant, it affects the lifetimes and concentrations of atmospheric trace gases, including methane and HFCs.

Tropospheric ozone is not emitted directly into the air. It is created by photochemical reactions between NOx and VOC emissions from vehicles, industrial facilities, consumer products and many other sources.

Ozone has long been recognized as a significant local and regional air quality issue due to its impacts on human health and the environment. Federal clean air laws require areas with unhealthy levels of ozone to develop plans, known as SIPs. These plans include measures that describe how an area will attain federal ozone air quality standards. In addition to measures

included in the SIP, the State has adopted several regulatory programs focused on controlling ozone forming compounds (NOx and VOCs). These include the Low Emission Vehicle Programs, Off-Road Engine Standards, On-Road Heavy-Duty Diesel Vehicles Regulation, and Consumer Products Regulations.

ii) Methane

Methane is a potent and short-lived GHG. It is the second most prevalent GHG emitted in the U.S. from human activities. In addition to its climate forcing properties, methane also has several indirect effects including its role in contributing to global background ozone. As air quality standards tighten, reducing background ozone becomes more critical.

Enteric fermentation, manure management, landfills, natural gas transmission (methane is a significant constituent of natural gas), and wastewater treatment are the state's largest anthropogenic methane-producing sources.

Methane concentrations have been increasing due to human activities related to fossil fuel extraction and distribution, agriculture, and waste handling. Methane emissions are also contributed by non-anthropogenic or "natural" sources such as wetlands, oceans, forests, fires, terrestrial arthropods (such as termites) and geological sources (such as submarine gas seepage, micro seepage over dry lands and geothermal seeps).

iii) Hydrofluorocarbons

HFCs are synthetic gases that are the fastest growing climate forcers in the U.S. as well as in many other countries. HFCs represent just three percent of all GHG emissions in California, but their warming effect is hundreds to thousands of times that of CO_2. HFCs are primarily produced for use as substitutes for ozone-depleting substances in refrigeration, air conditioning, insulating foams, solvents, aerosol products, and fire protection.

iv) Black Carbon

Black carbon is a subset of PM emissions and consists of small dark particles that result from incomplete combustion of fossil fuels, bio-fuels, and biomass. It contributes to climate change both directly by absorbing sunlight, and indirectly by depositing on snow and by interacting with clouds and affecting cloud formation.

Unlike other GHGs, black carbon has a very short atmospheric lifetime (an average of about a week), resulting in a strong correlation to regional emission sources. As a result, emission reductions have immediate benefits for climate and health.

The main sources of black carbon in California are wildfires, off-road vehicles (e.g., locomotives, marine vessels, tractors, excavators, dozers), on-road vehicles (e.g., cars, trucks, and buses), fireplaces, agricultural burning (burning agricultural waste), and prescribed burning (planned burns of forest or wildlands). California has been an international leader in reducing black carbon, with 90 percent control since the early 1960s and close to 95 percent control expected by 2020 due to existing programs that target reducing PM from diesel engines and burning activities.

Recent CARB estimates suggest that the annual black carbon emissions in California decreased about 70 percent between 1990 and 2010, in direct proportion to declining diesel PM emissions – a co-benefit of CARB's regulations on diesel engines. Other categories of diesel engines, such as off-road diesels (e.g., agricultural and construction equipment), building equipment and diesel generators, are also projected to have major declines in diesel PM emissions. Efforts to manage agricultural, forest, and range land management burning operations are expected to continue reducing black carbon emissions.

e) Adaptation to Climate Change

According to IPCC global average temperature is expected to increase by 3–7°F by the end of the century, depending on future GHG emission scenarios (IPCC 2013). Resource areas other than air quality and global average temperature could be indirectly affected by the accumulation of GHG emissions. For example, an increase in the global average temperature is expected to result in a decreased volume of precipitation falling as snow in California and an overall reduction in snowpack in the Sierra Nevada. Snowpack in the Sierra Nevada provides both water supply (runoff) and storage (within the snowpack before melting), which is a major source of supply for the state.

According to CEC, statewide average temperatures increased by about 1.7°F from 1895 to 2011 (CEC 2012). Throughout the past century precipitation (i.e., rain and snow) has followed the expected pattern of a largely Mediterranean climate with wet winters and dry summers, and considerable variability from year to year. No consistent trend in the overall amount of precipitation has been detected, except that a larger proportion of total precipitation is falling as rain instead of snow. In addition, during the last 35 years, the Sierra Nevada range has witnessed both the wettest and the driest years on record of more than 100 years. While intermittent droughts have been a common feature of the state's climate, evidence from tree rings and other indicators reveal that over the past 1,500 years, California has experienced dry spells that persisted for several years or even decades (CEC 2012).

The effects of global climate change could lead to a variety of secondary effects to public health, water supply, energy supply, sea level, wildfire risks, and ecosystems. Recent data, climate projections, topographic, demographic, and land use information have led to the findings that:

- The state's electricity system is more vulnerable than was previously understood.
- The Sacramento-San Joaquin Delta is sinking, putting levees at growing risk.
- Wind and waves, in addition to faster rising seas, will worsen coastal flooding.
- Animals and plants need connected "migration corridors" to allow them to move to more suitable habitats to avoid serious impacts.
- Native freshwater fish are particularly threatened by climate change.
- Minority and low-income communities face the greatest risks from climate change.
- There are effective ways to prepare for and manage climate change risks, but local governments face many barriers to adapting to climate change; these can be addressed so that California can continue to prosper.

At the same time, the State has recognized the need to adapt to climate change impacts that can no longer be avoided. In 2014, the CNRA released the Safeguarding California Plan, which serves as an update to the 2009 California Climate Adaptation Strategy. The many adaptation planning efforts underway in virtually every State agency, in regional and local communities such as Chula Vista, San Diego, Los Angeles, Santa Barbara, Santa Cruz, San Francisco, Hayward, Marin County, Sacramento, and others, as well as in private businesses suggest that CEOs, elected officials, planners, and resource managers understand the reality that California and the world is facing.

In fact, the latest climate science makes clear that State, national, and global efforts to mitigate climate change must be accelerated to limit global warming to levels that do not endanger basic life-support systems and human well-being. Success in mitigation will keep climate change within the bounds that allow ecosystems and society to adapt without major disruptions. Further advances in integrated climate change science can inform California's and the world's climate choices and help ensure a resilient future (CEC 2012).

B. Regulatory Setting

Applicable laws and regulations specific to the reduction of GHG emissions are listed in Table 10 below. It should be noted that other laws and regulations described under Energy Demand in this Environmental Setting would also reduce GHG emissions.

Table 10: Applicable Laws and Regulations for Greenhouse Gases

Regulation	Description
Federal	
Mandatory Greenhouse Gas Reporting Rule	On September 22, 2009, U.S. EPA issued a final rule for mandatory reporting of GHGs from large GHG emissions sources in the U.S. In general, this national reporting requirement will provide U.S. EPA with accurate and timely GHG emissions data from facilities that emit 25,000 $MTCO_2e$ per year. This publicly available data will allow the reporters to track their own emissions, compare them to similar facilities, and aid in identifying cost effective opportunities to reduce emissions in the future. Reporting is at the facility level, except that certain suppliers of fossil fuels and industrial greenhouse gases along with vehicle and engine manufacturers will report at the corporate level. An estimated 85 percent of the total U.S. GHG emissions, from approximately 10,000 facilities, are covered by this final rule.
National Program to Cut Greenhouse Gas Emissions and Improve Fuel	On September 15, 2009, U.S. EPA and NHTSA proposed a new national program that would reduce GHG emissions and improve fuel efficiency for all new cars and trucks sold in the U.S. EPA proposed the first-ever national GHG emissions standards under the CAA, and

Regulation	Description
Economy for Cars and Trucks	NHTSA proposed CAFE standards under the Energy Policy and Conservation Act (EPCA). This proposed national program would allow automobile manufacturers to build a single light-duty national fleet that satisfies all requirements under both Federal programs and the standards of California and other states. The President requested that U.S. EPA and NHTSA, on behalf of DOT, develop, through notice and comment rulemaking, a coordinated National Program under the CAA and the EPCA, as amended by the Energy Independence and Security Act, to reduce fuel consumption by and GHG emissions of light-duty vehicles for model years 2017–2025. U.S. EPA and NHTSA are developing the proposal based on extensive technical analyses, an examination of the factors required under the respective statutes and on discussions with individual motor vehicle manufacturers and other stakeholders. The National Program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles (light-duty vehicles) built in those model years (76 FR 48758). The first part of this program (i.e., 2012–2016) is implemented. The next part (i.e., 2017-2025) was released by U.S. EPA in 2016 for which CARB is proposed to accept compliance thereof as also being acceptable for California compliance, similar to what was done for the first part.
Endangerment and Cause or Contribute Findings	On December 7, 2009, U.S. EPA adopted its Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA (Endangerment Finding). The Endangerment Finding is based on Section 202(a) of the CAA, which states that the Administrator (of U.S. EPA) should regulate and develop standards for "emission[s] of air pollution from any class of classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The rule addresses Section 202(a) in two distinct findings. The first addresses whether the concentrations of the six key GHGs (i.e., CO_2, methane, N_2O, HFCs, PFCs, and SF_6) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and therefore the threat of climate change.

Regulation	Description
	The Administrator found that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CAA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wildfires, droughts, sea level rise, and higher intensity storms) are a threat to the public health and welfare. Therefore, GHGs were found to endanger the public health and welfare of current and future generations. The Administrator also found that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. U.S. EPA's final findings respond to the 2007 U.S. Supreme Court decision that GHGs fit within the CAA definition of air pollutants. The findings do not in and of themselves impose any emission reduction requirements but rather allow U.S. EPA to finalize the GHG standards proposed earlier in 2009 for new light-duty vehicles as part of the joint rulemaking with DOT.
Significant New Alternatives Policy (SNAP)	U.S. EPA's SNAP program provides an evolving list of alternatives (i.e., chemicals that may replace one that is currently in use for a specific purpose). U.S. EPA makes decisions informed by the overall understanding of the environmental and human health impacts as well as the current knowledge regarding available substitutes. Where U.S. EPA is determining whether to add a new substitute to the list, U.S. EPA compares the risk posed by the new substitute to the risks posed by other alternatives on the list and determines whether that specific new substitutes poses more risk than already-listed alternatives for the same use. Section 612 of the CAA provides that U.S. EPA must prohibit the use of a substitute where it has determined that there are other available substitutes that pose less overall risk to human health and the environment.
State	
EO S-3-05	EO S-3-05, which was signed by former Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change. It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems,

Regulation	Description
	and potentially cause a rise in sea levels. To combat those concerns, the EO established statewide GHG emission reduction targets. Specifically, emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80 percent below the 1990 level by 2050. The EO directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce GHG emissions to the target levels. The Secretary will also submit biannual reports to the governor and State legislature describing progress made toward reaching the emission targets; impacts of global warming on California's resources; and mitigation and adaptation plans to combat these impacts. To comply with the EO, the Secretary of the CalEPA created the Climate Action Team made up of members from various State agencies and commission. The Climate Action Team released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through State incentive and regulatory programs.
AB 32, the California Global Warming Solutions Act, Statutes of 2006	In September 2006, former Governor Arnold Schwarzenegger signed AB 32, the California Global Warming Solutions Act of 2006. AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from substantial stationary and mobile source categories. AB 32 requires CARB to produce a Scoping Plan by 1/1/2009 and at least every 5 years afterwards that details how the State will meet its GHG reduction targets. AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the State achieves the reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

Regulation	Description
EO B-30-15	EO B-30-15 (2015) established a California GHG reduction target of 40 percent below 1990 levels by 2030. To accomplish this goal, directs State agencies to take measures consistent with their existing authority to reduce GHG emissions. CARB initiated a public process in the summer of 2015 and worked closely with other State agencies to update the State's Climate Change Scoping Plan. The 2017 Scoping Plan, released and adopted in December 2017, provides the framework for achieving the 2030 target. Concurrent planning efforts related to energy efficiency in existing buildings (AB 758), SLCPs, sustainable freight, Greenhouse Gas Reduction Fund Investments, forest health, and others will be coordinated with, and feed into, the 2017 Scoping Plan.
SB 32 and AB 197 (Statutes of 2016)	Governor Brown signed SB 32 (Pavley, Chapter 249, Statutes of 2016) and AB 197 (Garcia, Chapter 250, Statutes of 2016) on September 8, 2016. SB 32 establishes a statewide target of reducing statewide GHG emissions to 40 percent below 1990 levels by 2030. This is the same target contained in EO B-30-15 (2015). SB 32 authorizes CARB to adopt regulations to achieve the maximum technologically-feasible and cost-effective GHG reductions. AB 197 creates a legislative committee to oversee CARB and requires CARB to take specific actions when adopting plans and regulations pursuant to SB 32 related to disadvantaged communities, identification of specific information regarding reduction measures, and information regarding existing greenhouse gases at the local level.
EO-N-79-20	In September 2020, Governor Newsom issued EO N-79-20, calling for reduced carbon pollution from the transportation sector. The EO directs CARB, in coordination with other State agencies, U.S. EPA, and local air districts, to develop and propose technologically feasible and cost-effective strategies to achieve 100 percent zero-emission from off-road vehicles and equipment operations in the State by 2035.
SB 350, Clean Energy and Pollution Reduction Act of 2015 (Statutes of 2015)	The Clean Energy and Pollution Reduction Act of 2015 (De León, Chapter 547, Statutes of 2015) requires the amount of electricity generated and sold to retail customers per year from eligible renewable energy resources be increased to 50 percent by December 31, 2030. This act also requires doubling of the energy efficiency savings in electricity and natural gas for retail customers, through energy efficiency and conservation, by December 31, 2030.

Regulation	Description
SB 100, Renewables Portfolio Standard Program: Emissions of Greenhouse Gases	SB 100, approved on September 10, 2018, amends the California Renewables Portfolio Standard. This bill revises the legislative findings and declarations of the statewide goal of achieving 50 percent renewable resources by December 31, 2030 as mandated by the Renewables Portfolio Standard Program to a 60 percent target by December 31, 2030. The bill would require that retail sellers and local publicly owned electric utilities procure a minimum quantity of electricity products from eligible renewable energy resources so that the total kilowatt hours of those products sold to their retail end-use customers achieve 44 percent and 60 percent of retail sales by the target dates stated above, respectively. This bill would also require that the State supply 100 percent of retail sales of electricity to California end-use customers from renewable energy resources and zero-carbon resources by December 31, 2045.
SB 605, SLCPs (Statutes of 2014)	SB 605 (Lara, Chapter 605, Statutes of 2014) directs CARB to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants in the State through the following actions: (1) Complete an inventory of sources and emissions of short-lived climate pollutants in the State based on available data. (2) Identify research needs to address any data gaps. (3) Identify existing and potential new control measures to reduce emissions. (4) Prioritize the development of new measures for short-lived climate pollutants that offer co-benefits by improving water quality or reducing other air pollutants that impact community health and benefit disadvantaged communities, as identified pursuant to Section 39711 of the Health and Safety Code. (5) Coordinate with other State agencies and districts to develop measures identified as part of the comprehensive strategy. In 2017, CARB published and adopted the SLCP Reduction Strategy, which serves as one of five pillars identified by Governor Jerry Brown to achieve the state's GHG reduction goals for 2030 and 2050.
AB 1493, Statutes of 2002	In September 2004, CARB approved regulations to reduce GHG emissions from new motor vehicles. CARB took this action pursuant to Chapter 200, Statutes of 2002 (AB 1493, Pavley) which directed CARB

Regulation	Description
	to adopt regulations that achieve the maximum feasible and cost-effective reduction in GHG emissions from motor vehicles. The regulations, which took effect in 2006 following an opportunity for legislative review, apply to new passenger vehicles and light-duty trucks beginning with the 2009 model year.
EO S-1-07	EO S-1-07, which was signed by former Governor Schwarzenegger in 2007, proclaims that the transportation sector is the main source of GHG emissions in California, at over 40 percent of statewide emissions. It establishes a goal that the carbon intensity of transportation fuels sold in California should be reduced by a minimum of 10 percent by 2020. This order also directed CARB to determine if the LCFS could be adopted as a discrete early action measure after meeting the mandates in AB 32. CARB adopted the original LCFS regulation on April 23, 2009.
SB 1368, Statutes of 2006	SB 1368 is the companion bill of AB 32 and was signed by former Governor Schwarzenegger in September 2006. SB 1368 requires CPUC to establish a GHG emission performance standard for baseload generation from investor-owned utilities by February 1, 2007. CEC must establish a similar standard for local publicly owned utilities by June 30, 2007. These standards cannot exceed the GHG emission rate from a baseload combined-cycle natural gas fired plant. The legislation further requires that all electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by CPUC and CEC.
SB 1078, Statutes of 2002, SB 107, Statutes of 2006, and SBx1 2	SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20 percent of their supply from renewable sources by 2017. SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010. In 2010, SBx1 2 was chaptered, which expanded the state's RPS to 33 percent renewable power by 2020.
SB 97, Statutes of 2007	As directed by SB 97, the CNRA adopted Amendments to the CEQA Guidelines for GHG emissions on December 30, 2009. On February 16, 2010, the Office of Administrative Law approved the Amendments, and filed them with the Secretary of State for inclusion in the California Code of Regulations. The Amendments became effective on March 18, 2010.

Regulation	Description
SB 375, Statutes of 2008	SB 375, signed in September 2008, aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation. SB 375 requires MPOs to adopt an SCS or Alternative Planning Strategy (APS), which will prescribe land use allocation in that MPO's RTP. CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light-duty trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012. This bill also extends the minimum time period for the Regional Housing Needs Allocation cycle from five years to eight years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the RTP (and associated SCS or APS). However, new provisions of CEQA would incent qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."
EO S-13-08	Sea-level rise is a foreseeable indirect environmental impact associated with climate change, largely attributable to thermal expansion of the oceans and melting polar ice. As discussed above in the environmental setting (subheading "Adaptation to Climate Change"), sea level rise presents impacts to California associated with coastal erosion, water supply, water quality, saline-sensitive species and habitat, land use compatibility, and flooding. Former Governor Arnold Schwarzenegger signed EO S-13-08 on November 14, 2008. This EO directed the CNRA to develop the 2009 California Climate Adaptation Strategy, which summarizes the best-known science on climate change impacts in seven distinct sectors – public health, biodiversity and habitat, ocean and coastal resources, water management, agriculture, forest resources, and transportation and energy infrastructure – and provides recommendations on how to manage against those threats (CNRA 2009). This EO also directed the Office of Planning and Research (OPR), in cooperation with the CNRA, to provide land use planning guidance related to sea level rise and other climate change impacts by May 30, 2009, which is also provided

Regulation	Description
	in the 2009 California Climate Adaptation Strategy and OPR continues to further refine land use planning guidance related to climate change impacts (CNRA 2009). EO S-13-08 also directed CNRA to convene an independent panel to complete the first California Sea Level Rise Assessment Report. This report is to be completed no later than December 1, 2010. The report is intended to provide information on the following: • Relative sea level rise projections specific to California, considering issues such as coastal erosion rates, tidal impacts, El Niño and La Niña events, storm surge, and land subsidence rates; • The range of uncertainty in selected sea level rise projections; • A synthesis of existing information on projected sea level rise impacts to State infrastructure (such as roads, public facilities, and beaches), natural areas, and coastal and marine ecosystems; and • Discussion of future research needs regarding sea level rise for California.
CARB's Landfill Methane Control Measure	The regulation requires owners and operators of certain uncontrolled municipal solid waste landfills to install gas collection and control systems and requires existing and newly installed gas and control systems to operate in an optimal manner. The regulation allows local air districts to voluntarily enter into agreements with CARB to implement and enforce the regulation and to assess fees to cover costs. Some local air districts have also adopted rules to implement federal standards for the installation of gas collection and control systems.
AB 341 (Statutes of 2011)	AB 341 (Chesbro, Chapter 476, Statutes of 2011) established a State target to reduce by 75 percent the amount of solid waste sent to landfills by 2020 through recycling, composting, and source reduction practices.
AB 1826 (Statutes of 2014)	AB 1826 (Chesbro, Chapter 727, Statutes of 2014) requires businesses generating specified amounts of organic wastes to begin arranging for the recycling and diversion of those wastes from landfill disposal beginning in 2016.

Regulation	Description
Refrigerant Management Plan	The Refrigerant Management Plan requires facilities with refrigeration systems with more than 50 pounds of high-GWP refrigerant to: conduct and report periodic leak inspections; promptly repair leaks; and keep service records on site.
Compliance Offset Protocols under the State's Cap-and-Trade Program	Compliance Offset Protocols under the state's Cap-and-Trade Program include a livestock protocol, rice cultivation protocol, and mine methane capture protocol. The protocols provide methods to quantify, report, and credit GHG emission reductions from sectors not covered by the Cap-and-Trade Program.
AB 1257 (Statutes of 2013)	AB 1257 (Bocanegra, Chapter 749, Statutes of 2013) directs CEC to assemble a report by November 2015 (and every four years after), in consultation with other State agencies, to identify strategies for maximizing the benefits obtained from natural gas as an energy source.
AB 1900 (Statutes of 2012)	AB 1900 (Gatto, Chapter 602, Statutes of 2012) directed CPUC to adopt natural gas constituent standards (in consultation with CARB and the Office of Environmental Health and Hazard Assessment [OEHHA]). The legislation is also designed to streamline and standardize customer pipeline access rules and encourage the development of statewide policies and programs to promote all sources of biomethane production and distribution.
SB 1122 (Statutes of 2012)	SB 1122 (Rubio, Chapter 612, Statutes 2012) directed CPUC to require the state's investor-owned utilities to develop and offer 10 to 20-year market-price contracts to procure an additional 250 megawatts of cumulative electricity generation from biogas facilities that commence operating on or after June of 2013.
California Sustainable Freight Action Plan	In response to EO B-32-15, the California Department of Transportation (Caltrans), CalEPA, CNRA, and other State departments developed the California Sustainable Freight Action Plan in July 2016. The plan established targets to improve freight efficiency, transition to zero-emission technologies, and make California's freight system more competitive. The targets are not mandates but are aspiration measures of progress. Plan measures are conceptual and rely on the future development of regulations to implement the strategies. Plan strategies include on-dock and near-dock strategies to shift freight movement from truck to rail.

Regulation	Description
Local	
Local Climate Action Plans (CAPs)	CARB encourages local governments to adopt GHG reduction goals for municipal operations emissions and establish goals parallel to the State's commitment to reducing GHG emissions. Development projects within a jurisdiction with adopted, verified CAPs would be subject to the requirements of the CAP.

9. Hazards and Hazardous Materials

A. Existing Conditions

1. U.S.

Hazardous materials are substances with physical properties that could pose a substantial present or future hazard to human health or the environment when improperly handled, disposed, or otherwise managed. A number of properties may cause a substance to be considered hazardous, including toxicity (causes human health effects), ignitibility (can burn), corrosivity (causes severe burns or damage to materials), and reactivity (causes explosions or generates toxic gases). The term "hazardous material" refers to both hazardous substances and hazardous wastes. A hazardous waste is a waste with a chemical composition or other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment. This includes items, such as fuels, industrial solvents and chemicals, process water, and spent materials (e.g., pozzolans, foams).

Naturally occurring hazardous materials in the U.S. include asbestos, radon, and mercury. Asbestos is a naturally occurring mineral composed of long, thin, fibrous crystals. Asbestos is found in 20 of the U.S. states and has been mined in 17 of these states, including the Appalachian region, California, and Oregon. Mercury is a chemical element that comes from both natural sources and human activities. Natural sources of mercury include volcanoes, hot springs, and natural mercury deposits. Sources related to human activities include coal combustion and certain industrial and mining activities. Radon is a gas that forms during the decay of uranium that is naturally found in rock, water, and soil. It migrates to the surface through cracks or fractures in the Earth's crust.

2. California

Health and Safety Code Section 25501 defines "hazardous materials," in part, as a material identified in statute that, "because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or

to the environment if released into the workplace or the environment." Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, and any material which a handler or the administering regulatory agency has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment. A number of properties may cause a substance to be considered hazardous, including toxicity (causes human health effects), ignitibility (can burn), corrosivity (causes severe burns or damage to materials), and reactivity (causes explosions or generates toxic gases). A hazardous waste is a waste with a chemical composition or other properties that make it capable of causing illness, death, or some other harm to humans and other life forms when mismanaged or released into the environment. This may include items, such as spent fuels, industrial solvents and chemicals, process water, and other spent materials (i.e., some types of batteries and fuel cells). California's hazardous waste regulations provide criteria to use to determine whether a waste is hazardous, including the following: 1) a list of criteria (toxic, ignitable, corrosive, and reactive) that a waste may exhibit; 2) a list of those wastes that are subject to regulation; and 3) a list of chemical names and common names that are presumed to be hazardous in California. The California Hazardous Waste Control Law recognizes more than 780 hazardous chemicals and nearly 30 additional common materials that may be hazardous.

Naturally occurring hazardous materials are also found in California, including asbestos. Naturally occurring asbestos is also often found in a type of rock (serpentine) located in the California Coast Ranges and Sierra foothills.

B. Regulatory Setting

Applicable laws and regulations associated with hazards and hazardous materials are discussed in Table 11.

Table 11: Applicable Laws and Regulations for Hazards and Hazardous Materials

Regulations	Description
Federal	
CWA (40 CFR 112)	The 1972 amendments to the CWA provide the statutory basis for the NPDES permit program and the basic structure for regulating the discharge of pollutants from point sources to waters of the U.S. Section 402 of the CWA specifically required U.S. EPA to develop and implement the NPDES program.
SDWA	SDWA is the main federal law that ensures the quality of Americans' drinking water. Under the SDWA, U.S. EPA sets standards for drinking water quality and oversees the states, localities, and water suppliers who implement those standards. The SDWA was originally

Regulations	Description
	passed by Congress in 1974 to protect public health by regulating the nation's public drinking water supply. The law was amended in 1986 and 1996 and requires many actions to protect drinking water and its sources: rivers, lakes, reservoirs, springs, and ground water wells. The SDWA does not regulate private wells which serve fewer than 25 individuals.
Federal Hazardous Materials Regulations (Title 49, CFR, Parts 100-180)	The regulations establish criteria for the safe transport of hazardous materials. Compliance is mandatory for intrastate and interstate transportation.
Toxic Substances Control Act (TSCA) 15 USC Section 2601 et seq.	The TSCA provides U.S. EPA with authority to require reporting, record-keeping and testing requirements, and restrictions relating to chemical substances and/or mixtures. The TSCA addresses the production, importation, use, and disposal of specific chemicals including polychlorinated biphenyls, asbestos, radon, and lead-based paint.
Resource Conservation and Recovery Act (RCRA) (42 USC Section 6901 et seq. (40 CFR Parts 260-273)	The RCRA of 1976 gives U.S. EPA the authority to control hazardous waste from the "cradle-to-grave." This includes the generation, transportation, treatment, storage, and disposal of hazardous waste. The RCRA also set forth a framework for the management of non-hazardous solid wastes. The 1986 amendments to the RCRA enabled U.S. EPA to address environmental problems that could result from underground tanks storing petroleum and other hazardous substances. The Federal Hazardous and Solid Waste Amendments are the 1984 amendments to the RCRA that focused on waste minimization and phasing out land disposal of hazardous waste as well as corrective action for releases. Some of the other mandates of this law include increased enforcement authority for U.S. EPA, more stringent hazardous waste management standards, and a comprehensive underground storage tank program. Federal regulations adopted by U.S. EPA are found in 40 CFR.
Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)	The CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment. The CERCLA also enabled the revision of the National

Regulations	Description
	Contingency Plan (NCP). The NCP provided the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also established the National Priorities List. The Superfund Amendments and Reauthorization Act (SARA) of 1986 reauthorized the CERCLA to continue cleanup activities around the country. Several site-specific amendments, definitions clarifications, and technical requirements were added to the legislation, including additional enforcement authorities. Also, Title III of the SARA authorized the Emergency Planning and Community Right-to-Know Act (EPCRA).
EPCRA (42 USC Section 9601 et seq.)	The SARA of 1986 created the EPCRA (40 CFR Parts 350-372), also known as the SARA Title III, a statute designed to improve community access to information about chemical hazards and to facilitate the development of chemical emergency response plans by state/tribe and local governments. The EPCRA required the establishment of state/tribe emergency response commissions, responsible for coordinating certain emergency response activities and for appointing local emergency planning committees.
Fuels and Fuel Additive Program (40 CFR Part 79)	U.S. EPA regulates diesel fuels under two programs; one is administered under the Office of Pollution Prevention and Toxic Substances (OPPTS) and the other is administered under the Transportation and Air Quality group. OPPTS requires that all chemicals produced in the U.S. are registered with the TSCA. The Transportation and Air Quality group requires that any fuels sold for ground transportation purposes must be registered with U.S. EPA and the volumes reported on a quarterly basis.
State	
Hazardous Materials Transportation (Vehicle Code Sections 353; 2500-2505; 31303-31309; 32000-32053; 32100-32109; 31600-31620)	Regulations pertaining to the safe transport of hazardous materials are in Vehicle Code Sections 31301-31309. All motor carriers and drivers involved in transportation of hazardous materials must comply with the requirements contained in federal and State regulations, and must apply for and obtain a hazardous materials transportation license from the California Highway Patrol. A driver is required to obtain a hazardous materials endorsement issued by the driver's country or State of domicile to operate any commercial vehicle carrying hazardous materials. The driver is required to display placards or markings while hauling hazardous waste unless

Regulations	Description
	the driver is exempt from the endorsement requirements. A driver who is a California resident is required to obtain an endorsement from California Highway Patrol.
Hazardous Waste Control Law (Health and Safety Code, Division 20, Chapter 6.5, 22 CCR, Division 4.5)	California requirements and statutory responsibilities in managing hazardous waste in California – this includes the generation, transportation, storage, treatment, recycling, and disposal of hazardous waste, including batteries. The Hazardous Waste Control Law and implementing regulations are administered and enforced by Department of Toxic Substances Control (DTSC).
California Accidental Release Prevention (CalARP) Program (19 CCR Division 2, Chapter 4.5, Sections 2735-2785)	The purpose of the CalARP program is to prevent accidental releases of substances that can cause serious harm to the public and the environment, to minimize the damage if releases do occur, and to satisfy community right-to-know laws. This is accomplished by requiring businesses that handle more than a threshold quantity of a regulated substance listed in the regulations to develop a Risk Management Plan (RMP). An RMP is a detailed engineering analysis of the potential accident factors present at a business and the mitigation measures that can be implemented to reduce this accident potential.
Hazardous Material Business Plan & Area Plan Program (Health and Safety Code Sections 25500 – 25520; 19 CCR, Division 2, Chapter 4, Article 3 & 4)	The Business and Area Plans Program, relating to the handling and release or threatened release of hazardous materials, was established in California to protect the public health and safety and the environment. Basic information on the location, type, quantity, and the health risks of hazardous materials handled, used, stored, or disposed of in the state, which could be accidently released into the environment, is not now available to firefighters, health officials, planners, public safety officers, health care providers, regulatory agencies, and other interested persons. The information provided by business and area plans is necessary to prevent or mitigate the damage to the health and safety of persons and the environment from the release or threatened release of hazardous materials into the workplace and environment. Certified Unified Program Agencies (CUPAs) use information collected from the Business Plan and CalARP programs to identify hazardous materials in their communities. This information provides the basis for the Area Plan and is used to determine the appropriate level of emergency planning necessary to respond to a release.

Regulations	Description
Unified Program Administration (Health and Safety Code, Chapter 6.11, Sections 25404-25404.8; 27 CCR, Division 1, Subdivision 4, Chapter 1, Sections 15100-15620)	A CUPA, which is authorized by the Secretary of CalEPA to carry out several of the hazardous waste/hazardous materials regulatory programs administered by the State in a coordinated and consistent manner. The six hazardous waste and materials program elements covered by the CUPA include: 1) Hazardous Waste Generators 2) Underground Tanks 3) Above Ground Tanks 4) Accidental Release Program 5) Hazardous Material Release Response Plans & Spill Notification 6) Hazardous Materials Management Plans & Inventory Reporting The intent of the CUPA is to simplify the hazardous materials regulatory environment and provide a single point of contact for businesses to address inspection, permitting, billing, and enforcement issues.
Local	
Various Local Ordinances	Various ordinances, codes, or emergency operations plans may be adopted at the local level (including individual ports) to provide stricter requirements in the management of hazardous materials and waste activities within the jurisdiction.

10. Hydrology and Water Quality

A. Existing Conditions

1. U.S.

The U.S. has a very diverse climate due to its wide range of geographic features. The climate is temperate in most of the U.S., subtropical in the southern region, tropical in Hawaii and in Florida, polar in Alaska, semi-arid in the Great Plains, arid in the Great Basin, and Mediterranean in California. Weather in the U.S. is influenced by the polar jet stream. The Great Basin and Columbia Plateau are arid and semi-arid, with annual precipitation averaging less than 15 inches. From July to September monsoons and thunderstorms affect the

southwest and Great Basin region. The Cascades region is one of the snowiest places in the world, with some spots averaging over 600 inches of snow annually.

About 90 percent of public water systems in the U.S. obtain their water from groundwater. However, because systems served by groundwater tend to be much smaller than systems served by surface water, only 34 percent of Americans (101 million) are supplied with treated groundwater, while 66 percent (195 million) are supplied with surface water.

2. California

a) Surface Waters

Surface waters occur as streams, lakes, ponds, coastal waters, lagoons, estuaries, floodplains, dry lakes, desert washes, wetlands, and other collection sites. Water bodies modified or developed by man, including reservoirs and aqueducts, are also considered surface waters. Surface water resources are very diverse throughout the state, due to the high variance in tectonics, topography, geology/soils, climate, precipitation, and hydrologic conditions. Overall, California has the most diverse range of watershed conditions in the U.S., with varied climatic regimes ranging from Mediterranean climates with temperate rainforests in the north coast region to desert climates containing dry desert washes and dry lakes in the southern central region.

The average annual runoff for the State is 71 million acre-feet (DWR 2003). The State has more than 60 major stream drainages and more than 1,000 smaller, but significant drainages that drain coastal mountains and inland mountainous areas. High snowpack levels and resultant spring snowmelt yield high surface runoff and peak discharge in the Sierra Nevada and Cascade Mountains that feed surface flows, fill reservoirs, and recharge groundwater. Federal, state, and local engineered water projects, aqueducts, canals, and reservoirs serve as the primary conduits of surface water sources to areas that have limited surface water resources. Most of the surface water storage is transported for agricultural, urban, and rural residential needs to the San Francisco Bay Area and to cities and areas extending to southern coastal California. Surface water is also transported to southern inland areas, including Owens Valley, Imperial Valley, and Central Valley areas.

b) Groundwater

The majority of runoff from snowmelt and rainfall flows down mountain streams into low gradient valleys and either percolates into the ground or is discharged to the sea. This percolating flow is stored in alluvial groundwater basins that cover approximately 40 percent of the geographic extent of the State (DWR 2003). Groundwater recharge occurs more readily in areas underlain by coarse sediments, primarily in mountain base alluvial fan settings. As a result, most of California's groundwater basins are located in broad alluvial valleys flanking mountain ranges, such as the Cascade Range, Coast Ranges, Transverse Ranges, and the Sierra Nevada.

There are 250 major groundwater basins that serve approximately 30 percent of California's urban, agricultural, and industrial water needs, especially in southern portion of San Francisco

Bay, the Central Valley, greater Los Angeles area, and inland desert areas where surface water is limited. On average, more than 15 million acre-feet of groundwater are extracted each year in the state, of which more than 50 percent is extracted from 36 groundwater basins in the Central Valley.

c) Water Quality

Land uses have a great effect on surface water and groundwater water quality in the State of California. Water quality degradation of surface waters occurs through nonpoint- and point-source discharges of pollutants. Nonpoint source pollution is defined as not having a discrete or discernible source and is generated from land runoff, precipitation, atmospheric deposition, seepage, and hydrologic modification (U.S. EPA 1993). Nonpoint-source pollution includes runoff containing pesticides, insecticides, and herbicides from agricultural areas and residential areas; acid drainage from inactive mines; bacteria and nutrients from septic systems and livestock; VOCs and toxic chemicals from urban runoff and industrial discharges; sediment from timber harvesting, poor road construction, improperly managed construction sites, and agricultural areas; and atmospheric deposition and hydromodification. In comparison, point-source pollution is generated from identifiable, confined, and discrete sources, such as a smokestack, sewer, pipe or culvert, or ditch. These pollutant sources are regulated by U.S. EPA and the State Water Resources Control Board (SWRCB) through RWQCBs. Many of the pollutants discharged from point-sources are the same as for nonpoint-sources, including municipal (bacteria and nutrients), agricultural (pesticides, herbicides, and insecticides), and industrial pollutants (VOCs and other toxic effluent).

B. Regulatory Setting

Applicable laws and regulations associated with hydrology, water quality, and water supply are discussed in Table 12.

Table 12: Applicable Laws and Regulations for Hydrology, Water Quality, and Water Supply

Regulation	Description
Federal	
National Flood Insurance Program	Designated floodplain mapping program, flooding and flood hazard reduction implementation, and federal subsidized flood insurance for residential and commercial property. Administered by the Federal Emergency Management Agency (FEMA).
EO 11988	Requires actions to be taken for federal activities to reduce the risks of flood losses, restore and preserve floodplains, and minimize flooding impacts to human health and safety.

Regulation	Description
CWA	Administered primarily by U.S. EPA, the CWA pertains to water quality standards, state responsibilities, and discharges of waste to waters of the U.S. Sections 303, 401, 402, and 404.
CWA Section 303	Defines water quality standards consisting of 1) designated beneficial uses of a water, 2) the water quality criteria (or "objectives" in California) necessary to support the uses, and 3) an antidegradation policy that protects existing uses and high-water quality. Section 303(d) requires states to identify water quality impairments where conventional control methods will not achieve compliance with the standards and establish total maximum daily load programs to achieve compliance.
CWA Section 401	State certification system for federal actions, which may impose conditions on a project to ensure compliance with water quality standards.
CWA Section 402	Section 402 mandates permits for municipal stormwater discharges, which are regulated under the NPDES General Permit for Municipal Separate Storm Sewer Systems. Several of the cities and counties issue their own NPDES municipal stormwater permits for the regulations of stormwater discharges. These permits require that controls are implemented to reduce the discharge of pollutants in stormwater discharges to the maximum extent possible, including management practices, control techniques, system design and engineering methods, and other measures as appropriate. As part of permit compliance, these permit holders have created Stormwater Management Plans for their respective locations. These plans outline the requirements for municipal operations, industrial and commercial businesses, construction sites, and planning and land development. These requirements may include multiple measures to control pollutants in stormwater discharge. During implementation of specific projects, applicants will be required to follow the guidance contained in the Stormwater Management Plans as defined by the permit holder in that location.
CWA Section 404	Permit system for dredging or filling activity in waters of the U.S., including wetlands, and administered by USACE.
National Toxics Rule and California Toxics Rule	Applicable receiving water quality criteria promulgated by U.S. EPA for priority toxic pollutants consisting generally of trace metals, synthetic organic compounds, and pesticides.

Regulation	Description
Mining and Mineral Policy Act	The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
State	
California Water Rights	SWRCB administers review, assessment, and approval of appropriative (or priority) surface water rights permits/licenses for diversion and storage for beneficial use. Riparian water rights apply to the land and allow diversion of natural flows for beneficial uses without a permit, but users must share the resources equitably during drought. Groundwater management planning is a function of local government. Groundwater use by overlying property owners is not formally regulated, except in cases where the groundwater basin supplies are limited and uses have been adjudicated, or through appropriative procedures for groundwater transfers.
Public Trust Doctrine	Body of common law that requires the State to consider additional terms and conditions when issuing or reconsidering appropriative water rights to balance the use of the water for many beneficial uses irrespective of the water rights that have been established. Public trust resources have traditionally included navigation, commerce, and fishing and have expanded over the years to include protection of fish and wildlife, and preservation goals for scientific study, scenic qualities, and open-space uses.
Porter-Cologne Water Quality Control Act (Water Code Sections 13000 et seq. and Title 23)	SWRCB is responsible for statewide water quality policy development and exercises the powers delegated to the State by the federal government under the CWA. Nine RWQCBs adopt and implement water quality control plans (Basin Plans) which designate beneficial uses of surface waters and groundwater aquifers and establish numeric and narrative water quality objectives for beneficial use protection. RWQCBs issue waste discharge requirements for discharge activities to water and land, require monitoring and maintain reporting programs, and implement enforcement and compliance policies and procedures. Other State agencies with jurisdiction in water quality regulation in California

Regulation	Description
	include the Department of Pesticide Regulation, DTSC, CDFW, and OEHHA.
Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California	The State Implementation Policy provides implementation procedures for discharges of toxic pollutants to receiving waters.
Thermal Plan	The Water Quality Control Plan for Control of Temperature in the Coastal and Interstate Water and Enclosed Bays and Estuaries of California was adopted by SWRCB in 1972 and amended in 1975. The Thermal Plan restricts discharges of thermal waste or elevated temperature waste to waters of the state. Generally, the Thermal Plan prohibits discharges from increasing ambient temperatures by more than 1°F over more than 25 percent of a stream cross section, increasing ambient temperatures by more than 4°F in any location, and prohibits discharge of waste that exceeds more than 20°F above the ambient temperature.
Statewide NPDES General Permit for Stormwater Associated with Land Disturbance and Construction Activity (Order No. 2009-0009-DWQ, NPDES No. CAR000002)	NPDES permit for stormwater and non-storm discharges from construction activity that disturbs greater than 1 acre. The general construction permit requires the preparation of a SWPPP that identifies best management practices (BMPs) to be implemented to control pollution of storm water runoff. The permit specifies minimum construction BMPs based on a risk-level determination of the potential of the project site to contribute to erosion and sediment transport and sensitivity of receiving waters to sediment. While small amounts of construction-related dewatering are covered under the General Construction Permit, RWQCBs have also adopted a General Order for Dewatering and Other Low Threat Discharges to Surface Waters (General Dewatering Permit). This permit applies to various categories of dewatering activities and may apply to some construction sites, if construction of specific projects required dewatering in greater quantities than that allowed by the General Construction Permit and discharged the effluent to surface waters. The General Dewatering Permit contains waste discharge limitations and prohibitions similar to those in the General Construction Permit.

Regulation	Description
Statewide NPDES General Permit for Discharges of Stormwater Associated with Industrial Facilities (Order No. 97-003-DWQ, NPDES No. CAS000001)	NPDES permit for stormwater and non-storm discharges from types of industrial sites based on the Standard Industrial Classification. The general industrial permit requires the preparation of a SWPPP that identifies potential onsite pollutants, BMPs to be implemented, and inspection/monitoring.
SB 1168, Statutes of 2014 Chapter 346, Pavley	This bill requires all groundwater basins designated as high- or medium-priority basins by California Department of Water Resources (DWR) that are designated as basins subject to critical conditions of overdraft to be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2020, and requires all other groundwater basins designated as high- or medium-priority basins to be managed under a groundwater sustainability plan or coordinated groundwater sustainability plans by January 31, 2022. This bill would require a groundwater sustainability plan to be developed and implemented to meet the sustainability goal, established as prescribed, and would require the plan to include prescribed components.
AB 1739, Statutes of 2014, Dickinson, Chapter 347	This bill establishes groundwater reporting requirements for a person extracting groundwater in an area within a basin that is not within the management area of a groundwater sustainability agency or a probationary basin. The bill requires the reports to be submitted to SWRCB or, in certain areas, to an entity designated as a local agency by SWRCB.
SB 1319, Statutes of 2014, Chapter 348, Pavley	This bill allows SWRCB to designate a groundwater basin as a probationary basin subject to sustainable groundwater management requirements. This bill also authorizes SWRCB to develop an interim management plan in consultation with DWR under specified conditions.
Local	
Water Agencies	Water agencies enter into contracts or agreements with the federal and State governments to protect the water supply and to ensure

Regulation	Description
	the lands within the agency have a dependable supply of suitable quality water to meet present and future needs.
Floodplain Management	General plans guide county land use decisions, and require the identification of water resource protection goals, objectives, and policies. Floodplain management is addressed through ordinances, land use planning, and development design review and approval. Local actions may be coordinated with FEMA for the National Flood Insurance Program. Typical provisions address floodplain use restrictions, flood protection requirement, allowable alteration of floodplains and stream channels, control of fill and grading activities in floodplains, and prevention of flood diversions where flows would increase flood hazards in other areas.
Drainage, Grading, and Erosion Control Ordinances	Counties regulate building activity under the federal Uniform Building Code, local ordinances, and related development design review, approval, and permitting. Local ordinances are common for water quality protection addressing drainage, stormwater management, land grading, and erosion and sedimentation control.
Environmental Health	RWQCBs generally delegate permit authority to county health departments to regulate the construction and operation/maintenance of on-site sewage disposal systems (e.g., septic systems and leach fields, cesspools).

11. Land Use and Planning

A. Existing Conditions

1. U.S.

The way physical landscapes are used or developed is commonly referred to as land use. Public agencies are the primary entities that determine the types of land use changes that can occur for specific purposes within their authority or jurisdiction. In most states, land uses decisions are made by local governments. In incorporated areas, land use decisions are typically made by the city. In unincorporated areas, land use decisions are typically made by the county. Sometimes state, regional, or federal land management agencies also make land use decisions. Generally, State law establishes the framework for local planning procedures, which local governments follow in adopting their own set of land use policies and regulations in response to the unique issues they face.

2. California

In California, the State Planning and Zoning Law (Government Code Section 65000 et seq.) provides the primary legal framework that cities and counties must follow in land use planning and controls. Planned land uses are designated in the city or county general plan, which serves as the comprehensive master plan for the community. Also, city and county land use and other related resource policies are defined in the General Plan. The primary land use regulatory tool provided by the California Planning and Zoning Law is the zoning ordinance adopted by each city and county. Planning and Zoning Law requirements are discussed in the regulatory setting below.

When approving land use development, cities and counties must comply with CEQA, which requires that they consider the significant environmental impacts of their actions and the adoption of all feasible mitigation measures to substantially reduce significant impacts, in the event a project causes significant or potentially significant effects on the environment. In some cases, building permits may be ministerial, and therefore exempt from CEQA, but most land use development approval actions by cities and counties require CEQA compliance.

Land use decisions in California are also be governed by State agencies such as the California Coastal Commission, California State Lands Commission, California Department of Parks and Recreation, and others, where the State has land ownership or permitting authority with respect to natural resources or other State interests.

B. Regulatory Setting

Applicable laws and regulations associated with land use and planning are discussed in Table 13.

Table 13: Applicable Laws and Regulations for Land Use and Planning

Regulation	Description
Federal	
FLPMA	FLPMA is the principal law governing how BLM manages public lands. FLPMA requires BLM to manage public land resources for multiple use and sustained yield for both present and future generations. Under FLPMA, BLM is authorized to grant rights-of-way for generation, transmission, and distribution of electrical energy. Although local agencies do not have jurisdiction over the federal lands managed by BLM, under FLPMA and BLM regulations at 43 CFR Part 1600, BLM must coordinate its planning efforts with State and local planning initiatives. FLPMA defines an Area of Critical Environmental Concern (ACEC) as an area within the public lands where special management attention is required (when such areas are developed or

Regulation	Description
	used or where no development is required) to protect and prevent irreparable damage to important historic, cultural, or scenic values, fish and wildlife resources, or other natural systems or processes, or to protect life and safety from natural hazards. BLM identifies, evaluates, and designates ACECs through its resource management planning process. Allowable management practices and uses, mitigation, and use limitations, if any, are described in the planning document and the concurrent or subsequent ACEC Management Plan. ACECs are considered land use authorization avoidance areas because they are known to contain resource values that could result in denial of applications for land uses that cannot be designed to be compatible with management objectives and prescriptions for the ACEC.
RMPs	Established by FLPMA, RMPs are designed to protect present and future land uses and to identify management practices needed to achieve desired conditions within the management area covered by the RMPs. Management direction is set forth in the RMPs in the form of goals, objectives, standards, and guidelines. These, in turn, direct management actions, activities, and uses that affect land management, and water, recreation, visual, natural, and cultural resources.
NFMA	The NFMA is the primary statute governing the administration of national forests. The act requires the Secretary of Agriculture to assess forestlands, develop a management program based on multiple-use, sustained-yield principles, and implement a resource management plan for each unit of the National Forest System. Goal 4 of the USFS's National Strategic Plan for the National Forests states that the nation's forests and grasslands play a significant role in meeting America's need for producing and transmitting energy. Unless otherwise restricted, National Forest Service lands are available for energy exploration, development, and infrastructure (e.g., well sites, pipelines, and transmission lines). However, the emphasis on non-recreational special uses, such as utility corridors, is to authorize the special uses only when they cannot be reasonably accommodated on non-National Forest Service lands.

Regulation	Description
State	
State Planning and Zoning Law (Government Code Section 65300 et seq.)	Establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county. The general plan addresses a broad range of topics, including, at a minimum, land use, circulation, housing, conservation, open space, noise, and safety. In addressing these topics, the general plan identifies the goals, objectives, policies, principles, standards, and plan proposals that support the city or county's vision for the area. The general plan is also a long-range document that typically addresses the physical character of an area over a 20-year period. Although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals.
Subdivision Map Act (Government Code section 66410 et seq.)	In general, land cannot be divided in California without local government approval. The primary goals of the Subdivision Map Act are: (a) to encourage orderly community development by providing for the regulation and control of the design and improvements of the subdivision with a proper consideration of its relation to adjoining areas; (b) to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and (c) to protect the public and individual transferees from fraud and exploitation. (61 Ops. Cal. Atty. Gen. 299, 301 [1978]; 77 Ops. Cal. Atty. Gen. 185 [1994]). Dividing land for sale, lease or financing is regulated by local ordinances based on the State Subdivision Map Act (Government Code Section 66410 et seq.).
SB 375, Statutes of 2008	SB 375 augments the existing federal requirement for MPOs to develop RTPs for their respective regions. Under SB 375, MPOs must prepare an SCS to supplement their RTPs. RTP/SCSs contain land use strategies to reduce VMT-related emissions of GHGs. Following the adoption of an RTP/SCSs, land use strategies must be implemented at the local level by land use agencies.

Regulation	Description
Local	
General Plans	The most comprehensive land use planning is provided by city and county general plans, which local governments are required by State law to prepare as a guide for future development. The general plan contains goals and policies concerning topics that are mandated by State law or which the jurisdiction has chosen to include. Required topics are land use, circulation, housing, conservation, open space, noise, and safety. Other topics that local governments frequently choose to address are public facilities, parks and recreation, community design, or growth management, among others. City and county general plans must be consistent with each other. County general plans must cover areas not included by city general plans (i.e., unincorporated areas).
Specific and Community Plans	A city or county may also provide land use planning by developing community or specific plans for smaller, more specific areas within their jurisdiction. These more localized plans provide for focused guidance for developing a specific area, with development standards tailored to the area, as well as systematic implementation of the general plan. Specific and community plans are required to be consistent with the city or county's general plan.
Zoning	The city or county zoning code is the set of detailed requirements that implement the general plan policies at the level of the individual parcel. The zoning code presents standards for different uses and identifies which uses are allowed in the various zoning districts of the jurisdiction. Since 1971, State law has required the city or county zoning code to be consistent with the jurisdiction's general plan, except in charter cities.
CEQA Guidelines Section 15332	CEQA Guidelines Section 15332 provides for certain types of infill projects that may be determined to be categorically exempt from CEQA review by lead agencies. Infill projects that may be exempt from environmental review under this class of categorical exemption must: be consistent with the applicable general plan and zoning designations; be within city limits and on a parcel no greater than five acres; not contain valuable habitat for any federal or State listed species; not contribute to any significant effects to traffic, noise, or air and water quality; and be adequately served by existing utilities and public services.

12. Mineral Resources

A. Existing Conditions

1. International

Various countries export the mineral resources used in the production of lithium-ion batteries (e.g., lithium, cobalt) to international manufacturers. In 2018, Australia exported 51,000 tons of lithium, Chile exported 16,000 tons, Argentina exported 6,200 tons, and China exported 8,000. From 2016 to 2019, the United States imported lithium from Argentina (55 percent), Chile (36 percent), China (5 percent), Russia (2 percent), and others (2 percent) (USGS 2021). Major suppliers of cobalt, a precious metal used in the manufacturing of batteries, include the Democratic Republic of the Congo, which mined 90,000 tons of cobalt in 2018; well over half of the world's total supply of cobalt. Other countries' cobalt mining totals for 2018 include Russia (5,900 tons), Cuba (4,900 tons), Australia (4,700 tons) Canada (3,800 tons), and China (3,100 tons) (USGS 2020).

2. U.S.

Mineral resources are all the physical materials that are extracted from the earth for use. Modern society is dependent on a huge amount and variety of mineral resources. Mineral resources are classified as metallic or non-metallic. As measured by consumption, the most important metallic resources are iron aluminum, copper, zinc, and lead. The most important nonmetallic resources include crushed stone, sand and gravel, cement, clays, salt, and phosphate. Mineral reserves are known deposits of minerals that can be legally mined economically using existing technology.

3. California

The CGS classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act of 1975 and assists in the designation of land containing significant aggregate resources. MRZs have been designated to indicate the significance of mineral deposits. The MRZ categories follow:

- **MRZ-1:** Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.
- **MRZ-2:** Areas where adequate information indicates significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- **MRZ-3:** Areas containing mineral deposits the significance of which cannot be evaluated from available data.
- **MRZ-4:** Areas where available information is inadequate for assignment to any other MRZ.

California ranks as 7th in the U.S. for non-fuel mineral production, accounting for approximately 3.9 percent of the nation's total. In 2011, there were approximately 700 active mineral mines that produced: sand and gravel, boron, Portland cement, crushed stone, gold, masonry cement, clays, gemstones, gypsum, salt, silver, and other minerals (Clinkenbeard and Smith 2013).

B. Regulatory Setting

Applicable laws and regulations associated with mineral resources are discussed in Table 14.

Table 14: Applicable Laws and Regulations for Mineral Resources

Regulation	Description
Federal	
Mining and Mineral Policy Act	The Mining and Mineral Act of 1970 declared that the Federal Government policy is to encourage private enterprise in the development of a sound and stable domestic mineral industry, domestic mineral deposits, minerals research, and methods for reclamation in the minerals industry.
State	
SMARA	The intent of SMARA of 1975 is to promote production and conservation of mineral resources, minimize environmental effects of mining, and to assure that mined lands will be reclaimed to conditions suitable for alternative uses. An important part of the SMARA legislation requires the State Geologist to classify land according to the presence or absence of significant mineral deposits. Local jurisdictions are given the authority to permit or restrict mining operations, adhering to the SMARA legislation. Classification of an area using MRZs to designate lands that contain mineral deposits are designed to protect mineral deposits from encroaching urbanization and land uses that are incompatible with mining. The MRZ classifications reflect varying degrees of mineral significance, determined by available knowledge of the presence or absence of mineral deposits as well as the economic potential of the deposits.
CBSC (24 CCR)	California's minimum standards for structural design and construction are given in the CBSC (24 CCR). The CBSC is based on the Uniform Building Code, which is used widely throughout U.S. (generally adopted on a state-by-state or district-by-district basis)

Regulation	Description
	and has been modified for California conditions with numerous, more detailed or more stringent regulations. The CBSC provides standards for various aspects of construction, including (i.e., not limited to) excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soil strength loss. In accordance with California law, proponents of specific projects would be required to comply with all provisions of the CBSC for certain aspects of design and construction.
PRC Sections 2762-2763	PRC Section 2762 states that the general plan must establish mineral resource management policies if the State Geologist has identified resources of statewide or regional significance within the city or county. PRC Section 2763 requires that city and county land use decisions affecting areas with minerals of regional or statewide significance be consistent with mineral resource management policies in the general plan, including protection of known mineral resources.
Local	
Local Grading and Erosion Control Ordinances	Many counties and cities have grading and erosion control ordinances. These ordinances are intended to control erosion and sedimentation caused by construction activities. A grading permit is typically required for construction-related projects. As part of the permit, project applicants usually must submit a grading and erosion control plan, vicinity and site maps, and other supplemental information. Standard conditions in the grading permit include a description of BMPs similar to those contained in a SWPPP.
City/County General Plans	Most city and county general plans have an element that addresses mineral resources within that jurisdiction.

13. Noise

A. Existing Conditions

Acoustics is the scientific study that evaluates perception, propagation, absorption, and reflection of sound waves. Sound is a mechanical form of radiant energy, transmitted by a pressure wave through a solid, liquid, or gaseous medium. Sound that is loud, disagreeable,

unexpected, or unwanted is generally defined as noise. Common sources of environmental noise and noise levels measured in decibels (dB) are presented in Table 15.

Table 15: Typical Noise Levels

Common Outdoor Activities	Noise Level (dB)	Common Indoor Activities
	110	Rock band
Jet flyover at 1,000 feet	100	--
Gas lawnmower at 3 feet	90	--
Diesel truck moving at 50 mph at 50 feet	80	Food blender at 3 feet, Garbage disposal at 3 feet
Noisy urban area, Gas lawnmower at 100 feet	70	Vacuum cleaner at 10 feet, Normal speech at 3 feet
Commercial area, Heavy traffic at 300 feet	60	
Quiet urban daytime	50	Large business office, Dishwasher in next room
Quiet urban nighttime	40	Theater, Large conference room (background)
Quiet suburban nighttime	30	Library, Bedroom at night, Concert hall (background)
Quiet rural nighttime	20	Broadcast/Recording Studio
	10	--
Threshold of Human Hearing	0	Threshold of Human Hearing

Notes: dB=A-weighted decibels; mph=miles per hour

Source: Caltrans 2013: p.2-20.

1. Sound Properties

A sound wave is initiated in a medium by a vibrating object (e.g., vocal cords, the string of a guitar, the diaphragm of a radio speaker). The wave consists of minute variations in pressure, oscillating above and below the ambient atmospheric pressure. The number of pressure variation cycles occurring per second is referred to as the frequency of the sound wave and is expressed in hertz.

Directly measuring sound pressure fluctuations would require the use of a very large and cumbersome range of numbers. To avoid this and have a more useable numbering system, the dB scale was introduced. A sound level expressed in decibels is the logarithmic ratio of two like pressure quantities, with one pressure quantity being a reference sound pressure. For sound pressure in air the standard reference quantity is generally considered to be 20 micropascals, which directly corresponds to the threshold of human hearing. The use of the decibel is a convenient way to handle the million-fold range of sound pressures to which the human ear is sensitive. A decibel is logarithmic; it does not follow normal algebraic methods and cannot be directly summed. For example, a 65-dB source of sound, such as a truck, when joined by another 65 dB source results in a sound amplitude of 68 dB, not 130 dB (i.e., doubling the source strength increases the sound pressure by 3 dB). A sound level increase of 10 dB corresponds to 10 times the acoustical energy, and an increase of 20 dB equates to a 100-fold increase in acoustical energy.

The loudness of sound perceived by the human ear depends primarily on the overall sound pressure level and frequency content of the sound source. The human ear is not equally sensitive to loudness at all frequencies in the audible spectrum. To better relate overall sound levels and loudness to human perception, frequency-dependent weighting networks were developed. The standard weighting networks are identified as A through E. There is a strong correlation between the way humans perceive sound and A-weighted sound levels (dBA). For this reason, the dBA can be used to predict community response to noise from the environment, including noise from transportation and stationary sources. Sound levels expressed as dB in this section are A-weighted sound levels, unless noted otherwise.

Noise can be generated by many sources, including mobile sources (i.e., transportation) such as automobiles, trucks, and airplanes and stationary sources (i.e., non-transportation) such as construction sites, machinery, and commercial and industrial operations. As acoustic energy spreads through the atmosphere from the source to the receiver, noise levels attenuate (i.e., decrease) depending on ground absorption characteristics, atmospheric conditions, and the presence of physical barriers. Noise generated from mobile sources generally attenuate at a rate of 4.5 dB per doubling of distance. Stationary noise sources spread with more spherical dispersion patterns that attenuate at a rate of 6 to 7.5 dB per doubling of distance.

Atmospheric conditions such as wind speed, turbulence, temperature gradients, and humidity may additionally alter the propagation of noise and affect levels at a receiver. Furthermore, the presence of a large object (e.g., barrier, topographic features, and intervening building façades) between the source and the receptor can provide significant attenuation of noise levels at the receiver. The amount of noise level reduction (i.e.,

shielding) provided by a barrier primarily depends on the size of the barrier, the location of the barrier in relation to the source and receivers, and the frequency spectra of the noise. Natural (e.g., berms, hills, and dense vegetation) and human-made features (e.g., buildings and walls) may be used as noise barriers.

All buildings provide some exterior-to-interior noise reduction. A building constructed with a wood frame and a stucco or wood sheathing exterior typically provides a minimum exterior-to-interior noise reduction of 25 dB with its windows closed, whereas a building constructed of a steel or concrete frame, a curtain wall or masonry exterior wall, and fixed plate glass windows of one-quarter-inch thickness typically provides an exterior-to-interior noise reduction of 30–40 dB with its windows closed (Caltrans 2011).

2. Common Noise Descriptors

The intensity of environmental noise fluctuates over time, and several different descriptors of time-averaged noise levels are used. The selection of a proper noise descriptor for a specific source depends on the spatial and temporal distribution, duration, and fluctuation of both the noise source and the environment. The noise descriptors most often in relation to the environment are defined below (Caltrans 2013).

Equivalent Noise Level (L_{eq}): The equivalent steady-state noise level in a stated period of time that would contain the same acoustic energy as the time-varying noise level during the same period (i.e., average noise level).

Maximum Noise Level (L_{max}): The highest instantaneous noise level during a specified time.

Minimum Noise Level (L_{min}): The lowest instantaneous noise level during a specified time.

Day-Night Noise Level (L_{dn}): The 24-hour L_{eq} with a 10-dB penalty applied during the noise-sensitive hours from 10 p.m. to 7 a.m., which are typically reserved for sleeping.

Community Noise Equivalent Level (CNEL): Like the L_{dn} described above with an additional 5-dB penalty applied during the noise-sensitive hours from 7 p.m. to 10 p.m., which are typically reserved for relaxation, conversation, reading, and watching television.

Community noise is commonly described in terms of the ambient noise level, which is defined as the all-encompassing noise level associated with a given noise environment. A common statistical tool to measure the ambient noise level is the L_{eq} descriptor listed above, which corresponds to a steady-state A-weighted sound level containing the same total energy as a time-varying signal over a given time period (usually one hour). The L_{eq} is the foundation of the composite noise descriptors such as L_{dn} and CNEL, as defined above, and shows very good correlation with community response to noise.

3. Effects of Noise on Humans

Excessive and chronic exposure to elevated noise levels can result in auditory and non-auditory effects on humans. Auditory effects of noise on people are those related to temporary or permanent hearing loss caused by loud noises. Non-auditory effects of

exposure to elevated noise levels are those related to behavioral and physiological effects. The non-auditory behavioral effects of noise on humans are associated primarily with the subjective effects of annoyance, nuisance, and dissatisfaction, which lead to interference with activities such as communications, sleep, and learning. The non-auditory physiological health effects of noise on humans have been the subject of considerable research attempting to discover correlations between exposure to elevated noise levels and health problems, such as hypertension and cardiovascular disease. The mass of research infers that noise-related health issues are predominantly the result of behavioral stressors and not a direct noise-induced response. The extent to which noise contributes to non-auditory health effects remains a subject of considerable research, with no definitive conclusions.

The degree to which noise results in annoyance and interference is highly subjective and may be influenced by several non-acoustic factors. The number and effect of these non-acoustic environmental and physical factors vary depending on individual characteristics of the noise environment such as sensitivity, level of activity, location, time of day, and length of exposure. One key aspect in the prediction of human response to new noise environments is the individual level of adaptation to an existing noise environment. The greater the change in the noise levels that are attributed to a new noise source, relative to the environment an individual has become accustomed to, the less tolerable the new noise source will be perceived.

With respect to how humans perceive and react to changes in noise levels, a 1-dB increase is imperceptible, a 3-dB increase is barely perceptible, a 6-dB increase is clearly noticeable, and a 10-dB increase is subjectively perceived as approximately twice as loud (Egan 2007). These subjective reactions to changes in noise levels was developed based on test subjects' reactions to changes in the levels of steady-state pure tones or broad-band noise and to changes in levels of a given noise source. It is probably most applicable to noise levels in the range of 50 to 70 dB, as this is the usual range of voice and interior noise levels. For these reasons, a noise level increase of 3 dB or more is typically considered substantial in terms of the degradation of the existing noise environment.

Negative effects of noise exposure include physical damage to the human auditory system, interference, and disease. Exposure to noise may result in physical damage to the auditory system, which may lead to gradual or traumatic hearing loss. Gradual hearing loss is caused by sustained exposure to moderately high noise levels over a period of time; traumatic hearing loss is caused by sudden exposure to extremely high noise levels over a short period. Gradual and traumatic hearing loss both may result in permanent hearing damage. In addition, noise may interfere with or interrupt sleep, relaxation, recreation, and communication. Although most interference may be classified as annoying, the inability to hear a warning signal may be considered dangerous. Noise may also be a contributor to diseases associated with stress, such as hypertension, anxiety, and heart disease. The degree to which noise contributes to such diseases depends on the frequency, bandwidth, and level of the noise, and the exposure time (Caltrans 2013).

4. Vibration

Vibration is the periodic oscillation of a medium or object with respect to a given reference point. Sources of vibration include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) and those introduced by human activity (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, (e.g., operating factory machinery or transient in nature, explosions). Vibration levels can be depicted in terms of amplitude and frequency, relative to displacement, velocity, or acceleration.

Vibration amplitudes are commonly expressed in peak particle velocity (PPV) or root-mean-square (RMS) vibration velocity. PPV is defined as the maximum instantaneous positive or negative peak of a vibration signal. PPV is typically used in the monitoring of transient and impact vibration and has been found to correlate well to the stresses experienced by buildings (FTA 2018; Caltrans 2020). PPV and RMS vibration velocity are normally described in inches per second (in/sec).

Although PPV is appropriate for evaluating the potential for building damage, it is not always suitable for evaluating human response. It takes some time for the human body to respond to vibration signals. In a sense, the human body responds to average vibration amplitude. The RMS of a signal is the average of the squared amplitude of the signal, typically calculated over a 1-second period. As with airborne sound, the RMS velocity is often expressed in decibel notation as vibration decibels (VdB), which serves to compress the range of numbers required to describe vibration (FTA 2018). This is based on a reference value of 1 microinch per second.

The typical background vibration-velocity level in residential areas is approximately 50 VdB. Groundborne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels (FTA 2018).

Typical outdoor sources of perceptible groundborne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the groundborne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Construction activities could generate groundborne vibrations that potentially pose a risk to nearby structures. Constant or transient vibrations can weaken structures, crack facades, and disturb occupants (FTA 2018).

Construction vibrations can be transient, random, or continuous. Transient construction vibrations are generated by blasting, impact pile driving, and wrecking balls. Continuous vibrations result from vibratory pile drivers, large pumps, and compressors. Random vibration can result from jackhammers, pavement breakers, and heavy construction equipment. Table 16 describes the general human response to different levels of groundborne vibration-velocity levels.

Table 16: Human Response to Different Levels of Groundborne Noise and Vibration

Vibration-Velocity Level	Human Reaction
65 VdB	Approximate threshold of perception.
75 VdB	Approximate dividing line between barely perceptible and distinctly perceptible. Many people find that transportation-related vibration at this level is unacceptable.
85 VdB	Vibration acceptable only if there are an infrequent number of events per day.

Notes: VdB = vibration decibels referenced to 1 microinch per second and based on the root mean square (RMS) velocity amplitude.

Source: FTA 2018: p. 111.

5. Sensitive Land Uses

Noise-sensitive land uses are generally considered to include those uses where noise exposure could result in health-related risks to individuals, as well as places where quiet is an essential element of their intended purpose. Residential dwellings are of primary concern because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Additional land uses such as parks, schools, historic sites, cemeteries, and recreation areas are also generally considered sensitive to increases in exterior noise levels. Places of worship and transit lodging, and other places where low interior noise levels are essential are also considered noise-sensitive. These types of receptors are also considered vibration-sensitive land uses in addition to commercial and industrial buildings where vibration would interfere with operations within the building, including levels that may be well below those associated with human annoyance.

B. Regulatory Setting

Applicable laws and regulations associated with noise are discussed in Table 17.

Table 17: Applicable Laws and Regulations for Noise

Regulation	Description
Federal	
Federal Noise Control Act (1972)	This act established a requirement that all federal agencies administer their programs to promote an environment free of noise

Regulation	Description
U.S. EPA (40 CFR 201-211)	that jeopardizes public health or welfare. U.S. EPA was given the responsibility for providing information to the public regarding identifiable effects of noise on public health or welfare, publishing information on the levels of environmental noise that will protect the public health and welfare with an adequate margin of safety, coordinating federal research and activities related to noise control, and establishing federal noise emission standards for selected products distributed in interstate commerce. This act also directed that all federal agencies comply with applicable federal, state, interstate, and local noise control regulations.
Quiet Communities Act (1978)	This act promotes the development of effective State and local noise control programs, to provide funds for noise research, and to produce and disseminate educational materials to the public on the harmful effects of noise and ways to effectively control it.
14 CFR, Part 150 (FAA)	These address airport noise compatibility planning and include a system for measuring airport noise impacts and present guidelines for identifying incompatible land uses. All land uses are considered compatible with noise levels of less than 65 dBA L_{dn}. At higher noise levels, selected land uses are also deemed acceptable, depending on the nature of the use and the degree of structural noise attenuation provided.
International Standards and Recommended Practices (International Civil Aviation Organization)	This contains policies and procedures for considering environmental impacts (e.g., aircraft noise emission standards and atmospheric sound attenuation factors).
32 CFR, Part 256 (Department of Defense Air Installations Compatible Use Zones Program)	Air Installations Compatible Use Zones plans prepared for individual airfields are primarily intended as recommendations to local communities regarding the importance of maintaining land uses which are compatible with the noise and safety impacts of military aircraft operations.
23 CFR, Part 772, Federal Highway Administration	Federal Highway Administration standards, policies, and procedures provide procedures for noise studies and noise abatement measures to help protect the public health and welfare,

Regulation	Description
standards, policies, and procedures	to supply noise abatement criteria, and to establish requirements for information to be given to local officials for use in the planning and design of highways.
29 CFR, Part 1910, Section 1910.95 (U.S. Department of Labor Occupational Safety and Health Administration)	This regulation established a standard for noise exposure in the workplace.
FTA Guidance	This guidance presents procedures for predicting and assessing noise and vibration impacts of proposed mass transit projects. All types of bus and rail projects are covered. Procedures for assessing noise and vibration impacts are provided for different stages of project development, from early planning before mode and alignment have been selected through preliminary engineering and final design. Both for noise and vibration, there are three levels of analysis described. The framework acts as a screening process, reserving detailed analysis for projects with the greatest potential for impacts while allowing a simpler process for projects with little or no effects. This guidance contains noise and vibration impact criteria that are used to assess the magnitude of predicted impacts. A range of mitigation is described for dealing with adverse noise and vibration impacts.
49 CFR 210 (Federal Rail Administration Railroad Noise Emission Compliance Standards) and Guidance (2005)	This section and guidance contain criteria and procedures for use in analyzing the potential noise and vibration impacts of various types of high-speed fixed guideway transportation systems.
State	
CPUC Section 21670	The State Aeronautics Act of CPUC establishes statewide requirements for airport land use compatibility planning and requires nearly every county to create an Airport Land Use Commission or other alternative.
California Airport Noise Regulations	In Section 5006, the regulations state that: "The level of noise acceptable to a reasonable person residing in the vicinity of an

Regulation	Description
promulgated in accordance with the State Aeronautics Act (21 CCR Section 5000 et seq.)	airport is established as a CNEL value of 65 dBA for purposes of these regulations. This criterion level has been chosen for reasonable persons residing in urban residential areas where houses are of typical California construction and may have windows partially open. It has been selected with reference to speech, sleep, and community reaction.
24 CCR, Part 2	These establish standards governing interior noise levels that apply to all new single-family and multi-family residential units in California. These standards require that acoustical studies be performed before construction at building locations where the existing L_{dn} exceeds 60 dBA. Such acoustical studies are required to establish mitigation that will limit maximum L_{dn} levels to 45 dBA in any habitable room.
Local	
City/County General Plan Noise Elements	Local general plans in California must include a noise element per Government Code Section 65302(f). The General Plan Guidelines maintained and published by OPR provide detailed guidance to local agencies on standards and methods of analysis that should be used when developing or updating a noise element. Local governments must "analyze and quantify" noise levels and the extent of noise exposure through actual measurement or the use of noise modeling. Technical data relating to mobile and point sources must be collected and synthesized into a set of noise control policies and programs that "minimizes the exposure of community residents to excessive noise." Noise level contours must be mapped, and the conclusions of the element used as a basis for land use decisions. The noise element must include implementation measures and possible solutions to existing and foreseeable noise problems. Furthermore, the policies and standards must be sufficient to serve as a guideline for compliance with sound transmission control requirements. The noise element directly correlates to the land use, circulation, and housing elements. A noise element is to be used as "a guide for establishing a pattern of land uses in the land use element that minimizes the exposure of community residents to excessive noise." (OPR 2017)

Regulation	Description
City/County Noise Regulations	Most local governments in California maintain and enforce noise regulations contained in local codes and ordinances that apply to diverse types of activities in the community. These regulations may include noise standards that apply to construction activities associated with new development projects, as well as ongoing operational activities associated with existing or future land uses.

14. Employment, Population, and Housing

A. Existing Conditions

1. U.S.

The employed civilian labor force, unemployment rates, employment opportunities, and population estimates and projections for cities, counties, and states are collected every 10 years by the U.S. Census Bureau (Census). The estimated population in 2019 for the U.S. was approximately 328,239,523 and the estimated number of housing units was 139,684,244 (Census 2019). The estimated average number of persons per household in 2014-2018 was 2.63 in the U.S. (Census 2019). In December 2020, the unemployment rate in the U.S. declined from 14.8 percent in April 2020 to 6.7 percent (BLS 2021a).

2. California

a) Population

According to the Census data, the estimated population of California in 2019 was 39,512,223 (Census 2019). Since California became a state in 1850, the population has been increasing rapidly. Within the first 150 years of California's statehood, the population increased from fewer than 100,000 citizens to almost 34 million in 2000 (Census 2001). It is expected that the population of California will reach and surpass the 50-million mark sometime between 2040 and 2050 if the current growth rates persist (University of Southern California 2012).

b) Housing

As population within the State increases, housing distribution and household conditions are expected to evolve. Estimated housing units, households, and vacancy rates for the State of California in 2013 are shown below in Table 18. Data was derived from the 2010 Census (Census 2018).

Table 18: California Housing Profile

Housing Profile Component	Housing Profile Value
Total Housing Units	13,680,081
Total households	12,577,498
Vacant housing units	1,102,583
Owner-occupied	7,035,371
Renter-occupied	15,691,211
Homeowner vacancy rate	2.1
Rental vacancy rate	6.3

Source: Census 2018.

c) Employment

In December 2020, the civilian labor force in California was approximately 18,705,475, and the unemployment rate decreased from 16 percent in April 2020 to 9.3 percent in December 2020 (BLS 2021b).

B. Regulatory Setting

See land use planning and housing-related regulations in Section 11.0, Land Use and Planning.

15. Public Services

A. Existing Conditions

1. U.S.

U.S. EPA is charged with protecting human health and the environment, by writing and enforcing regulations based on laws passed by Congress. U.S. EPA Criminal Investigation Division's primary mission is the enforcement of U.S. environmental laws as well as any other federal law in accordance with the guidelines established by the Attorney General of the U.S. (18 USC 3063). These environmental laws include those specifically related to air, water, and land resources. USFS is an agency of USDA that administers the nation's 155 national forests and 20 national grasslands, including fire protection and response services. Major divisions of the agency include the National Forest System, State and Private Forestry, and the Research

and Development branch. The Fire and Aviation Management part of USFS works to advance technologies in fire management and suppression, maintain and improve the extremely efficient mobilization and tracking systems in place, and reach out in support of federal, state, and international fire partners.

Education is primarily a State and local responsibility in the U.S. Communities, as well as public and private organizations, establish schools, develop curricula, and determine requirements for enrollment and graduation.

2. California

a) Law Enforcement

California's environmental laws are enforced by a matrix of State and local agencies, some at CalEPA, each charged with enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticide laws, the Attorney General's Office, local District Attorneys and City Attorneys. The Attorney General represents the people of California in civil and criminal matters before trial courts, appellate courts, and the supreme courts of California and the U.S. Regarding environmental issues, the Attorney General enforces laws that safeguard the environment and natural resources in the state. Recent actions by the Attorney General related to air quality and climate change issues include filing numerous actions against the Trump Administration opposing federal rollbacks of environmental protection regulations and requiring implementation of existing rules. These actions involve a range of regulations, including those concerning greenhouse gas emissions from stationary sources and vehicles, regulations of toxic air pollution, and planning requirements for criteria pollution planning. The Attorney General also continues to work broadly to support CARB actions, including working with local governments to ensure that land use planning processes take account of global warming, promoting renewable energy and enhanced energy efficiency in California, and working with other State leaders and agencies to implement AB 32, the Global Warming Solutions Act of 2006.

CalEPA was created in 1991 by Governor's EO. CalEPA's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality, and economic vitality. CalEPA is composed of various boards, departments, and offices, including: CARB, Department of Pesticide Regulation, DTSC, OEHHA, and SWRCB (including the nine RWQCBs).

California's environmental laws are enforced by State and local agencies, each charged with enforcing the laws governing a specific media such as air, water, hazardous waste, solid waste, and pesticides. Enforcement agencies for these media are as follows:

- Air: CARB (part of CalEPA) and Local Air Districts.
- Water: SWRCB (part of CalEPA), RWQCBs (part of CalEPA), local wastewater officials, and the California Department of Public Health.
- Hazardous Waste: DTSC (part of CalEPA) and CUPAs.
- Carcinogens/Reproductive Toxins: Prop. 65 through OEHHA (part of CalEPA).

- Pesticides: Department of Pesticide Regulation (part of CalEPA) and County Agricultural Commissioners

Statewide law enforcement service is provided by the California Highway Patrol, which is responsible for protecting State resources and providing crime prevention services and traffic enforcement along the State's highways and byways.

Community law enforcement service is provided by local police and sheriff agencies (i.e., cities and counties, respectively) to prevent crime, respond to emergency incidents, and provide traffic enforcement on local roadways.

b) Fire Protection and Emergency Medical Response Services

State-level fire protection and emergency response service is provided by the California Department of Forestry and Fire Protection (CAL FIRE), primarily in rural areas of the State. CAL FIRE is an emergency response and resource protection department. CAL FIRE protects lives, property, and natural resources from fire, responds to emergencies of all types, and protects and preserves timberlands, wildlands, and urban forests.

Local and urban fire protection service is provided by local fire districts and/or local agencies (e.g., fire departments of cities and counties). In addition to providing fire response services most fire agencies also provide emergency medical response services (i.e., ambulance services) within their service areas.

3. Schools

Statewide, the regulation of education for youth is provided by the California Department of Education. The State Board of Education (SBE) is the governing and policy-making body of the California Department of Education. SBE sets K-12 education policy in the areas of standards, instructional materials, assessment, and accountability. Locally, school districts are responsible for the management and development of elementary, middle, and high-school facilities.

B. Regulatory Setting

Applicable laws and regulations associated with public services are discussed in Table 19.

Table 19: Applicable Laws and Regulations for Public Services

Regulation	Description
Federal	
American with Disabilities Act	Guidelines to ensure that facilities are accessible to individuals with disabilities. Implements requirements for the design and construction of buildings.

Regulation	Description
State	
State Fire Responsibility Areas	Areas delineated by CAL FIRE for which the State assumes primary financial responsibility for protecting natural resources from damages of fire. Local jurisdictions are required to adopt minimum recommended requirements for road design, road identification, emergency fire suppression and fuel breaks and greenbelts. All projects within or adjacent to a State Fire Responsibility Area must meet these requirements.
State School Funding	Education Code Section 17620 authorizes school districts to levy a fee, charge, dedication, or other requirement for any development project for the construction or reconstruction of school facilities.

16. Recreation

A. Existing Conditions

1. U.S.

Recreational resources and facilities are provided and managed at federal, state, and local levels. The federal government manages a diverse array of recreational facilities and resources that include national parks and monuments, national forests and grasslands, wildlife refuges, wilderness areas, lakes and lands managed by different agencies in the federal government, wild and scenic rivers, and back country byways, national trials, and marine reserves and estuaries. Each federal agency's programs include recreation components.

2. California

California contains approximately 14,000 parks, managed by nearly 1,000 agencies (CSP 2015). The California Outdoor Recreation Plan and associated research provide policy guidance to all public agencies – federal, state, local, and special districts that oversee outdoor recreation on lands, facilities, and services throughout California. Agencies and departments that are involved in recreational activities include Boating and Waterways, Fish and Wildlife, Tahoe Regional Planning Association, various conservancies, and others.

Recreational lands and facilities are also managed by regional and local park and recreation agencies and open space districts. City and county general plans contain recreation elements that provide framework for planning agencies to consider when projects are developed and implemented.

B. Regulatory Setting

Applicable laws and regulations associated with recreation are discussed in Table 20.

Table 20: Applicable Laws and Regulations for Recreation

Regulation	Description
Federal	
FLPMA, 1976 – 43 CFR 1600	Establishes public land policy; guidelines for administration; and provides for the "multiple use" management, protection, development, and enhancement of public lands. Multiple use management, defined as "management of the public lands and their various resource values so that they are utilized in the combination that will best meet the present and future needs of the American people" with recreation identified as one of the resource values.
Local	
General Plans	General plans for cities and counties contain designations for recreational areas. These are policy documents with planned land use maps and related information that are designed to give long-range guidance to those local officials making decisions affecting the growth and resources of their jurisdictions. Because of the number and variety of general plans and related local plans, they are not listed individually.

17. Transportation

A. Existing Conditions

1. U.S. and California

Existing roadway systems in the U.S. and California generally consist of highways, freeways, arterials, local streets, and intersections/ramps. The existing average annual daily traffic volumes on the roadway segments that comprise these systems vary considerably (i.e., from hundreds to hundreds of thousands). The level of service (LOS), a scale used to determine the operating quality of a roadway segment or intersection based on volume-to-capacity ratio or average delay, also vary from LOS A, the best and smoothest operating conditions, to LOS F, most congested operating conditions. Other roadway and traffic volume

characteristics such as roadway length, number of lanes and facility type (e.g., two-lane freeway), right-of-way width and pavement width, terrain classification (e.g., flat), percent of heavy-duty truck traffic, and accident rates (e.g., number of accidents per million vehicle miles traveled) also vary substantially depending on the location. In addition to the roadway systems, circulation networks provide additional transportation opportunities and include mass transit, airports, and non-motorized travel (e.g., pedestrian and bicycle paths).

B. Regulatory Setting

Applicable laws and regulations associated with transportation are discussed in Table 21.

Table 21: Applicable Laws and Regulations for Transportation

Regulation	Description
Federal	
40 CFR, Part 77 (FAA)	Requires a determination of no hazard to air navigation for structures that will be more than 200 feet above ground level.
State	
SB 375, Statutes of 2008	The Sustainable Communities and Climate Protection Act of 2008 (Sustainable Communities Act, SB 375, Chapter 728, Statutes of 2008) supplements the requirements under the Federal-Aid Highway Act. In addition to preparing RTPs, under SB 375, MPOs must develop SCSs that address VMT-related GHG emissions and include strategies to reduce emissions. Through the RTP/SCSs, MPOs allocate federal and State transportation funding to local and regional projects that would reduce VMT-related emissions.
SB 743, Statutes of 2013, Chapter 386	SB 743, passed in 2013, requires OPR to develop new CEQA guidelines that address traffic metrics under CEQA. As stated in the legislation, upon adoption of the new guidelines, "automobile delay, as described solely by level of service or similar measures of vehicular capacity or traffic congestion shall not be considered a significant impact on the environment pursuant to this division, except in locations specifically identified in the guidelines, if any." CNRA is currently in the process of reviewing the updates to the CEQA Guidelines proposed by OPR.
Vehicle Code Sections 353; 2500-2505; 31303-	Regulates the highway transport of hazardous materials.

Regulation	Description
31309; 32000-32053; 32100-32109; 31600-31620; Health and Safety Code Section 25160 et seq.	
Vehicle Code Sections 13369; 15275 and 15278	Addresses the licensing of drivers and the classification of licenses required for the operation of particular types of vehicles and requires certificates permitting operation of vehicles transporting hazardous materials.
Vehicle Code Sections 35100 et seq.; 35250 et seq.; 35400 et seq.	Specifies limits for vehicle width, height, and length.
Vehicle Code Section 35780	Requires permits for any load exceeding Caltrans weight, length, or width standards on public roadways.
California Streets and Highways Code Section 117, 660-672	Requires permits for any load exceeding Caltrans weight, length, or width standards on County roads.
California Streets and Highways Code Sections 117, 660-670, 1450, 1460 et seq., and 1480 et seq.	Regulate permits from Caltrans for any roadway encroachment from facilities that require construction, maintenance, or repairs on or across State highways and County roads.
CEQA [PRC CEQA Sections 21099(b)(2) and (c)(1)]	CEQA Section 21099(b)(2) states that automobile delay, as described solely by level of service or similar measures of traffic congestion are not a significant environmental impact except in certain specified locations. Section 21099(c)(1) permits OPR to establish alternative metrics for assessing traffic impacts outside transit priority areas.
Local	
City/County Codes	Many local governments in California maintain and enforce local codes that apply standards to transportation facilities and services.

18. Utilities and Service Systems

A. Existing Conditions

1. U.S.

The U.S. Bureau of Reclamation (USBR) is a federal agency. It is the largest wholesaler of water in the U.S. and the second largest producer of hydroelectric power (USBR 2017). The Federal Power Commission regulates both the interstate transmission of electricity and the sale of hydroelectric power at the wholesale level in the U.S., and the Federal Energy Regulatory Commission (FERC) has authority over intrastate as well as interstate natural gas production.

2. California

a) Water Supply and Distribution

The principal water supply facilities in California are operated by USBR and DWR. In California, the Mid-Pacific Region of USBR is responsible for the management of the Central Valley Project (CVP). The CVP serves farms, homes, and industry in California's Central Valley as well as the major urban centers in the San Francisco Bay Area. The CVP consists of 20 dams and reservoirs, 11 power plants, and 500 miles of major canals and reaches from the Cascade Mountains near Redding in the north to the Tehachapi Mountains near Bakersfield in the south. In addition to delivering water for municipal and industrial uses and the environment, the CVP produces electric power and provides flood protection, navigation, recreation, and water quality benefits (USBR 2017).

DWR is a State agency that is responsible for managing and implementing the State Water Project (SWP). The SWP is a water storage and delivery system of reservoirs, aqueducts, power plants, and pumping plants. Its main purpose is to store water and distribute it to 29 urban and agricultural water supply contractors in Northern California, the San Francisco Bay Area, the San Joaquin Valley, the Central Coast, and Southern California (DWR 2018).

Local water districts, irrigation districts, special districts, and jurisdictions (e.g., cities and counties) manage and regulate the availability of water supplies and the treatment and delivery of water to individual projects. Depending on their location and the source of their supplies, these agencies may use groundwater, surface water through specific water entitlements, or surface water delivered through the CVP or SWP. In some remote areas not served by a water supply agency, individual developments may need to rely upon the underlying groundwater basin for their water supply. In these cases, the project would be required to secure a permit from the local or State land use authority and seek approval for development of the groundwater well(s).

b) Wastewater Collection and Treatment

SWRCB is the State agency responsible for the regulation of wastewater discharges to surface waters and groundwater via land discharge. SWRCB and nine RWQCBs are

responsible for development and enforcement of water quality objectives and implementation plans that protect the beneficial uses of the federal and State waters. SWRCB also administers water rights in California. The RWQCBs are responsible for issuing permits or other discharge requirements to individual wastewater dischargers and for ensuring that they are meeting the requirements of the permit through monitoring and other controls.

Wastewater collection, treatment, and discharge service for developed and metropolitan areas is typically provided by local wastewater service districts or agencies that may or may not be operated by the local jurisdiction (e.g., city or county). These agencies are required to secure treatment and discharge permits for the operation of a wastewater facility from the RWQCB. Wastewater is typically collected from a specific development and conveyed through a series of large pipelines to the treatment facility where it is treated to permitted levels and discharged to surface waters or the land.

In areas that are remote or that are not served by an individual wastewater service provider, developments would be required to install an individual septic tank or other on-site wastewater treatment system. These facilities would need to be approved by the local or State land use authority and the RWQCB.

c) Electricity and Natural Gas

CPUC regulates investor-owned electric and natural gas companies located within California. The CPUC's Energy Division develops and administers energy policy and programs and monitors compliance with the adopted regulations.

Locally, energy service is provided by a public or private utility. New development projects would need to coordinate with the local service provider to ensure adequate capacity is available to serve the development.

d) Solid Waste Collection and Disposal

Statewide, the California Department of Resources Recycling and Recovery (CalRecycle), is responsible for the regulation of the disposal and recycling of all solid waste generated in California. CalRecycle acts as an enforcement agency in the approval and regulation of solid waste disposal and recycling facilities. Local agencies can create local enforcement agencies and, once approved by CalRecycle, they can serve as the enforcement agency for landfills and recycling facilities with their jurisdictions.

Local agencies or private companies own and operate landfill facilities and solid waste is typically hauled to these facilities by private or public haulers. Individual projects would need to coordinate with the local service provider and landfill to determine if adequate capacity exists to serve the project.

B. Regulatory Setting

Applicable laws and regulations associated with utilities are discussed in Table 22.

Table 22: Applicable Laws and Regulations for Utilities

Regulation	Description
Federal	
Federal Power Act of 1935	In the Federal Power Act of 1935 (49 Stat. 803), created the Federal Power Commission, an independent regulatory agency with authority over both the interstate transmission of electricity and the sale of hydroelectric power at the wholesale level. The act requires the commission to ensure that electricity rates are "reasonable, nondiscriminatory and just to the consumer." The Federal Power Act of 1935 also amended the criteria that the commission must apply in deciding whether to license the construction and operation of new hydroelectric facilities.
Natural Gas Act (NGA) of 1938	Together with the Federal Power Act of 1935, the NGA (P.L. 75-688, 52 Stat. 821) was an essential piece of energy legislation in the first half of the 20th century. These statutes regulated interstate activities of the electric and natural gas industries, respectively. The acts are similarly structured and constitute the classic form of command-and-control regulation authorizing the federal government to enter into a regulatory compact with utilities. In short, the NGA enabled federal regulators to set prices for gas sold in interstate commerce in exchange for exclusive rights to transport the gas.
Natural Gas Policy Act (NGPA) of 1978	The NGPA granted FERC the authority over intrastate as well as interstate natural gas production. The NGPA established price ceilings for wellhead first sales of gas that vary with the applicable gas category and gradually increase over time.
State	
Waste Heat and Carbon Emissions Reduction Act of 2007	The Waste Heat and Carbon Emissions Reduction Act of 2007 (AB 1613), placed requirements on CPUC, CEC, and local electric utilities to develop incentive programs and technical efficiency guidelines to encourage the installation of small CHP systems. CEC approved efficiency and certification guidelines for eligible systems under AB 1613 in January 2010, and CPUC approved standardized contracting and pricing provisions between CHP operators and the Investor Owned Utilities in November 2012.

Regulation	Description
AB 1900 (Statutes of 2012)	AB 1900 (Gatto, Chapter 602, Statutes of 2012) directed CPUC to adopt natural gas constituent standards (in consultation with CARB and OEHHA). The legislation is also designed to streamline and standardize customer pipeline access rules and encourage the development of statewide policies and programs to promote all sources of biomethane production and distribution.
Section 21151.9 of the PRC/ Water Code Section 10910 et seq.	Required the preparation of a water supply assessment for large developments. These assessments are prepared by public water agencies responsible for providing service and address whether there are adequate existing and projected future water supplies to serve the proposed project. All projects that meet the qualifications for preparing a water supply assessment must identify the water supplies and quantities that would serve the project as well as project the total water demand for the service area (including the project's water demands) by source in 5-year increments over a 20-year period. This information must include data for a normal, single-dry, and multiple-dry years. A water supply assessment is required to be approved by the water service agency before the project can be implemented.
Local	
City/County General Plan	Local general plans in California must include a circulation element per Government Code Section 65302(b), which includes identification of the locations and extent of existing and proposed public utilities and facilities. The circulation element of a general plan should assess the adequacy and availability of community water, sewer, and drainage facilities and the need for expansion and improvements; trends in peak and average daily flows; the number and location of existing and proposed power plants, oil and gas pipelines, and major electric transmission lines and corridors; existing and projected capacity of treatment plants and trunk lines; and potential future development of power plants (OPR 2017).
City/County Codes and Ordinances	Most cities and counties have adopted municipal codes and ordinances that pertain to utilities and service systems. Local codes and ordinances include, but not limited to, limitations on the

Regulation	Description
	locations of wells, sewers, and other water-related facilities; and development standards for future utility land use projects.

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Attachment B. Summary of Environmental Impacts and Mitigation Measures

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Aesthetics		
Impact 1-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Aesthetics Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 1-1: Implement State SIP Strategy EA Mitigation Measure 1-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to aesthetics. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized general practices routinely required to avoid and/or minimize impacts to aesthetic resources include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. • The project proponent would color and finish the surfaces of all project structures and buildings visible to the public to: (1) minimize visual intrusion and contrast by blending with the landscape; (2) minimize glare; and (3) comply with local design policies and ordinances. The project proponent would submit a surface treatment plan to the lead agency for review and approval. • To the extent feasible, the sites selected for use as construction staging and laydown areas would be areas that are already disturbed and/or are in locations of low visual sensitivity. Where feasible, construction staging and laydown areas for equipment, personal vehicles, and material storage would be sited to take advantage of natural screening opportunities provided by existing structures, topography, and/or vegetation. Temporary visual screens would be used where helpful, if existing landscape features did not screen views of the areas. • All construction, operation, and maintenance areas would be kept clean and tidy, including the re-vegetation of disturbed soil and storage of construction materials and equipment would be screened from view and/or are generally not	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	visible to the public, where feasible. • Siting projects and their associated elements next to important scenic landscape features or in a setting for observation from State scenic highways, national historic sites, national trails, and cultural resources would be avoided to the greatest extent feasible. • The project proponent would contact the lead agency to discuss the documentation required in a lighting mitigation plan, submit to the lead agency a plan describing the measures that demonstrate compliance with lighting requirements, and notify the lead agency that the lighting has been completed and is ready for inspection.	
Agriculture and Forestry Resources		
Impact 2-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Agriculture and Forestry Resources Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 2-1: Implement State SIP Strategy EA Mitigation Measure 2-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to agriculture and forestry. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize agriculture and forestry resource impacts include: • Proponents of new or modified facilities constructed as a result of reasonably foreseeable compliance responses would coordinate with local or State land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the environmental impacts of the project. Because CARB has no land use authority, mitigation is not within its purview to reduce potentially significant impacts to less-than-significant levels. Any mitigation specifically required for a new or modified facility would be determined by the lead agency and future environmental documents by local and State lead agencies should include analysis of the following: ▪ Avoidance of lands designated as Important Farmlands (State defined Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) as defined by the Farmland Mapping and Monitoring	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	Program. ▪ Analysis of the feasibility of using farmland that is not designated as Important Farmland prior to deciding on the conversion of Important Farmland. ▪ The feasibility, proximity, and value of the proposed project sites should be balanced before a decision is made to locate a facility on land designated as Important Farmland. ▪ Any action resulting in the conversion of Important Farmlands should consider mitigation for the loss of such farmland. Any such mitigation should be completed prior to the issuance of a grading or building permit by providing the permitting agency with written evidence of completion of the mitigation. Mitigation may include but is not limited to: ▪ Permanent preservation of off-site Important Farmland (State defined Prime Farmland, Farmland of Statewide Importance, and Unique Farmland) of equal or better agricultural quality, at a ratio of at least 1:1. o Preservation may include the purchase of agricultural conservationeasement(s); purchase of credits from an established agricultural farmland mitigation bank; contribution of agricultural land or equivalent funding to an organization that provides for the preservation of farmland towards the ultimate purchase of	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	an agricultural conservation easement. o Participation in any agricultural land mitigation program, including local government maintained, that provides equal or more effective mitigation than the measures listed.	
Air Quality		
Impact 3-1: Short-Term Construction-Related Effects to Air Quality Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 3-1: Implement State SIP Strategy EA Mitigation Measure 3-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to air quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize air quality impacts include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. • Project proponents would apply for, secure, and comply with all appropriate air quality permits for project construction from the local agencies with air quality jurisdiction and from other applicable agencies, if appropriate, prior to construction mobilization. • Project proponents would comply with the federal Clean Air Act (The Act) and the California Clean Air Act (e.g., New Source Review and Best Available Control Technology criteria, if applicable). • Project proponents would comply with local plans, policies, ordinances, rules, and regulations regarding air quality-related emissions and associated exposure (e.g., construction-related fugitive PM dust regulations, indirect source review, and payment into offsite mitigation funds).	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	• For projects located in PM nonattainment areas, prepare and comply with a dust abatement plan that addresses emissions of fugitive dust during construction and operation of the project.	
Impact 3-2: Long-Term Operation-Related Effects to Air Quality Beneficial	N/A	N/A
Biological Resources		
Impact 4-1: Short-Term Construction-Related Effects to Biological Resources Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 4-1: Implement State SIP Strategy EA Mitigation Measure 4-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to biological resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize biological resource impacts include:	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	• Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant biological resources impacts of the project. • Actions required to mitigate potentially significant biological impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. ▪ Retain a qualified biologist to prepare a biological inventory of site resources prior to ground disturbance or construction. If protected species or their habitats are present, comply with applicable federal and State endangered species acts and regulations. Construction and operational planning will require that important fish or wildlife movement corridors or nursery sites are not impeded by project activities.	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	▪ Retain a qualified biologist to prepare a wetland survey of onsite resources. This survey shall be used to establish setbacks and prohibit disturbance of riparian habitats, streams, intermittent and ephemeral drainages, and other wetlands. Wetland delineation is required by Section 404 of the Clean Water Act and is administered by the U.S. Army Corps of Engineers. ▪ Prohibit construction activities during the rainy season with requirements for seasonal weatherization and implementation of erosion prevention practices. ▪ Prohibit construction activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring, as needed, to address project activities that could cause an active nest to fail. ▪ Prepare site design and development plans that avoid or minimize disturbance of habitat and wildlife resources and prevent stormwater discharge that could contribute to sedimentation and degradation of local waterways. Depending on disturbance size and location, a National Pollution Discharge Elimination System (NPDES) construction permit may be required from the California State Water Resources Control Board. ▪ Prepare spill prevention and emergency response plans, and hazardous waste disposal plans as	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	appropriate to protect against the inadvertent release of potentially toxic materials. ▪ Plant replacement trees and establish permanent protection suitable habitat at ratios considered acceptable to comply with "no net loss" requirements. ▪ Contractor will keep the site and materials organized and store them in a way to prevent attracting wildlife by not creating places for wildlife to hide or nest (e.g., capping pipes, covering trashcans and emptying trash receptacles consistently and promptly when full).	
Impact 4-2: Long-Term Operation-Related Effects to Biological Resources Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 4-2*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to biological resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	that are routinely required to avoid and/or minimize biological resource impacts include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant biological resources impacts of the project. • Prohibit vegetation management activities in the vicinity of raptor nests during nesting season or establish protective buffers and provide monitoring as needed to ensure that project activity does not cause an active nest to fail. • Maintain site design and development plan features that avoid or minimize disturbance of habitat and wildlife resources, and prevents stormwater discharge that could contribute to sedimentation and degradation of local waterways during project operation. • Maintain and replace, as needed replacement trees and permanently protected suitable habitat identified during the	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	construction phase of the project.	
Cultural Resources		
Impact 5-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Cultural Resources Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 5-1: Implement State SIP Strategy EA Mitigation Measure 5-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to cultural resources. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize cultural resource impacts include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant cultural resources impacts of the project. Actions required to mitigate potentially significant cultural impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. ▪ Retain the services of cultural resources specialists with training and background that conforms to the U.S. Secretary of Interior's Professional Qualifications Standards, as published in Title 36, Code of Federal Regulations, part 61. ▪ Seek guidance from the State and federal lead agencies, as appropriate, for coordination of Nation-to-Nation consultations with the Native American Tribes. ▪ Provide notice to Native American Tribes of project details to identify potential Tribal Cultural Resources (TCRs). In the case that a TCR is identified, prepare mitigation measures that: o Avoid and preserve the resources in place, o Treat the resource with culturally appropriate dignity,	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	○ Employ permanent conservation easements, and ○ Protect the resource. ▪ Consult with lead agencies early in the planning process to identify the potential presence of cultural properties. The agencies will provide the project developers with specific instruction on policies for compliance with the various laws and regulations governing cultural resources management, including coordination with regulatory agencies and Native American Tribes. ▪ Define the area of potential effect (APE) for each project, which is the area within which project construction and operation may directly or indirectly cause alterations in the character or use of historic properties. The APE should include a reasonable construction buffer zone and laydown areas, access roads, and borrow areas, as well as a reasonable assessment of areas subject to effects from visual, auditory, or atmospheric impacts, or impacts from increased access. ▪ Retain the services of a paleontological resources specialist with training and background that conforms with the minimum qualifications for a vertebrate paleontologist as described in Measures for Assessment and Mitigation of Adverse Impacts to	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	Non-Renewable Paleontological Resources: Standard Procedures (Society of Vertebrate Paleontology 2010). ▪ Conduct initial scoping assessments to determine whether proposed construction activities would disturb formations that may contain important paleontological resources. Whenever possible potential impacts to paleontological resources should be avoided by moving the site of construction or removing or reducing the need for surface disturbance. The scoping assessment should be conducted by the qualified paleontological resources specialist in accordance with applicable agency requirements. ▪ The project proponent's qualified paleontological resources specialist would determine whether paleontological resources would likely be disturbed in a project area on the basis of the sedimentary context of the area and a records search for past paleontological finds in the area. The assessment may suggest areas of high known potential for containing resources. If the assessment is inconclusive a surface survey is recommended to determine the fossiliferous potential and extent of the pertinent sedimentary units within the project site. If the site contains areas of high potential for significant paleontological resources and avoidance is not possible, prepare a paleontological resources	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	management and mitigation plan that addresses the following steps: ○ a preliminary survey (if not conducted earlier) and surface salvage prior to construction; ○ physical and administrative protective measures and protocols such as halting work, to be implemented in the event of fossil discoveries; ○ monitoring and salvage during excavation; ○ specimen preparation; ○ identification, cataloging, curation and storage; and ○ a final report of the findings and their significance.	
Energy Demand		
Impact 6-1: Short-Term Construction-Related Effects on Energy Demand Less than significant	N/A	N/A
Impact 6-2: Long-Term Operation-Related Effects on Energy Demand	N/A	N/A

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Beneficial		
Geology and Soils		
Impact 7-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Geology, Seismicity, and Soils Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 7-1: Implement State SIP Strategy EA Mitigation Measure 7-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to geology and soils. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to geology, seismicity, and soils include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant geology and soils impacts of the project. Actions required to mitigate potentially significant geology and soil impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. ▪ Prior to the issuance of any development permits, proponents of new or modified facilities or infrastructure would prepare a geotechnical investigation/study, which would include an evaluation of the depth to the water table, liquefaction potential, physical properties of subsurface soils including shrink-swell potential (expansion), soil resistivity, slope stability, mineral resources, and the presence of hazardous materials. ▪ Proponents of new or modified facilities or infrastructure would provide a complete site grading plan, and drainage, erosion, and sediment control plan with applications to applicable lead agencies. Proponents would avoid locating facilities on steep slopes, in alluvial fans and other areas prone to landslides or flash floods, or with gullies or washes, as much as possible.	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	▪ Disturbed areas outside of the permanent construction footprint would be stabilized or restored using techniques such as soil loosening, topsoil replacement, revegetation, and surface protection (i.e., mulching).	
Greenhouse Gas Emissions and Climate Change		
Impact 8-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Greenhouse Gas Emissions and Climate Change Beneficial	N/A	N/A
Hazards and Hazardous Materials		
Impact 9-1: Short-Term Construction-Related Effects to Hazards and Hazardous Materials Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 9-1: Implement State SIP Strategy EA Mitigation Measure 9-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to hazards and hazardous materials. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	the proposed action for compliance with CEQA statutes. Project specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to hazards and hazardous materials include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant hazards and hazardous materials impacts of the project. • Actions required to mitigate potentially significant upset and accident-related hazard impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. • Handling of potentially hazardous materials/wastes should be performed under the direction of a licensed professional with the necessary experience and knowledge to oversee the proper identification, characterization, handling and	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	disposal or recycling of the materials generated as a result of the project. As wastes are generated, they would be placed, at the direction of the licensed professional, in designated areas that offer secure, secondary containment and/or protection from stormwater runoff. Other forms of containment may include placing waste on plastic sheeting (and/or covering with same) or in steel bins or other suitable containers pending profiling and disposal or recycling. • The temporary storage and handling of potentially hazardous materials/wastes should be in areas away from sensitive receptors such as schools or residential areas. These areas should be secured with chain-link fencing or similar barrier with controlled access to restrict casual contact from non-project personnel. All project personnel that may come into contact with potentially hazardous materials/wastes will have the appropriate health and safety training commensurate with the anticipated level of exposure.	
Impact 9-2: Long-Term Operation-Related Effects to Hazards and Hazardous Materials Less than significant	N/A	N/A
Hydrology and Water Quality		
Impact 10-1: Short-Term	***TRU Draft Supplemental EA Mitigation Measure 10-1:***	Potentially significant and

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Construction-Related Effects on Hydrology and Water Quality Potentially significant	***Implement State SIP Strategy EA Mitigation Measure 10-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations regarding hydrology and water quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or mitigate hydrology and water quality-related impacts include the following: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review,	unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant hydrology and water quality impacts of the project. Actions required to mitigate potentially significant hydrology and water quality impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. • Under the oversight of the lead agency, prior to issuance of any construction permits, the proponents for the proposed renewable energy project would prepare a stormwater drainage and flood control analysis and management plan. The plans would be prepared by a qualified professional and would summarize existing conditions and the effects of project improvements, and would include all appropriate calculations, a watershed map, changes in downstream flows and flood elevations, proposed on- and off-site improvements, features to protect downstream uses, and property and drainage easements to accommodate downstream flows from the site. Project drainage features would be designed to protect existing downstream flow conditions that would result in new or increased severity of offsite flooding. • Establish drainage performance criteria for off-site drainage, in consultation with county engineering staff, such that project-related drainage is consistent with applicable facility designs, discharge rates, erosion protection, and routing to drainage channels, which could be accomplished by, but is not limited to: (a) minimizing directly connected impervious	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	areas; (b) maximizing permeability of the site; and, (c) stormwater quality controls such as infiltration, detention/retention, and/or biofilters; and basins, swales, and pipes in the system design. • The project proponent would design and construct new facilities to provide appropriate flood protection such that operations are not adversely affected by flooding and inundation. These designs would be approved by the local or State land use agency. The project proponent would also consult with the appropriate flood control authority on the design of offsite stream crossings such that the minimum elevations are above the predicted surface-water elevation at the agency's designated design peak flows. Drainage and flood prevention features shall be inspected and maintained on a routine schedule specified in the facility plans, and as specified by the county authority. • As part of subsequent project-level planning and environmental review, the project proponent shall coordinate with the local groundwater management authority and prepare a detailed hydrogeological analysis of the potential project-related effects on groundwater resources prior to issuance of any permits. The proponent shall mitigate for identified adverse changes to groundwater by incorporating technically achievable and feasible modifications into the project to avoid offsite groundwater level reductions, use alternative technologies or changes to water supply operations, or otherwise compensate or offset	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	the groundwater reductions.	
Impact 10-2: Long-Term Operation-Related Effects to Hydrology and Water Quality Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 10-2a: Implement State SIP Strategy EA Mitigation Measure 10-1*** Full text of measure previously provided. ***TRU Draft Supplemental EA Mitigation Measure 10-2b: Implement State SIP Strategy EA Mitigation Measure 10-2*** The Regulatory Setting in Attachment A includes applicable laws and regulations that provide protection of hydrology and water quality. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to hydrology and water quality: • Identify and avoid areas with unstable slopes and local factors that can cause slope instability (groundwater conditions, precipitation, seismic activity, slope angles, and	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	geologic structure). • Identify soil properties, engineering constraints, and facility design criteria. • Develop a site grading and management plan to identify areas of disturbance, areas of cut and fill, slope during and after grading, existing vegetation, and measures to protect slope, drainages, and existing vegetation in the project area. • Develop an erosion control plan to delineate measures to minimize soil loss and reduce sedimentation to protect water quality. • Design runoff control features to minimize soil erosion. • Construct drainage ditches only where necessary. • Use appropriate structures at culvert outlets to prevent erosion.	
Land Use Planning		
Impact 11-1: Short-Term Construction-Related and Long-Term Operation-Related Impacts on Land Use and Planning Less than significant	N/A	N/A

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
Mineral Resources		
Impact 12-1: Short-Term Construction-Related Effects to Mineral Resources Less than significant	N/A	N/A
Impact 12-2: Long-Term Operation-Related Effects to Mineral Resources Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 12-2*** The Regulatory Setting in Attachment A includes applicable laws and regulations that provide protection of mineral resources. CARB does not have the authority to require implementation of mitigation related to new or modified infrastructure that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified infrastructure in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation measures may be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize impacts to mineral resources include: • Proponents of construction activities implemented because of reasonably foreseeable compliance responses associated with the Proposed Amendments would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation

	environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development.
	
	• Based on the results of the environmental review, proponents will implement all feasible mitigation to reduce or substantially lessen the potentially significant impacts on mineral resources associated with the project.
	
	• Actions required to mitigate potentially significant mineral resource impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency.
	
	  ▪ Prior to the issuance of any development permits, proponents of new or modified infrastructure will prepare an investigation/study, which will include an evaluation of the development's impact on the availability of mineral resources valuable to the region and residents of the State or delineated on a local general plan, specific plan, or other land use plan.
	
	  ▪ Proponents of new or modified infrastructure will provide a complete site plan showing any overlapping areas between the proposed plan and locally important mineral resources delineated on a local general plan, specific plan, or other land use plan. Proponents will avoid locating infrastructure that would result in the loss of availability of locally	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	important mineral resources, as much as possible.	
Noise		
Impact 13-1: Short-Term Construction-Related Noise Effects Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 13-1: Implement State SIP Strategy EA Mitigation Measure 13-1*** The Regulatory Setting in Attachment A includes, but is not limited to, applicable laws and regulations that pertain to noise. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that could be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize noise include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant noise and vibration impacts of the project. Actions required to mitigate potentially significant noise impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. ▪ Ensure noise-generating construction activities (including truck deliveries, pile driving, and blasting) are limited to the least noise-sensitive times of day (e.g., weekdays during the daytime hours) for projects near sensitive receptors. ▪ Consider use of noise barriers, such as berms, to limit ambient noise at property lines, especially where sensitive receptors may be present. ▪ Ensure all project equipment has sound-control devices no less effective than those provided on the original equipment. ▪ All construction equipment used would be adequately muffled and maintained.	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	▪ Consider use of battery-powered forklifts and other facility vehicles. ▪ Ensure all stationary construction equipment (i.e., compressors, generators) is located as far as practicable from nearby sensitive receptors or shielded. ▪ Properly maintain mufflers, brakes and all loose items on construction and operation related vehicles to minimize noise and address operational safety issues. Keep truck operations to the quietest operating speeds. Advise about downshifting and vehicle operations in sensitive communities to keep truck noise to a minimum. ▪ Use noise controls on standard construction equipment; shield impact tools. ▪ Consider use of flashing lights instead of audible back-up alarms on mobile equipment. ▪ Install mufflers on air coolers and exhaust stacks of all diesel and gas-driven engines. ▪ Equip all emergency pressure relief valves and steam blow-down lines with silencers to limit noise levels. ▪ Contain facilities within buildings or other types of effective noise enclosures.	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	▪ Employ engineering controls, including sound-insulated equipment and control rooms, to reduce the average noise level in normal work areas.	
Impact 13-2: Long-Term Operation-Related Noise Effects Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 13-2: Implement State SIP Strategy EA Mitigation Measure 13-1*** Full text of measure previously provided.	Potentially significant and unavoidable
Population and Housing		
Impact 14-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Population and Housing Less than significant	N/A	N/A
Public Services		
Impact 15-1: Short-Term Construction-Related and Long-Term Operation-Related Effects to Public Services Less than significant	N/A	N/A
Recreation		
Impact 16-1: Short-Term Construction-Related and Long-Term Operation-Related Effects	N/A	N/A

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
to Recreation Less than significant		
Transportation		
Impact 17-1: Short-Term Construction-Related Effects to Transportation Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 17-1: Implement State SIP Strategy EA Mitigation Measure 17-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations regarding transportation. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize construction traffic impacts include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant transportation impacts of the project. Actions required to mitigate potentially significant traffic impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. ▪ Minimize the number and length of access, internal, service, and maintenance roads and use existing roads when feasible. ▪ Provide for safe ingress and egress to/from the proposed project site. Identify road design requirements for any proposed roads, and related road improvements. ▪ If new roads are necessary, prepare a road siting plan and consult standards contained in federal, State, or local requirements. The plans should include design and construction protocols to meet the appropriate roadway standards and be no larger than necessary to accommodate their intended functions (e.g., traffic volume and weight of vehicles). Access roads should be located to avoid or minimize impacts to washes and stream crossings, follow natural contours and	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	minimize side-hill cuts. Roads internal to a project site should be designed to minimize ground disturbance. Excessive grades on roads, road embankments, ditches, and drainages should be avoided, especially in areas with erodible soils. ▪ Prepare a Construction Traffic Control Plan and a Traffic Management Plan.	
Impact 17-2: Long-Term Operation-Related Effects to Transportation Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 17-2: Implement State SIP Strategy EA Mitigation Measure 17-1*** Full text of measure previously provided.	Potentially significant and unavoidable
Utilities and Service Systems		
Impact 18-1: Short-Term Construction-Related and Long-Term Operational Impacts on Utilities and Service Systems Potentially significant	***TRU Draft Supplemental EA Mitigation Measure 18-1: Implement State SIP Strategy EA Mitigation Measure 18-1*** The Regulatory Setting in Attachment A includes applicable laws and regulations that relate to utilities and service systems. CARB does not have the authority to require implementation of mitigation related to new or modified facilities that would be approved by local jurisdictions. The ability to require such measures is under the purview of jurisdictions with local or State land use approval and/or permitting authority. New or modified facilities in California would most likely qualify as a "project" under CEQA. The jurisdiction with primary approval authority over a proposed action is the Lead Agency, which is required to review the proposed action for compliance with CEQA statutes. Project-specific impacts and mitigation would be identified during	Potentially significant and unavoidable

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	the environmental review by agencies with project-approval authority. Recognized practices that are routinely required to avoid and/or minimize utility and service-related impacts include: • Proponents of new or modified facilities or infrastructure constructed as a result of reasonably foreseeable compliance responses would coordinate with State or local land use agencies to seek entitlements for development including the completion of all necessary environmental review requirements (e.g., CEQA). The local or State land use agency or governing body must follow all applicable environmental regulations as part of approval of a project for development. • Based on the results of the environmental review, proponents would implement all feasible mitigation to reduce or substantially lessen the potentially significant scenic or aesthetic impacts of the project. Actions required to mitigate potentially significant utility or service-related impacts may include the following; however, any mitigation specifically required for a new or modified facility would be determined by the lead agency. ▪ Comply with local plans and policies regarding the provision of water supply, wastewater treatment, and storm water drainage utilities, and solid waste services. ▪ Where an on-site wastewater system is proposed, submit a permit application to the appropriate local	

Resource Area Impact Significance before Mitigation	Potential Mitigation	Significance after Mitigation
	jurisdiction. ▪ Where appropriate, prepare a Water Supply Assessment consistent with the requirements of Section 21151.9 of the PRC/ Section 10910 et seq. of the Water Code. The water supply assessment would be approved by the local water agency/purveyor prior to construction of the project. ▪ Comply with local plans and policies regarding the provision of wastewater treatment services.	
Wildfire		
Impact 19-1: Short-Term Construction-Related and Long-Term Operation-Related Effects on Wildfire *Less than significant*		

Appendix E

List of Public Workshops, Meetings, Conference Calls, Video Conferences, and Site Visits Supporting the Public Process for Development of the Proposed Amendments

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Date of Release: July 27, 2021
Date of Hearing: September 23, 2021

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As of June 2021, staff have conducted more than 160 meetings with members of impacted communities, environmental justice advocates, air districts, industry stakeholders (including TRU owners and operators, TRU dealers and service centers, truck and trailer leasing companies, trade associations, TRU manufacturers, electric utilities, freight facility owners and operators, infrastructure manufacturers, and electronic telematics system suppliers), and other interested parties. Meeting formats included public workshops, work group meetings, community meetings, informal meetings, phone calls, and site visits with individual stakeholders.

These meetings were held at a variety of locations, including at the California Environmental Protection Agency (Cal/EPA) headquarters building in Sacramento, California, site visits to facilities, conference calls, and video conferences. At these meetings, staff discussed draft concepts and solicited input from affected stakeholders. Table 1 provides a list of the public workshops, work group meetings, community meetings, informal meetings, conference calls, video conferences, and site visits conducted during the development process for the Proposed Amendments.

Table 1. List of Public Workshops, Meetings, Conference Calls, Video Conferences, and Site Visits

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
March 16, 2016	Informational	Penske Logistics	Meeting and Site visit	Sacramento
April 5, 2016	Informational	Lineage Logistics	Site visit	San Leandro
April 13, 2016	Regulatory development	Public workshop (various attendees)	Workshop/Webcast	Cal/EPA Building, Sacramento
May 20, 2016	Informational	Walmart Distribution Center	Meeting and Site visit	Red Bluff
October 5, 2016	Informational	California Trucking Association, American Trucking Association	Meeting	Cal/EPA Building, Sacramento
October 6, 2016	Informational	Sysco	Conference call	N/A
December 21, 2016	Informational	Union Pacific Railroad	Meeting and Site visit	Roseville
February 15, 2017	Informational	Volta Air	Meeting	Cal/EPA Building, Sacramento
March 21, 2017	Informational	Advanced Energy Machines	Meeting	Cal/EPA Building, Sacramento
June 15, 2017	Informational	Advanced Energy Machines	Meeting	Cal/EPA Building, Sacramento
June 20, 2017	Outreach	Sysco	Meeting	Cal/EPA Building, Sacramento
July 11, 2017	Technology/ Informational	Dearman Engines	Meeting	Cal/EPA Building, Sacramento
August 14, 2017	Informational	Thermo King	Conference call	N/A
August 16, 2017	Informational	Carrier Transicold	Meeting	Cal/EPA Building, Sacramento
August 16, 2017	Regulatory development	Public workshop (various attendees)	Workshop/Webcast	Cal/EPA Building, Sacramento

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
August 18, 2017	Regulatory development	Public workshop (various attendees)	Workshop	Riverside
August 22, 2017	Outreach	California Fresh Fruit Association	Conference call	N/A
August 23, 2017	Informational	TK Services	Meeting	Cal/EPA Building, Sacramento
August 29, 2017	Regulatory development	Public workshop (various attendees)	Workshop	Los Angeles
September 6, 2017	Regulatory development	Public workshop (various attendees)	Workshop/Webcast	Cal/EPA Building, Sacramento
September 18, 2017	Community outreach	Community meeting (various attendees)	Community meeting	Lamont
September 19, 2017	Community outreach	Community meeting (various attendees)	Community meeting	Long Beach
September 20, 2017	Community outreach	Community meeting (various attendees)	Community meeting	Inland Empire
September 25, 2017	Community outreach	Community meeting (various attendees)	Community meeting	Oakland
October 11, 2017	Informational	Sysco Foodservices	Meeting and Site visit	Walnut
October 13, 2017	Informational	United States Cold Storage	Meeting and Site visit	McClellan Park
October 17, 2017	Informational	PG&E	Conference call	N/A
November 2, 2017	Informational	Thermo King and Ingersoll Rand/Trane	Meeting	Cal/EPA Building, Sacramento
November 3, 2017	Regulatory development	Work group meeting (various attendees)	Work group meeting	Cal/EPA Building, Sacramento
November 6, 2017	Regulatory development	California Cotton Ginners and Growers	Meeting	Fresno

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
		Association, Western Agricultural Processors Association		
November 16, 2017	Informational	Thermo King and Metis Technologies	Meeting	Cal/EPA Building, Sacramento
December 19, 2017	Regulatory development	Pacific Maritime Shipping Association	Conference call	N/A
January 9, 2018	Regulatory development/Technology	Thermo King; Ingersoll Rand/Trane; Montgomery Consultants	Meeting	Cal/EPA Building, Sacramento
January 10, 2018	Informational	Metis Technologies	Meeting	Cal/EPA Building, Sacramento
January 17, 2018	Informational	PG&E	Conference call	N/A
January 24, 2018	Technology/ Informational	Atlantic Dynamics	Meeting	Cal/EPA Building, Sacramento
February 14, 2018	Regulatory development	Public workshop (various attendees)	Workshop	Cal/EPA Building, Sacramento
March 23, 2018	Technology/ Informational	Dearman Engines	Meeting	Cal/EPA Building, Sacramento
March 27, 2018	Regulatory development	California Trucking Association, American Trucking Association, and Certified Freight Logistics	Meeting	Cal/EPA Building, Sacramento
May 8, 2018	Informational	Dearman Engines	Meeting	Cal/EPA Building, Sacramento
May 21, 2018	Informational	Advanced Energy Machines	Meeting	Cal/EPA Building, Sacramento

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
June 20, 2018	Informational/ Regulatory development	US Foods	Meeting and Site visit	Livermore
July 18, 2018	Regulatory development	California Trucking Association, American Trucking Association	Meeting	Cal/EPA Building, Sacramento
July 26, 2018	Regulatory development	Clean Future	Meeting	Cal/EPA Building, Sacramento
July 27, 2018	Regulatory development	Safeway/Albertsons	Conference call	N/A
July 30, 2018	Regulatory development	TK Services	Meeting	Cal/EPA Building, Sacramento
July 31, 2018	Regulatory development	Volta Air	Conference call	N/A
July 31, 2018	Regulatory development	South Coast Air Quality Management District	Conference call	N/A
July 31, 2018	Regulatory development	Carrier Transicold	Meeting	Cal/EPA Building, Sacramento
August 1, 2018	Regulatory development	CAPCOA	Conference call	N/A
August 2, 2018	Regulatory development	Advanced Energy Machines	Conference call	N/A
August 2, 2018	Regulatory development	SDAQMD	Conference call	N/A
August 6, 2018	Regulatory development	CEA Consulting	Conference call	N/A
August 8, 2018	Regulatory development	US Cold Storage	Conference call	N/A
August 9, 2018	Regulatory development	California Trucking Association	Meeting	Cal/EPA Building, Sacramento
August 9, 2018	Regulatory development	Trane; Ingersoll Rand; Thermo King	Conference call	N/A
August 15, 2018	Regulatory development	California Cotton Ginners & Growers Association	Conference call	N/A

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
August 15, 2018	Regulatory development	South Coast Air Quality Management District	Conference call	N/A
August 16, 2018	Informational	PG&E	Conference call	N/A
August 21, 2018	Regulatory development	Port of Oakland	Conference call	N/A
August 22, 2018	Regulatory development	Carrier Transicold	Meeting	Cal/EPA Building, Sacramento
August 23, 2018	Regulatory development	Port of Long Beach	Conference call	N/A
August 24, 2018	Regulatory development	CEA	Conference call	N/A
August 30, 2018	Regulatory development	Southern California Edison	Conference call	N/A
August 31, 2018	Regulatory development	CEA, Union Pacific, Burlington Northern Santa Fe	Conference call	N/A
September 18, 2018	Regulatory development	Port of Los Angeles/Long Beach	Conference call	N/A
September 21, 2018	Outreach	California Cleaner Freight Coalition	Meeting	Long Beach
October 11, 2018	Informational	CEA, Burlington Northern Santa Fe, South Coast Air Quality Management District	Site visit	San Bernardino
October 11, 2018	Informational	CEA, Union Pacific, South Coast Air Quality Management District	Site visit	Colton
October 12, 2018	Informational	CEA, Union Pacific, South Coast Air Quality Management District	Site visit	Commerce
October 12, 2018	Informational	CEA, Burlington Northern Santa Fe,	Site visit	Hobart

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
		South Coast Air Quality Management District		
November 8, 2018	Informational/Regulatory development	Port of Los Angeles/Long Beach, SSA Terminal	Meeting and Site visit	Long Beach
January 30, 2019	Regulatory development	Carrier Transicold	Meeting	Cal/EPA Building, Sacramento
March 7, 2019	Technology/ Informational	eNow; PG&E; Idle Air; C&S Wholesale Grocers	Meeting and Site visit	Stockton
March 11, 2019	Regulatory development	Nisei Farmers League	Conference call	N/A
March 13, 2019	Regulatory development	California Trucking Association	Meeting	Cal/EPA Building, Sacramento
May 7, 2019	Informational	NATSO Alternative Fuels Council	Conference call	N/A
June 5, 2019	Informational	TK Services	Site visit	San Diego
June 6, 2019	Regulatory development/Outreach	Sysco Foodservices	Conference call	N/A
June 7, 2019	Informational	Costco	Conference call	N/A
June 10, 2019	Regulatory development/Outreach	Sysco	Conference call	N/A
June 12, 2019	Regulatory development/Outreach	Walmart	Conference call	N/A
June 17, 2019	Regulatory development/Outreach	Global Cold Chain Alliance	Conference call	N/A
June 19, 2019	Regulatory development/Outreach	International Warehouse Logistics Association and Weber Logistics	Conference call	N/A
July 16, 2019	Regulatory development	Carrier Transicold	Conference call	N/A

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
July 18, 2019	Outreach	US Foods (Livermore CSW Facility)	Meeting and Site visit	Livermore
July 24, 2019	Regulatory development	SCAQMD	Conference call	N/A
July 25, 2019	Regulatory development/Outreach	Penske	Conference call	N/A
August 13, 2019	Regulatory development/Outreach	CA Electric Transportation Coalition; CA Municipal Utilities Association; Southern CA Public Power Authority; Northern CA Power Agency	Conference call	N/A
August 21, 2019	Regulatory development/Outreach	California Trucking Association, American Trucking Association	Meeting	Cal/EPA Building, Sacramento
August 28, 2019	Regulatory development	Public workshop (various attendees)	Workshop	Fontana
September 3, 2019	Regulatory development	Public workshop (various attendees)	Workshop	Fresno
September 11, 2019	Regulatory development	Public workshop (various attendees)	Workshop/Webcast	Cal/EPA Building, Sacramento
September 13, 2019	Regulatory development	Thermo King	Conference call	N/A
September 20, 2019	Regulatory development	eNow	Conference call	N/A
September 24, 2019	Regulatory development	ESL Power Systems	Conference call	N/A
September 25, 2019	Regulatory development	Albertsons	Conference call	N/A
October 8, 2019	Regulatory development/ Technology	EPRI	Conference call	N/A
October 9, 2019	Regulatory development	Port of Hueneme	Conference call	N/A

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
October 17, 2019	Informational	eNow	Conference call	N/A
October 22, 2019	Regulatory development	Carrier Transicold	Meeting	Cal/EPA Building, Sacramento
October 31, 2019	Regulatory development	Emissions inventory and HRA public workshop (various attendees)	Workshop/Webcast	Cal/EPA Building, Sacramento
October 31, 2019	Regulatory development	Thermo King	Meeting	Cal/EPA Building, Sacramento
November 7, 2019	Informational	SCAQMD	Conference call	N/A
December 10, 2019	Regulatory development	CalETC	Conference call	N/A
December 17, 2019	Regulatory development	Infrastructure work group meeting (various attendees)	Work group meeting	Depot Park Office, Sacramento
January 8, 2020	Regulatory development	CalETC and Utilities	Conference call	N/A
January 28, 2020	Informational	Union Pacific; BNSF; Foulweather Consulting; CEA Consulting	Conference call	N/A
January 29, 2020	Regulatory development	Carrier Transicold	Conference call	N/A
February 5, 2020	Regulatory development	PG&E and California Electric Transportation Coalition	Conference call	N/A
February 21, 2019	Outreach	California Cotton Ginners and Growers Association and Nisei Farmers League	Conference call	N/A
February 26, 2020	Regulatory development	Dole	Conference call	Cal/EPA Building, Sacramento
March 3, 2020	Outreach	San Joaquin Valley Air Pollution Control District	Meeting	Fresno

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
		Citizens Advisory Committee members		
March 3, 2020	Regulatory development/ Outreach	Nisei Farmers League	Meeting	Fresno
March 16, 2020	Regulatory development/Outreach	California Trucking Association	Conference call	N/A
March 19, 2020	Regulatory development	Public workshop (various attendees)	Workshop (Teleconference)	Cal/EPA Building, Sacramento
April 6, 2020	Regulatory development	Clean Future	Conference call	N/A
April 6, 2020	Informational	Odyne	Conference call	N/A
April 7, 2020	Regulatory development	Carrier Transicold	Conference call	N/A
April 16, 2020	Regulatory development	Southern California Edison	Conference call	N/A
April 21, 2020	Informational	Clean Cold Power	Conference call	N/A
April 23, 2020	Regulatory development	Pacific Merchant Shipping Association	Conference call	N/A
April 23, 2020	Informational	Boreas	Conference call	N/A
April 24, 2020	Regulatory development	Port of Los Angeles	Conference call	N/A
May 13, 2020	Informational	Roush Cleantech	Conference call	N/A
May 20, 2020	Regulatory development	Carrier Transicold	Conference call	N/A
June 2, 2020	Regulatory development	Pacific Merchant Shipping Association	Conference call	N/A
June 9, 2020	Outreach	California Labor Management Cooperation Committee, International Brotherhood of Electrical Workers	Conference call	N/A

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
June 12, 2020	Informational	California Cleaner Freight Coalition	Conference call	N/A
June 16, 2020	Regulatory development	CEA Consulting	Conference call	N/A
July 3, 2020	Outreach	eNow	Conference call	N/A
July 7, 2020	Outreach	Prime, Inc.	Conference call	N/A
July 10, 2020	Regulatory development	CEA Consulting, Foulweather Consulting	Conference call	N/A
July 28, 2020	Outreach	MaxGen	Conference call	N/A
July 29, 2020	Regulatory development	Enforcement work group meeting (various attendees)	Work group meeting (teleconference)	N/A
August 12, 2020	Regulatory development	Port of Los Angeles/Long Beach	Conference call	N/A
August 13, 2020	Regulatory development	Pacific Merchant Shipping Association	Conference call	N/A
August 17, 2020	Regulatory development	Foulweather Consulting	Conference call	N/A
August 20, 2020	Regulatory development	Pacific Merchant Shipping Association	Conference call	N/A
August 27, 2020	Outreach	Clean Cold Power	Conference call	N/A
September 1, 2020	Informational	LogiXpower	Conference call	N/A
September 18, 2020	Regulatory development	United States Navy	Conference call	N/A
October 6, 2020	Regulatory development	CalETC and Utilities	Conference call	N/A
October 14, 2020	Regulatory development	United States Navy	Conference call	N/A
October 15, 2020	Outreach	Port of San Diego	Conference call	N/A
October 27, 2020	Regulatory development	Pacific Merchant Shipping Association	Conference call	N/A
November 3, 2020	Outreach	Clean Cold Power	Conference call	N/A
November 9, 2020	Outreach	Wabash National	Conference call	N/A

Date	Purpose of Meeting	Primary Meeting Attendees	Type of Meeting	Location of Meeting
December 10, 2020	Outreach	Clean Cold Power	Conference call	N/A
January 8, 2021	Informational	California Cleaner Freight Coalition	Conference call	N/A
February 2, 2021	Regulatory development/Outreach	California Trucking Association	Conference call	N/A
March 10, 2021	Informational	Conmet	Conference Call	N/A
March 12, 2021	Informational	California Cleaner Freight Coalition	Conference call	N/A
April 19, 2021	Informational	Nidec	Conference Call	N/A
May 14, 2021	Regulatory development	Thermo King	Conference Call	N/A
May 19, 2021	Regulatory development	Carrier Transicold	Conference call	N/A
June 7, 2021	Informational	CEA Consulting, Foulweather Consulting	Conference call	N/A
June 8, 2021	Outreach	Community meeting (various attendees)	Community meeting (video conference)	N/A
June 10, 2021	Outreach	Community meeting (various attendees)	Community meeting (video conference)	N/A
June 10, 2021	Regulatory development	Thermo King	Conference Call	N/A
June 11, 2021	Informational	California Cleaner Freight Coalition	Conference call	N/A
June 18, 2021	Regulatory development	CEA Consulting, Foulweather Consulting	Conference call	N/A

Appendix F

Applicable Facility Determination Methodology

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Date of Release: July 27, 2021
Date of Hearing: September 23, 2021

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I. Summary and Background

California Air Resources Board (CARB) staff are proposing amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate (TRU ATCM; title 13, California Code of Regulations, section 2477), hereafter referred to as the "Proposed Amendments." CARB adopted the TRU ATCM in 2004 (amended in 2010 and 2011) to reduce diesel particulate matter (PM) emissions from diesel-powered TRUs and TRU generator sets (gen set), as well as near source health risk at facilities where TRUs operate.

Despite the progress made, the emission reductions achieved under the TRU ATCM are not sufficient to protect communities from near source pollution impacts, or to help meet the current health based ambient air quality standards across California or the State's climate goals. The Proposed Amendments are needed to achieve additional emission reductions by requiring diesel-powered truck TRUs to transition to zero-emission technology, newly-manufactured TRU engines in the remaining categories to meet a PM emission standard, and the use of lower global warming potential refrigerant. The Proposed Amendments also include requirements for applicable facilities to ensure that only compliant TRUs operate on their property.

This appendix summarizes the data sources, process, rationale, and assumptions used in the development of a facility inventory, as well as the methodology used to determine the applicable facilities subject to the Proposed Amendments.

II. Refrigerated Facility Inventory

To determine the number of facilities that would be subject to the Proposed Amendments, staff analyzed the statewide population and distribution of facilities where TRUs operate, as well as the amount of TRU activity that occurs at those facilities.

A. Refrigerated Facility Inventory Data Sources

CARB staff reviewed facility datasets from various sources, including CARB, other State departments, contracted businesses, and online refrigerated business sites. CARB staff identified seven data sources with information on approximately 80,000 facilities with potential TRU activity. To validate the data from each data source, CARB staff reviewed the facilities using Google Maps and Google Earth to determine facility characteristics, including facility type, building size, and number of dock doors (CARB, 2019c).

Table 1 shows the number of facilities obtained from each data source and the number reviewed by CARB staff as of February 2020. With the exception of the Dun & Bradstreet (D&B) data set, staff reviewed all of the facilities from each source. Due to the large number of facilities from the D&B data source, staff reviewed only a subset

of the data from that source. Staff expect to complete review of the remaining D&B facilities prior to implementation of the Proposed Amendments.

Table 1. Total Number of Refrigerated Facilities and Number of Facilities Reviewed by Source (as of February 2020)[1]

Data Source	Number of Refrigerated Facilities	Number of Facilities Reviewed by Staff
CARB Refrigerant Management Program	6,775	6,775
Air Resources Board Equipment Registration Program	2,250	2,250
Manta	275	275
California Department of Public Health	150	150
Caltrans Truck Stop Directory	200	200
Dun & Bradstreet (Motel, Hotel, and Fast Food)	38,500	100
Dun & Bradstreet (Refrigerated Facilities)	31,625	12,575
CARB Staff Manual Additions	25	25
Total	79,800	22,350

Each data source used to develop the refrigerated facility inventory for the Proposed Amendments is described below.

1. CARB Refrigerant Management Program

Staff included all facilities subject to CARB's Refrigerant Management Program (RMP), which requires registration and annual reporting of all stationary refrigeration facilities with more than 50 pounds of high global warming potential refrigerant.[2] Staff used the RMP data as the base dataset due to the completeness of reported data, frequency of reporting, and the high likelihood that it contained facilities with TRU operations (CARB, 2018b).

2. Air Resources Board Equipment Registration (ARBER)

Staff included all facilities in the Air Resources Board Equipment Registration (ARBER) program that submitted a TRU operator report. The current TRU ATCM requires operators of terminals where TRUs or TRU generator sets are garaged, maintained, operated, or dispatched from to submit an operator report. Operator reports are required to be updated within 30 days of any changes (CARB, 2011).

[1] Staff used the February 2020 facility estimates (see Table 5) to analyze the cost impacts of the Proposed Amendments.
[2] For reference, most residential houses use less than 50 pounds of refrigerant.

3. Manta

Staff included all of the facilities listed as a cold storage warehouse in California on the Manta website. Manta is a nationwide marketing business listing website that can be searched by business type and state. It is a marketing platform that provides service listings for a wide range of both small and large business types (Manta, 2020).

4. California Department of Public Health

Staff included cold storage facilities registered with the California Department of Public Health, which requires annual registration and updates for facilities that store refrigerated foods at temperatures less than 45° F. These facilities generally do not own any of the products stored, but provide care, custody, and control of other company's products (CDPH, 2018).

5. Caltrans Truck Stop Directory

Staff included truck stops listed on the Caltrans Truck Stop Directory (Caltrans, 2020).

6. Dun & Bradstreet

D&B Corporation is a company that provides a wide range of business data for private companies, government agencies, and other industries. The database contains more than 300 million business records. Staff obtained information for all California businesses with refrigerated operations based on their North American Industry Classification System (NAICS) codes. Table 2 lists the NAICS codes staff used to identify facilities with potential TRU activity (Dun & Bradstreet, 2018).

Table 2. NAICS Codes for Refrigerated Transport

CARB Category	NAICS Code	NAICS Title
Food manufacturing	311411	Frozen fruit, juice, and vegetable manufacturing
	311412	Frozen specialty food
	311511	Fluid milk manufacturing
	311512	Creamery butter manufacturing
	311513	Cheese manufacturing
	311520	Ice cream and frozen desert manufacturing
	311611	Animal (except poultry) slaughtering
	311612	Meat processed from carcasses
	311615	Poultry processing
	311712	Fresh and frozen seafood processing
	311813	Frozen cakes, pies, and other pastries manufacturing
	311991	Perishable prepared food manufacturing
	312113	Ice manufacturing
	312120	Breweries

CARB Category	NAICS Code	NAICS Title
Grocery distribution	424210	Drugs and druggist sundries merchant wholesalers
	424410	General line grocery merchant wholesalers
	424420	Packaged frozen food merchant wholesalers
	424430	Dairy product (except dried or canned) merchant wholesalers
	424440	Poultry and poultry product merchant wholesalers
	424450	Confectionery merchant wholesaler
	424460	Fish and seafood merchant wholesalers
	424470	Meat and meat product merchant wholesalers
	424810	Beer and ale merchant wholesalers
Produce distribution	424480	Fresh fruit and vegetable merchant wholesalers
	424930	Flower, nursery stock, and florists' supply merchant wholesalers
Produce packing houses	115114	Fruit and vegetable grading, sorting, and packaging, fruit and vegetable pre-cooling
Grocery stores/markets	445110	Supermarkets and other grocery (except convenience) stores
	445210	Meat markets
	445220	Fish and seafood markets
	445230	Fruit and vegetable markets
	445292	Confectionery and nut stores
	452311	Warehouse Clubs and Supercenters
Grocery stores/markets	446110	Pharmacies and drug stores
Retail foodservices	488119	Other airport operations
	722212	Cafeterias
	722310	Food service contractors
	722330	Mobile food services
	922140	Correctional institutions
Fleet terminals	482111	Line-haul railroads
	482112	Short line railroads
	484220	Specialized freight (except used goods), local
	484230	Specialized freight (except used goods), long distance
Seaport terminals	488320	Marine cargo handling
Cold storage warehouses	493120	Refrigerated warehousing and storage
Other	325411	Medicinal and botanical manufacturing

CARB Category	NAICS Code	NAICS Title
	325412	Pharmaceutical preparation manufacturing
	325414	Biological product (except diagnostics) manufacturing
	722513	Limited service restaurants (fast food)
	325992	Photographic film, paper, plate, and chemical manufacturing
	336414	Guided missile and space vehicle manufacturing
	721110	Hotels and motels (except casino hotels)

7. CARB Staff Manual Additions

CARB staff added 25 facilities to the refrigerated facility inventory that were not included in the seven data sources. These facilities were discovered through communication with electric utilities and manual inspection of satellite imagery.

B. Refrigerated Facility Inventory Methodology

CARB staff performed the following steps to identify the number of unique facilities in the refrigerated facility inventory.

1. Identify datasets. Staff identified seven data sets with information (name, location, type) on facilities where TRU activity occurs.
2. Combine into one dataset. Staff combined the individual data sets into one dataset for ease of processing.
3. Normalize data. The various data sources did not contain the same fields and information was not formatted consistently. Staff normalized the data to organize the data in a single master dataset.
4. Standardize addresses and remove duplicates. Staff standardized facility addresses using the United States Postal Service (USPS) website and removed duplicate facility address records.
5. Divide the master dataset into smaller datasets. Staff split the master dataset into smaller datasets (subsets) based on NAICS code for business type: refrigerated WHDCs, grocery stores, seaport facilities and intermodal railyards, truck stops, fast food restaurants, motels and hotels, convenience stores, pharmacies, and other facilities.
6. Analyze subsets. Staff reviewed the subsets using Google Maps and Google Earth to determine facility characteristics, including facility type, building size, and number of dock doors.

III. Refrigerated Facility Types

Staff analyzed refrigerated WHDCs, grocery stores, seaport facilities, intermodal railyards, truck stops, fast food restaurants, motels, hotels, convenience stores, pharmacies, and other facility types with TRU activity. A description of each of the facility types analyzed and their operational characteristics is provided below.

A. Refrigerated Warehouses or Distribution Centers

Refrigerated WHDCs include a wide variety of facility types and are generally located in industrial areas. These facilities include, but are not limited to, refrigerated warehouses, distribution centers, cold storage warehouses, packing houses, and trans-loading facilities where a load is transferred from one mode of transportation to another. Refrigerated WHDC operations can include a variety of activities from the storage of food products to secondary services such as processing, preparing, or packaging. These facilities typically accommodate the loading and unloading of trucks and trailers with dock doors at or above grade level. Refrigerated WHDCs generally have more trailer TRU than truck TRU activity.

Staff identified two subcategories of refrigerated WHDCs based on size: 1) standard refrigerated WHDCs with a building size less than 199,999 square feet and 2) high-cube refrigerated WHDCs with a building size greater than or equal to 200,000 square feet. High-cube refrigerated WHDCs are usually associated with a higher level of activity, throughput, and automation with a minimum ceiling height of 24 feet (Jaller, 2017).

Based on warehousing vehicle trip studies, facility sizes generally correlate with a facility's heavy-duty truck trip rate and therefore the number of TRU loads (ITE, 2016). Trailer TRUs spend an average of 3.3 hours stationary per load at a refrigerated WHDC facility. Stationary operation can include any combination of loading, unloading, staging, or waiting to be dispatched (CARB, 2011) (CARB, 2018a).

The amount of daily TRU activity varies at refrigerated WHDCs. These facilities are usually gated or fenced, and closely monitor truck traffic entering and exiting the facility. Figure 1 shows an example of a high-cube refrigerated WHDC with multiple TRU equipped trailers being loaded or unloaded at the facility dock doors.

Figure 1. Refrigerated High-Cube Warehouse or Distribution Center

B. Grocery Stores

Grocery stores are generally located in commercial shopping centers near residential areas and sell food and other household merchandise directly to the public. Grocery stores carry refrigerated and frozen foods, meats, dairy, poultry, fresh fruits, vegetables, and other temperature sensitive products. These facilities typically accommodate the loading and unloading of trucks and trailers with at least one dock door or grade level door at the rear or side of the building, or through the front door when parking or building space is limited (CARB, 2019c).

Staff identified two subcategories of grocery stores based on size: 1) standard grocery stores (e.g., Ralphs and Safeway) with a building size less than 89,999 square feet and 2) supercenters (e.g., Walmart and Costco) with a building size greater than or equal to 90,000 square feet.

Grocery stores receive deliveries from both truck TRUs and trailer TRUs. Trailer TRU deliveries are regularly scheduled by the store and typically range from 2 to 4 trailer TRUs per day (CARB, 2019c). Trailer TRUs spend an average of 1.7 hours per delivery at the store and deliver 6 days per week (McCormack et al., 2010). In addition, approximately 17 percent of grocery stores report using trailer TRUs for additional cold storage during peak or holiday seasons and generally park them near the dock doors or parking lot (CARB, 2016).

The amount of daily TRU activity varies at grocery stores. Due to their close proximity to residential areas, emissions and health risk associated with TRU operations are significant from a health risk perspective (CARB 2019b). Figure 2 shows an example of

TRU equipped trailers at a supercenter docking area and a seasonal cold storage trailer unit (left trailer).

Figure 2. Grocery Store Dock and Seasonal Cold Storage Trailer TRU

C. Seaport Facilities

Seaport facilities are a component in the transportation of refrigerated cargo, typically within refrigerated intermodal international shipping containers or trailers. For staff's analysis, refrigerated WHDCs located on seaport property were included in the refrigerated WHDC category. Refrigerated ocean-going intermodal containers are usually 20 or 40 feet long and can be transported by ship, rail, or heavy-duty truck. Refrigerated international shipping containers have electrically driven refrigeration systems with plug-in capability and utilize ship power when on the ship (plugged into ship electric grid) or landside shore power at the docks (plugged into port electrical outlets). When electrical outlets are not available (e.g., traveling to an overland destination), TRUs draw power from diesel powered TRU generator sets that attach to the container or container chassis.

Approximately 3 percent of seaport cargo is refrigerated at the Port of Oakland and 4 percent at the San Pedro Bay Ports (POAK, 2018) (SPBP, 2020). However, based on

conversations with seaport staff, these percentages vary depending on the specific port and seasonal increases for agricultural products or other perishable goods. Seaports are generally located in industrial areas, nearby residential communities, are gated or fenced, and closely monitor truck traffic entering and exiting the facility.

Figure 3 shows a container with a diesel-powered pin-on generator set that provides electrical power to the TRU when it is not plugged into shore power. TRU generator sets are typically used when containers need to be transported long distances or wait for a time before being off-loaded or delivered to the next destination (e.g., warehouse or intermodal railyard). Some refrigerated marine containers do not require generator sets when the destination is close by and can be offloaded quickly (e.g., warehouses located near the seaport).

Figure 3. Refrigerated Container Equipped with a Generator Set

An example of a seaport facility is shown in Figure 4.

Figure 4. Seaport Facility

D. Intermodal Railyards

Intermodal railyards are another component in the transportation of refrigerated freight. These facilities have distinct areas for incoming and outgoing cargo, cargo staging, loading and unloading of trains, maintenance, and other activities.

Intermodal railyards primarily attract international refrigerated shipping containers with TRU generator sets, domestic shipping containers, and trailer TRUs. As described in the seaport facility discussion, international shipping containers have electrically-driven refrigeration units that can be powered by ship electrical power, seaport shore power, or a diesel-powered generator set. Domestic shipping containers and trailers differ from international shipping containers in that they have an extended length of 53 feet and are equipped with an integral TRU. Domestic shipping containers can be double stacked on a single flatbed railcar. Containers and trailers are transported to and from intermodal railyards by heavy-duty trucks or by connecting trains.

According to an industry source, the fraction of cargo handled at California intermodal railyards that is refrigerated ranges from less than 1 percent to 9 percent, depending on the railyard and seasonal increases for agricultural or other perishable products. Container and trailer TRUs spend an average of 24 hours at an intermodal railyard. Intermodal railyards are associated with elevated near-source health risk and are often located within or near California's disadvantaged communities. These facilities are often gated or fenced, and closely monitor truck traffic entering and exiting the facility. An example of an intermodal railyard with intermodal containers is shown in Figure 5.

Figure 5. Intermodal Railyard

E. Truck Stops

Truck stops are used by drivers transporting freight long distances and provide general services for both the driver and the truck. They generally operate 24 hours a day, 7 days a week to accommodate the variety of schedules and needs of truck drivers. Truck stop services vary depending on the ownership, location, and size of the truck stop. Basic services include restaurants, truck refueling and maintenance, and large parking areas that truck drivers may use for sleeping. Truck stops provide a rest area that accommodates larger trucks and their trailers, allowing drivers to comply with federal rest requirements. Truck stops are not directly part of the freight chain given that truck drivers visit them voluntarily.

Truck stops vary in size and the types of driver or truck services they provide. They range from less than 1 acre with no parking spaces to over 23 acres with over 540 parking spaces and accommodate a wide variety of heavy-duty truck types (CARB, 2019c). Depending on the driver's needs, the length of time the trailer TRU remains stationary will vary from a short refueling stop up to the 10 hours needed to meet mandatory rest requirements (FMCSA, 2016). These facilities are generally located in mixed commercial or industrial areas near major highways and provide easy access for truck drivers traveling major freight corridors. Figure 6 shows an example of trucks parked and refueling at a truck stop.

Figure 6. Truck Stop

F. Fast Food Restaurants

Fast food restaurants prepare food and drinks for on site or takeaway consumption. These facilities generally do not have dock doors, and receive deliveries through a grade-level door at the rear of the building or through the customer entrance. These deliveries are generally smaller than deliveries at other facility types and are completed in 30 minutes or less three days per week (Anderson, personal communication, January 2019).

Staff estimated that over 30,400 fast food facilities operate statewide, with an average facility size of approximately 3,400 square feet (CARB, 2019c). They are generally located within densely populated commercial and residential areas and often in clusters (multiple locations within a mile of each other).

Due to infrequent and short deliveries, fast food facilities and other restaurants typically have lower TRU activity compared to other facility types. Restaurants other than typical fast food types were assumed to have similar operational characteristics. Staff did not analyze an additional restaurant category based on similarities to fast food. Also, data was not available to suggest that the amount of stationary TRU activity that occurs at other restaurant types is different than fast food restaurants.

Figure 7 shows an example of a fast food restaurant accepting a delivery from a TRU equipped trailer through a customer entrance.

Figure 7. Fast Food Restaurant

G. Motels and Hotels

Motels and hotels provide short-term lodging accommodations for travelers, including truck drivers transporting TRU equipped trailers or containers. While staff assumed most truck drivers rest at truck stops or other locations in the sleeper cab of their trucks to minimize cost, some truck drivers do utilize motels and hotels.

Based on staff's analysis, motels and hotels are generally located along highways and range in size and room capacity with an average building size of 33,300 square feet (CARB, 2019c). Motels and hotels are usually visible from nearby highways or major thoroughfares for ease of access.

Depending on the length of the driver's stay, TRUs can be stationary at a motel or hotel for up to 10 hours needed to meet mandatory rest requirements (FMCSA, 2016). However, staff assumed that both motels and hotels typically have minimal overnight truck visits with TRU activity. Like fast food restaurants, these facilities have lower TRU activity compared to other facility types. An example of a roadside motel is shown in Figure 8.

Figure 8. Motel

H. Convenience Stores

Convenience stores are generally located in residential or mixed commercial areas. They are open for extended hours and sell a limited selection of household goods and groceries. They carry a small selection of refrigerated goods, such as drinks and produce. Convenience stores typically do not have dock doors and receive deliveries through a rear or side grade level door or through the customer entrance. Convenience stores generally have lower TRU activity compared to other facility types since they have smaller deliveries and shorter unloading times. Figure 9 shows an example of a convenience store.

Figure 9. Convenience Store

I. Pharmacies

Pharmacies are generally located in residential or mixed commercial areas. They primarily engage in the retail of prescription and non-prescription medicines. Pharmacies range in size and are often operated within larger grocery stores or supercenters. In addition, pharmacies also carry general merchandise such as cosmetics, toiletries, tobacco, and novelty merchandise. Cargo is typically unloaded through a single dock door, at or above grade-level. Staff assumed that refrigerated deliveries are infrequent or done by smaller truck TRUs at pharmacies due to the generally smaller volumes of refrigerated goods. Staff were not able to identify data or research in this category, but assumed lower TRU activity due to size and throughput of refrigerated goods. Pharmacies have limited refrigerated space and, as a result, lower TRU activity compared to other facility types. Figure 10 below shows a dedicated pharmacy facility located within a strip mall.

Figure 10. Pharmacy

J. Other Facility Types

Other facility types staff identified in the refrigerated facility inventory include hospitals, prisons, floral stores, cosmetics stores, and facilities where TRUs visit but did not fall into the above categories. Staff were unable to find data specific to these other types of facilities due to the diverse range of activities. Staff assumed that refrigerated deliveries at these facility types were infrequent and on average have shorter delivery times compared to refrigerated WHDCs and grocery stores.

IV. Applicable Facility Determination

A. Included Facility Types

Based on their TRU activity, the Proposed Amendments include refrigerated WHDCs, grocery stores, seaport facilities, and intermodal railyards. These facility types have the highest estimated contribution of statewide diesel PM emissions from TRUs and typically attract trailer TRUs that congregate and operate while stationary, which contributes to localized health risk. In addition, these facilities are generally gated or fenced (except grocery stores), and closely monitor truck traffic entering, exiting, or operating at the facility. Staff determined it would be feasible for these facility types to comply with the Proposed Amendments, which will require them to monitor TRU compliance.

B. Excluded Facility Types

The Proposed Amendments do not include truck stops as an applicable facility type. Truck stops are an optional destination for truck drivers, are not gated or fenced, and do not monitor truck traffic entering and exiting the facility. They have parking areas for overnight use, but it may be difficult for these facilities to ensure TRU compliance without unintentionally deterring drivers to park in nearby streets, neighborhoods, or disadvantaged communities.

Fast food restaurants, motels, hotels, convenience stores, pharmacies, and other facility types are also not included as applicable facility types based on their TRU activity. These facilities have less TRU activity with infrequent or short visits compared to the included facility types.

C. Applicable Facility Size Threshold Determination

To determine the building size thresholds, staff analyzed the operational characteristics (e.g., truck trips, load times, and location) for each included applicable facility type, as well as the variability of activity (e.g., size and type of facility) within each category. Staff quantified TRU emissions associated with each applicable facility type at a proposed threshold to determine the appropriateness of that size threshold. Staff also considered the general proximity to nearby communities (e.g., seaport facilities and intermodal railyards). The following describes the approach staff used to determine facility size thresholds for refrigerated WHDCs, grocery stores, seaport facilities, and intermodal railyards.

1. Refrigerated Warehouses or Distribution Centers

Refrigerated WHDCs primarily attract trailer TRUs, with a small percentage of domestic shipping containers and TRU generator sets. Staff estimated TRU activity using truck trip and building square footage metrics. Staff assumed that building square footage correlates with the number of heavy-duty truck trips per day and therefore the estimated number of refrigerated loads. TRUs spend an average of 3.3 hours stationary per load at refrigerated WHDCs, which could include any combination of loading, unloading, staging, or waiting to dispatch (CARB, 2011) (CARB, 2018a).

Using emission and health risk estimates, which are based on estimated TRU activity relative to the facility size, staff are proposing a facility size threshold for refrigerated WHDCs at 20,000 square feet or greater (CARB, 2019b). Staff analysis indicated that a small percentage of trailer TRUs visit smaller facilities, while greater TRU stationary activity occurs at larger WHDCs.

Staff used the equation below and the metrics provided in Table 3 to estimate statewide stationary trailer TRU emissions at refrigerated WHDCs.

$$Statewide\ Refrigerated\ WHDC\ TRU\ PM2.5\ Emissions\ (tpy)$$

$$= Total\ Building\ Square\ Footage\ \times \frac{Number\ of\ Truck\ Trips}{1{,}000\ Square\ Feet} \times \frac{Number\ of\ Loads}{Truck\ Trip\ Rate\ Final} \times \frac{TRU\ hours}{Load} \times \frac{Operating\ Days}{Year} \times TRU\ Emission\ Factor \times 62.5\%\ Engine\ Cycle\ \times \frac{Tons}{Gram}$$

Table 3. Refrigerated Warehouse or Distribution Center Metrics

Parameter	Description	Metric	Source/Reference/Notes
Total statewide building square footage	The total square footage of refrigerated WHDC facilities statewide	Sq. ft.	Building size. (CARB, 2019c).
Standard Refrigerated WHDC Truck-trip rate for facilities < 200k sq. ft.	TT rate is every time the truck crosses facility boundary	0.233 TT per 1,000 sq. ft.	SCAQMD/ITE Warehouse Vehicle Trip Generation Analysis 2016. (ITE, 2016)
High-Cube Refrigerated WHDC Truck-trip rate for facilities >200k sq. ft.	TT rate is every time the truck crosses facility boundary	0.749 TT per 1,000 sq. ft.	SCAQMD/ITE Warehouse Vehicle Trip Generation Analysis 2016. (ITE, 2016)
Loads per truck trip (TT) rate final	It takes two truck trips for a single load as TT is defined as every time the truck crosses facility boundary	1 TRU load per 2TT	SCAQMD/ITE Warehouse Vehicle Trip Generation Analysis 2016. (ITE, 2016)
Average time to load/unload and or stage, wait or dispatch	Average hours the TRU is at facility	3.3 hours per load	Ammendments for the Toxic Control Measure or In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate (CARB, 2011) Cold Storage Food/Distribution Questionnaire. (CARB, 2018a)

Parameter	Description	Metric	Source/Reference/Notes
Facility operating days	6 days per week, 52 weeks per year	312 days per year	Staff assessment. Facilities generally operate 5-7 days per week. Staff used 6 days per week as an average.
CA trailer TRU PM 2.5 emission factor	Weighted trailer TRU emission factor by population and year	2.08 grams per operating hour	2019 Emissions Inventory Update. (CARB, 2019a)
TRU diesel engine cycling percentage	Amount of time diesel engine is running when TRU is on	62.5%	2019 Emissions Inventory Update. (CARB, 2019a)
Gram to Ton Conversion	Conversion rate	0.0000011 tons per gram	Conversion rate.

2. Grocery Stores

Staff estimated trailer TRU activity at grocery stores using an average load per day metric. Trailer TRU deliveries typically range from 2 to 4 refrigerated trailer TRUs per day based on recent environmental planning document review (e.g., CEQA) and the average number of dock doors at grocery stores (CARB, 2019c). These TRUs spend an average of 1.7 hours per delivery and deliver on average 6 days per week (McCormack et al., 2010). Approximately 17 percent of grocery stores utilize stationary trailer TRUs for additional cold storage during busy seasons for an average of 89 days per year per facility (CARB, 2016). Unlike delivery trailers, cold storage trailers operate while stationary for weeks or months at a time.

Using the emission and health risk estimates, with consideration of the close proximity of these facilities to residential communities, and use of seasonal TRU units for additional cold storage, staff are proposing a facility size threshold for grocery stores at 15,000 square feet or greater.

Staff used the equations below and the metrics provided in Table 4 to estimate statewide stationary trailer TRU emissions at grocery stores.

$$Statewide\ Grocery\ Store\ TRU\ PM2.5\ Emissions\ (tpy) = Grocery\ Store\ Emissions\ + Seasonal\ Cold\ Storage\ Emissions$$

$$Where: Grocery\ Store\ Emissions = Number\ of\ Facilities\ \times (TRU\ Loads)/Day \times Hours/Load \times (Operating\ Days)/Year \times Trailer\ TRU\ Emission\ Factor \times 62.5\%\ Engine\ Cycle \times Ton/Gram$$

$$Seasonal\ Cold\ Storage\ Emissions = Number\ of\ Facilities \times \%\ of\ Facilities\ with\ Seasonal\ Cold\ Storage \times OperatingHours/year \times Trailer\ TRU\ Emission\ Factor \times 62.5\%\ Engine\ Cycle \times Ton/Gram$$

Table 4. Grocery Store Metrics

Parameter	Description	Metric	Source/Reference/Notes
Standard grocery trailer TRUs per day	Number of trailer TRUs at grocery stores <90K sq. ft.	2 trailers per day	(McCormack et al., 2010). Staff analysis based on averages and CEQA document reviews.
Supercenter trailer TRUs per day	Number of trailer TRUs at grocery stores >90K sq. ft.	4 trailers per day	(McCormack et al., 2010). Staff analysis based on averages and CEQA document reviews.
Hours per load	Average load time of a refrigerated trailer at grocery store	1.68 hours per load	(McCormack et al., 2010).
Facility operating days	6 days per week	6 days per week	(McCormack et al., 2010).
CA trailer TRU PM 2.5 emission factor	Weighted trailer TRU emission factor by population and year	2.08 grams per operating hour	2019 Emissions Inventory Update. (CARB, 2019a)
TRU diesel engine cycling percentage	Amount of time diesel engine is running when TRU is on	62.5%	2019 Emissions Inventory Update. (CARB, 2019a)
Gram to Ton Conversion	Conversion rate	0.0000011 tons per gram	Conversion rate.

Parameter	Description	Metric	Source/Reference/Notes
% of grocery stores with seasonal cold storage	Percentage of grocery stores that report using a trailer TRU for seasonal cold storage	17%	TRU Grocery Store Survey (CARB, 2016).
Operating Hours of trailer TRUs used for seasonal cold storage	89 days per year, 24 hours per day	2,136 hours per year	TRU Grocery Store Survey (CARB, 2016).

3. Seaport Facilities

Seaport facilities primarily attract international refrigerated shipping containers that use electric power while at the port and are generally equipped with a TRU generator set for over the road transport. On average, approximately 3 to 4 percent of port cargo is refrigerated, with seasonal increases for agricultural products or other perishable goods.

Staff are proposing to include all seaport facilities (no building size threshold) since activity is not based on facility size and TRUs operate for longer periods of time at these facility types compared to refrigerated WHDCs and grocery stores. In addition, many of California's seaport facilities are located within or near California's disadvantaged communities.

4. Intermodal Railyards

Intermodal railyards primarily attract trailer TRUs, domestic shipping containers, and international refrigerated shipping containers with generator sets. On average, the fraction of cargo handled at California intermodal railyards that is refrigerated ranges from less than 1 percent to 9 percent, depending on the railyard and seasonal increases for agricultural products or other perishable goods according to industry (CARB, 2020). Container and trailer TRUs spend an average of 24 hours at an intermodal railyard.

Staff are proposing to include all intermodal railyards (no building size threshold) since activity is not based on facility size and TRUs operate for longer periods of time at these facility types compared to refrigerated WHDCs and grocery stores. In addition, many of California's railyards are located within or near California's disadvantaged communities.

D. Estimated Applicable Facility Population

Staff estimated the statewide number of applicable facilities by determining the number of facilities above the proposed size threshold for each facility type in the

refrigerated facility inventory. Table 5 shows the applicable facility type, size threshold, and estimated statewide population of facilities subject to the Proposed Amendments.

Table 5. Estimated Statewide Applicable Facility Population in 2020

Facility Type	Population
Refrigerated WHDC (Building size greater than or equal to 20,000 square feet)	2,167
Grocery Store (Building size greater than or equal to 15,000 square feet)	3,918
Seaport Facility (No size threshold)	25
Intermodal Railyard (No size threshold)	9
Total	6,119

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Appendix G

Fee Development

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Date of Release: July 27, 2021
Date of Hearing: September 23, 2021

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This appendix describes California Air Resources Board (CARB or Board) staff's consideration of Senate Bill (SB) 854 criteria for adopting a schedule of fees and methodology for determining the fee amounts included in the proposed amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled TRUs, TRU Generator Sets, and Facilities Where TRUs Operate (TRU ATCM; title 13, California Code of Regulations, section 2477), hereafter referred to as the "Proposed Amendments."

CARB has historically used existing funds (primarily the Motor Vehicle Account) to implement and enforce the TRU ATCM. On June 27, 2018, California passed SB 854 (Committee on Budget and Fiscal Review, Chapter 51, Statutes of 2018).[1] SB 854 allows CARB to adopt a schedule of fees to cover all or part of CARB's reasonable costs associated with certification, audit, and compliance of off-road or non-vehicular engines and equipment, aftermarket parts, and emission control components sold in the State (limited to activities covered by Health & Saf. Code sections 38560, 43013 and 43018, on-road aftermarket parts under Vehicle Code section 27156(h)). As such, this legislation provides CARB the authority to assess fees to cover its reasonable costs, with specific considerations, on off-road and other mobile source certification and compliance programs not currently covered under the fee regulation authority in Health & Saf. Code section 43019. This new authority is housed in Health & Saf. Code section 43019.1. CARB will deposit fees collected into the Certification and Compliance Fund as required under Health & Saf. Code section 43019, used to support mobile source certification and compliance activities. The Proposed Amendments include TRU operating fees and applicable facility registration fees. The proposed fees cover CARB's reasonable costs associated with the certification, audit, and compliance of TRUs, as allowed by SB 854.

A. Consideration of Senate Bill 854 Criteria

To develop the fees for the Proposed Amendments, staff considered the criteria outlined in SB 854 described below.

1. Potential Impacts on Manufacturers that may Result from the Fee

The Proposed Amendments would impose fees on TRU and applicable facility owners. Staff do not anticipate significant impacts on TRU or applicable facility owners because the proposed fee amounts are relatively small compared to the total cost of the Proposed Amendments. In addition, the average annual fee amount for a TRU or applicable facility owner is less than one percent of their annual revenue. More

[1] California Health and Safety Code § 43019.1, Division 26, Senate Bill No. 854, July 27, 2018. (web link: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180SB854

information on the cost to typical and small businesses to comply with the Proposed Amendments is provided in Chapter X of the ISOR.

Manufacturers would not be subject to fees. As such, staff do not anticipate impacts on manufacturers, product pricing, or product availability as a result of the proposed fees.

2. **Size of Manufacturer**

There are two major TRU manufacturers in the market today, and several smaller ones. The proposed fees are not linked to size of the manufacturer. CARB staff does not anticipate a change in how businesses subject to the fee purchase TRUs, nor does CARB staff anticipate a shift in favor of or away from larger TRU manufacturers on the basis of the proposed fees.

In general, smaller businesses own fewer TRUs or applicable facilities. Because the proposed fees are assessed per TRU or applicable facility, businesses with fewer TRUs or applicable facilities would be subject to lower fees than businesses with a greater number of TRUs or facilities.

3. **Number of Certifications Requested and Consistency with Prior Year Certifications by the Manufacturer/Anticipated Change in the Number of Certifications Issued Annually**

Fees would be assessed for each TRU reported and applicable facility registered with CARB. CARB staff calculated the fee amounts based on TRU populations from the statewide TRU inventory (Appendix H to the ISOR) and applicable facility populations from the Applicable Facility Inventory (Appendix F to the ISOR). Both inventories account for an annual 1.6 percent growth rate. Staff also applied an approximate 13 percent non-compliance rate, which is based on the average of non-reporting assumed in the statewide TRU inventory (3.75 percent) and the percentage of citations issued by CARB's Enforcement Division for non-reporting violations in 2019 (21 percent).[2]

4. **Complexity of the Regulated Category**

Staff determined that compliance monitoring and enforcement activities related to zero-emission TRUs would be less resource intensive than existing monitoring and enforcement and therefore would have a lower TRU operating fee.

[2] California Air Resources Board, 2019 Annual Enforcement Report, June 2020. (web link: https://ww2.arb.ca.gov/sites/default/files/2020-06/2019_Annual_Enforcement_Report.pdf)

5. A Product's Potential Impact on Emissions

Zero-emission TRUs are subject to a lower TRU operating fee compared to a diesel-powered TRU.

6. Potential Impacts for Enacting a Partial Fee that does not Fully Cover the State Board's Costs

The Proposed Amendments include TRU operating fees and applicable facility registration fees to fully cover CARB's reasonable costs associated with certification, audit, and compliance of TRUs. However, the proposed fee amounts are based on estimated populations and compliance rates. Actual collected fee revenue may not fully cover TRU program costs. CARB has previously relied on existing funding from sources other than TRU and applicable facility owners and it is expected to continue to do so to some degree. Staff expects minimal or no impact on the processing time for TRU reporting or applicable facility registrations because of this funding structure.

B. Determination of Fee Amounts

To develop the fees for the Proposed Amendments, CARB staff determined the reasonable costs for the certification, audit, and compliance of TRUs. Costs include labor and operations. Below is a description of both cost categories.

1. Labor Costs

Labor costs include both the direct labor to implement TRU program activities (Direct Labor) and overhead costs that include administrative management, legal, and information technology costs to run the agency (Indirect Labor).

a. Direct Labor

The Direct Labor cost includes existing staff in the Transportation and Toxics Division and Enforcement Division, as well as new positions that CARB expects to secure in a budget change proposal. The need for additional staff is due to new requirements in the Proposed Amendments for out-of-state-based TRU reporting, TRU operating fees, applicable facility registration, applicable facility registration fees, and applicable facility reporting. New staff will assist owners with TRU reporting and applicable facility registration; provide technical assistance; issue compliance labels; conduct unit, fleet, and facility inspections; conduct fleet and facility investigations; and issue and process citations. Direct Labor costs include each staff and first level manager that would directly work on TRU program activities. Second level managers or above were not included in the calculation.

The percent time spent on TRU program activities is based on time estimates provided by current TRU program staff. The percent time was summed into a person year (PY) activity level for each classification. Each staff PY time was multiplied by the 2021 Fiscal Year Labor Budget class cost, which is a mid-range salary for each classification and includes benefits, operating expense, and equipment. Fiscal Year Labor Budget class cost is calculated annually through an administrative process which annualizes the California Department of Human Resources monthly salary by position class, adds an average of 53 percent of the salary cost for benefits, and adds an average of 20 percent of the salary cost for operating expenses and equipment for each class. Each class has its own benefit and operating expenses and equipment determination.

Table 1 and Table 2 show the annual Direct Labor cost for existing and new TRU program staff, respectively. The Direct Labor cost does not reflect the roughly 9.23 percent cut to labor costs across most State bargaining units as a result of negotiations in response to the current economic condition and anticipated impact on the State budget. Most of the agreements are temporary and are anticipated to have minimal impact during the effective dates of the Proposed Amendments.

Table 1. Annual TRU Program Direct Labor Cost – Existing Staff

Classification	PY Time Estimate	2021/2022 FY Cost	Annual Direct Labor Cost
Air Pollution Specialist	0.75	$195,000	$146,250
Air Resources Engineer	0.5	$206,000	$103,000
Air Resources Supervisor I	0.25	$238,000	$59,500
Staff Air Pollution Specialist	0.25	$220,000	$55,000
Total	1.75	n/a	$363,750

Table 2. Annual TRU Program Direct Labor Cost – New Staff

Classification	PY Time Estimate	2021/2022 FY Cost	Annual Direct Labor Cost
Air Resources Supervisor I	1.0	$238,000	$238,000
Staff Services Manager I	1.0	$156,000	$156,000
Air Pollution Specialist	4.0	$195,000	$780,000
Air Resources Technician II	16.0	$101,000	$1,616,000
Total	22.0	n/a	$2,790,000

b. Indirect Labor

Indirect Labor includes the management, administrative, legal, and information technology costs to run the agency. The Indirect Labor percentage was calculated directly for the agency using Division, Executive Office, and Chair Office management, Administrative Services Division, Legal Office, and information technology services staffing divided by the total agency labor force. The Indirect Labor percentage was

calculated as 26 percent of the Direct Labor cost for CARB. Indirect labor costs tend to be spread evenly across the agency.

c. Total Labor Cost

Table 3 shows the total annual labor cost for the TRU program.

Table 3. Total Annual TRU Program Labor Cost

Annual Direct Labor Cost	Annual Indirect Labor Cost	Total Annual Labor Cost
$3,153,750	$819,975	$3,973,725

2. Operational Costs

Operational Costs are the direct costs to conduct program activity. As shown in Table 4, this includes compliance labels, envelopes, and postage.

Table 4. TRU Program Operational Costs

Item	Quantity Purchased Per Year	Estimated Cost Per Item	Operational Cost
Compliance Label (two per TRU)	161,488	$2.50	$403,721
Envelope	80,744	$0.07	$5,652
Postage	80,744	$0.62	$50,061
Total	n/a	n/a	$459,435

3. Fee Calculation

CARB staff calculated the fee amounts based on TRU populations from the statewide TRU inventory (Appendix H to the ISOR) and applicable facility populations from the Applicable Facility Inventory (Appendix F to the ISOR). Based on the TRU and applicable facility populations, staff determined the average annual number of TRUs and applicable facilities that would be required to pay fees over a ten-year period beginning in 2023 if the fees were collected every three years. The ten-year period was used to reflect the average useful life of a TRU.

To determine the fee amounts, staff accounted for non-compliance since it is reflective of actual conditions. This results in a more accurate estimate of the number of TRUs and facilities that would comply with the fee requirements and the resulting fee revenue that CARB would collect. Staff applied an approximate 13 percent non-compliance rate, which is based on the average of non-reporting assumed in the statewide TRU inventory (3.75 percent) and the percentage of citations issued by CARB's Enforcement Division for non-reporting violations in 2019 (21 percent).

Table 5 shows the cost per TRU or applicable facility and zero-emission TRU, respectively.

Table 5. Cost per TRU or Applicable Facility (to be Collected Every 3 Years)

Total Annual Average TRU Program Cost	Average Annual Number of TRUs/ Applicable Facilities Subject to Fees	Average Annual Number of Zero-Emission TRUs Subject to Fees	Cost per TRU/ Applicable Facility (every 3 years)	Cost per Zero-Emission TRU (every 3 years)
$4,433,160	81,201	1,965	$54	$27

The fee calculation is based on estimated population numbers and non-compliance rates. CARB may amend the fee amounts in a future rulemaking if collected fees do not fully cover CARB's costs for activities associated with the TRU program.

Appendix H: 2021 Update to Emissions Inventory for Transport Refrigeration Units

July 2021

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Contents

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1. Summary and Background

This report covers the updates to the California Air Resources Board's (CARB) emissions inventory for transport refrigeration units (TRU). The previous inventory was released in 2011, and documentation is available online.[1] The recent updates include improvements to TRU populations, annual activity, emission factors, compliance choices under the Airborne Toxic Control Measure for In-Use Diesel-Fueled TRUs and TRU Generator Sets, and Facilities where TRUs Operate (TRU ATCM),[2] and growth factors. The updates were developed to provide data for CARB's 2019 Preliminary Health Analysis of TRUs.[3]

TRUs are diesel-powered refrigeration units installed on vehicles such as trucks, trailers, shipping containers, and railcars. The TRU emissions inventory also includes generator sets (gen set), systems designed to provide electricity to electrically-driven refrigeration units (including those on semi-trailer vans and shipping containers). TRUs are responsible for the safe transportation of most refrigerated goods, including meats, produce, dairy, and certain medicine and chemical products.

The diesel engines that power TRUs and TRU gen sets are a significant source of a number of pollutants, but are of particular concern due to the emissions of particulate matter under 2.5 microns in diameter (PM2.5) at locations and facilities where a large number of TRUs operate simultaneously, concentrating their emissions impact in the surrounding communities.

TRUs operating in California are subject to the TRU ATCM, which generally requires that TRUs meet in-use performance standards seven years after the engine model year. There are several ways to be in compliance with the in-use performance standards, meeting the U.S. EPA Tier 4 final emission standards for 25-50 horsepower engines, installing a Level 3 filter (with at least 85 percent PM control) on the TRU engine, or using a qualifying alternative technology. Compliance may also be maintained by replacing the existing unit (engine and refrigeration system) with a new TRU with a Tier 4 engine, which would then be in compliance until the seventh year after the replacement TRU's engine model year.

Although TRUs operate across the State, their impact is often concentrated in communities near facilities where dozens of TRUs may be operating simultaneously and continously.

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[1] *https://ww3.arb.ca.gov/msei/ordiesel.htm*

[2] *https://ww3.arb.ca.gov/diesel/tru/tru.htm*

[3] California Air Resources Board, Preliminary Health Analyses of Transport Refrigeration Units, October 18, 2019. (web link: *https://ww3.arb.ca.gov/cc/cold-storage/documents/hra_healthanalyses2019.pdf*)

California's anti-idling rule for trucks does not apply to TRU operations or reduce their emissions.

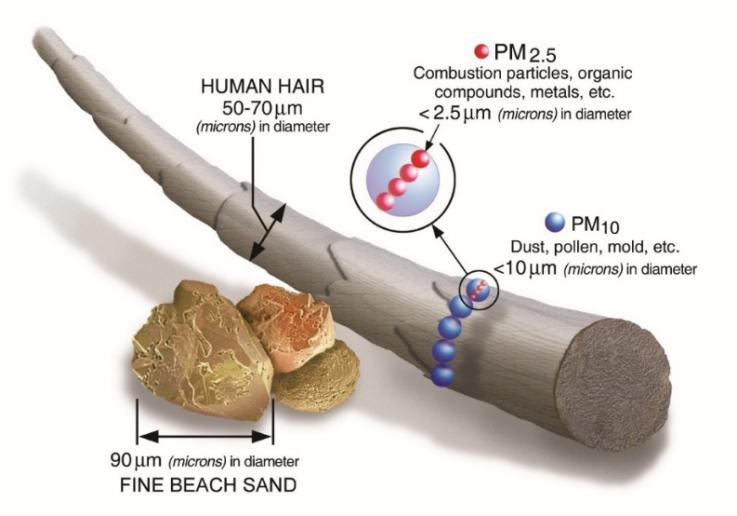
Figure 1 shows an example of a food distribution facility in Southern California.

Figure 1. Food Distribution Facility

TRUs are a relatively high source of particulate matter (PM) due to the lack of tight controls for particulate matter in the new engine standards for smaller diesel engines (see Section 2.1 below). These ultrafine particles are significantly smaller than most dust, pollen, and other sources of particulates, as shown in Figure 2. More information on the health risks associated with PM2.5 is available on CARB's website.[4]

[4] *https://ww2.arb.ca.gov/resources/inhalable-particulate-matter-and-health*

Figure 2. Particulate Matter Size Comparison



1.1. TRU Categories

TRU categories are determined based on the type of truck or container they are cooling (such as a single body truck, trailer, shipping container, or railcar) and the horsepower of the TRU. These groupings are important in identifying average horsepower, load factor, activity, percent of time spent in California, and turnover and purchasing habits.

Truck TRU: TRUs used to cool all types of single body trucks are referred to as truck TRUs. Generally, truck TRUs have between 7 and 19 horsepower, with an average of 13.9 horsepower. These trucks are generally used for local and regional delivery, and are assumed to be captive, meaning they do not leave California and all activity is within the State.

Trailer TRU: Trailer TRUs are the most common TRU type and are attached to trailers pulled by semi-trucks. Traditionally all trailer TRUs were rated between 25 and 35 horsepower. However, in the last few years, trailer TRUs were produced with engines between 23 and 25 horsepower. There are two subsets of trailer TRUs.

> **California Trailer TRU:** These TRUs are registered to a company or agency based in California and are required to register in the ARB Equipment Registration Program (ARBER) database.[5] California trailer TRUs are often used in long-haul transport and are not captive to California, since they often visit other states to deliver or bring in trailer loads. A majority of their activity is assigned to California.

[5] *https://ww2.arb.ca.gov/our-work/programs/transport-refrigeration-unit*

Out-of-State Trailer TRU: These TRUs are not registered to a company based in California and may voluntarily register in the ARBER database. A small fraction of their activity is assigned to California.

Railcar TRU: These TRUs supply refrigeration to railcar containers and are pulled by locomotives. A small fraction of their time is spent in California.

TRU Gen set: These TRUs are a gen set that provides power to a non-integrated refrigeration unit. Similar to trailer TRUs, most TRU gen sets were previously rated above 25 horsepower, but recent data from the ARBER database shows a majority of gen sets now sold are 23 to 25 horsepower engine units. Again, there are two subsets of TRU gen sets.

California TRU gen set: TRU gen sets are registered to a company based in California with reporting requirements in the ARBER database. Similar to trailer TRUs, a majority of their activity is assigned to California.

Out-of-State TRU gen set: These are TRU gen sets that are not registered to a company based in California and may voluntarily report tin the ARBER database. A small fraction of their activity occurs in California.

1.2. Emissions Inventory Methodology Overview and Sources

The following steps summarize the inventory process and identify each data source, with more detail included later in the report:

1. ARBER supplies TRU population data, including model year, horsepower, and any reported aftertreatment information
    a. Population data is scaled up based on CARB enforcement data that indicates not all TRUs report in ARBER (e.g., 96.3 percent of TRUs are assumed to be reported in ARBER database).
    b. Out-of-State TRUs are scaled up based on heavy duty truck populations from the EMFAC model as they have voluntary reporting requirements.
2. Activity is assigned based on survey data and TRU telematics reports. Activity is distributed for portion of time spent in-state vs out-of-state for trailer TRUs, railcars, and gen sets based on VMT patterns for in-state versus out-of-state trucks.
3. Load factors are assigned by TRU category, using analysis from the 2011 inventory, and supplemented by TRU telematics reports. TRU efficiency improvements in some categories are reflected in this step.
4. Future years are forecasted by applying a growth rate, along with a survival and purchasing curve based on reported age distributions.
5. Forecasted compliance with the TRU ATCM is based on observed compliance choices in the ARBER database and data from CARB's enforcement program.

6. Emissions are calculated for base and future years using Equation 1.

$$Emissions = Population * Activity * Hp * LF * EF * FCF \quad \text{(Equation 1)}$$

Where:

Population =	Count of equipment population
Activity =	Time the engine is running (hours)
Hp =	Horsepower (max brake horsepower) of the engine
LF =	Load factor (unit-less)
EF =	Emission factor (grams/kW-hr) specific to horsepower and model year and pollutant, and includes deterioration
FCF =	Fuel correction factor (unit-less) based on calendar year

2. TRU Data Base Year Inputs and Analysis

This section discusses data sources and analysis for the TRU emissions inventory model, including population, activity, load factor, and emission factors. These inputs are the foundation of the model and all forecasted years are built on this base year data.

2.1. Population and Age Distribution

The ARBER database provides a record of California-based TRUs and a partial record of TRUs that entered the State but are not based in California. Under the TRU ATCM, owners of TRUs based in California are required to report their TRUs to the ARBER database, with an initial reporting deadline of July 31, 2009. Owners of TRUs that are based outside California may report their TRUs but are not required to do so.

The ARBER database maintains reported information for each TRU, including the unit's model year, the engine model year, and any compliance actions taken, such as a diesel particulate filter (DPF) installation or engine replacement or rebuild. The database does not include information on annual activity, the amount of fuel used, or the load factor. As such, ARBER data can be used to analyze population and age distributions, but not activity.

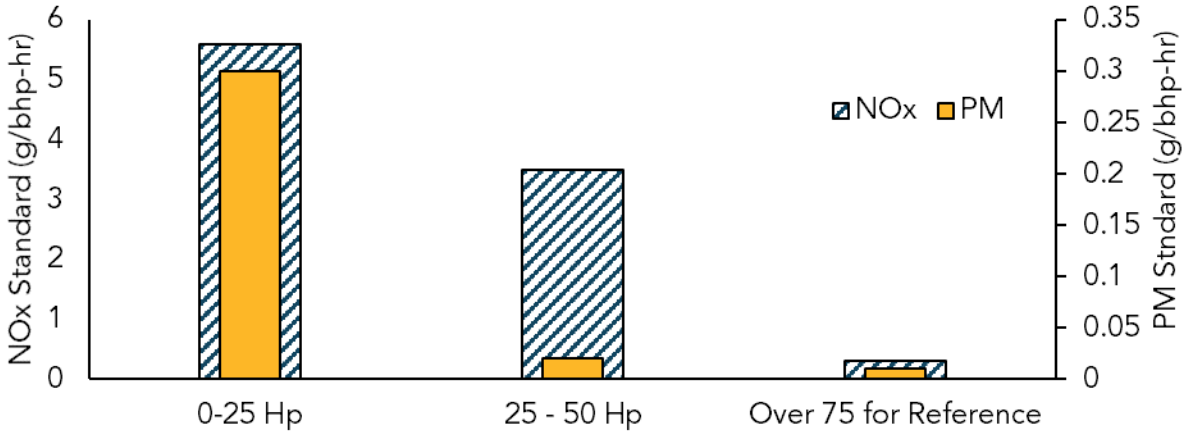
Data from the ARBER database was retrieved in November 2019 and is the primary input to estimate TRU population and age distribution in the 2021 TRU inventory.

The largest change in this new data set is the emergence of 23 to 25 horsepower trailer TRU engines. Figure 3 compares the difference in oxides of nitrogen (NOx) and PM emission factors (in grams per brake-horsepower-hour) according to horsepower groupings. Units with

engines under 25 horsepower have standards for PM 15 times higher than units with more than 25 horsepower, and emission standards NOx 1.5 times higher.

In the 2011 inventory, all trailer TRUs had engines ranging from 25 to 50 horsepower. Figure 3 includes diesel engines over 75 horsepower for comparison, although there are no TRUs in the inventory in this horsepower range. The diesel engines under 25 horsepower have significantly higher PM emissions standards because they lack DPFs and they have higher NOx emission standards as they also lack selective catalytic reduction systems (SCR). Diesel engines over 25 horsepower are expected to have DPFs or similar, and no SCRs. For comparison's sake only, most diesel engines above 75 horsepower are expected to have DPFs and SCRs, or equivalent emissions reduction. The increase of PM and NOx from engines between 23 and 25 horsepower is significant as the emergence of these smaller engines will become responsible for the majority of TRU emissions in the near future, if current trends continue.

Figure 3. Tier 4 Final Standards for Off-Road Diesel Engines by Horsepower Bin



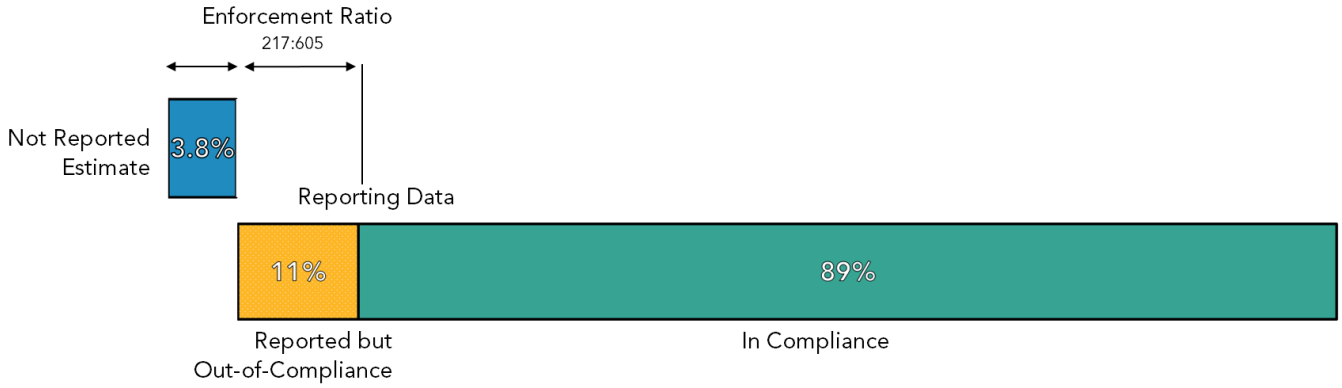
2.1.1. Population and Non-Reporting

Although TRUs based in California are required to report in ARBER, there is some level of non-compliance with this reporting requirement. Based on CARB enforcement data from 2009 and 2010, the previous 2011 model scaled up California units registered in ARBER by 3.12 percent to correct for those units that were not registered. New calendar year 2016 CARB enforcement data for TRUs was used to update the non-reporting factor in the 2021 inventory.

According to 2016 CARB enforcement data, non-compliance due to non-reporting was responsible for 217 violations, while non-compliance due to other issues was responsible for 605 violations. Essentially, for every three TRUs out of compliance for issues other than reporting, one was out of compliance for failure to report. The 2019 ARBER reporting data

indicates that compliant TRUs account for 89 percent of the population. Therefore, the remaining reported but non-compliant TRUs account for 11 percent. By applying the same ratio for non-reported units to reported but non-compliant units, the 3 to1 ratio can be multiplied by the 11 percent of non-compliant TRUs in the 2020 ARBER database. This results in a non-reporting rate of 3.75 percent, as shown in Figure 4 below.

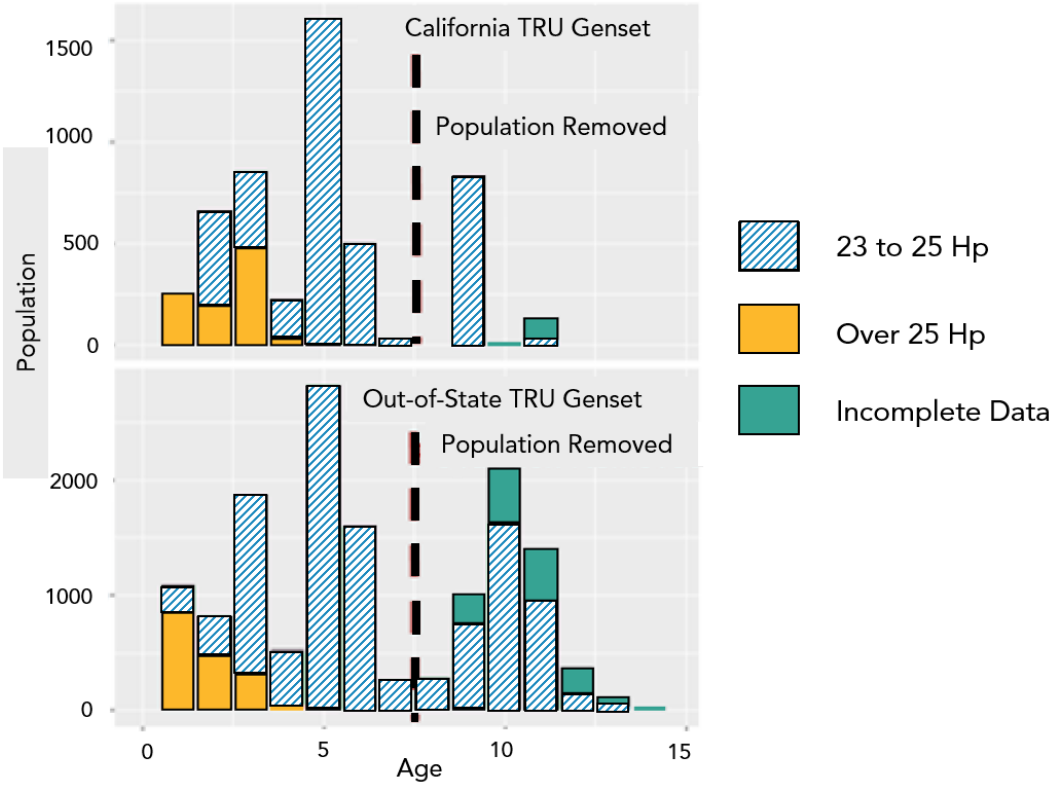
Figure 4. Determining TRU Non-Reporting Rates



2.1.2. TRU Gen Set Age Distribution Adjustments

According to information from TRU gen set owners and operators, as well as CARB staff, many TRU gen sets deemed non-compliant with the TRU ATCM remain registered in ARBER even though they are no longer brought into California. This was verified with data supplied by the TRU gen set companies as they have an electronic tracking program. The inventory reflects this practice by removing non-compliant TRU gen sets (those older than 7 years of age) from the base population from the ARBER dataset, for both in-state and out-of-state TRU gen sets. Figure 5 shows the age distributions before this adjustment, with all units older than 7 years of age removed following the compliance adjustment.

Figure 5. TRU Gen Set Age Distribution before Adjustment



2.1.3. Out-of-State TRU Population Scaling

Out-of-state TRUs are not required to report to ARBER, meaning the reporting data represents only a fraction of the total population of out-of-state units. To estimate the entire population of TRUs visiting California each year, the inventory uses the ratio for in-state versus out-of-state trucks from CARB's on-road mobile source emissions inventory, EMFAC2017.[6] Trucks used in the analysis were limited to T6 and T7, or medium-heavy and heavy-heavy duty truck types as those are most likely to pull a refrigerated trailer. Public trucks, port trucks, utility trucks, and other truck types unlikely to pull a refrigerated trailer were excluded.

Table 1 shows the in-state and out-of-state truck populations in a calendar year, and the ratio between the categories. Based on this analysis, the out-of-state trailer TRU population was scaled up to equal the number of California trailer TRUs multiplied by the ratio 3.64. This creates a target population of out-of-state TRUs of 131,160 (or 3.64 times the in-state population of registered TRUs).

[6] EMFAC2017, *https://www.arb.ca.gov/emfac/2017/*

Table 1. In-State and Out-of-State (T6 and T7) Truck Populations from EMFAC2017 from Applicable Categories

Truck Category	Population
Out-of-State[7]	601,690
In-state	165,300
Ratio of Out-of-State / In-state	3.64

Age distribution, after-treatment, and other characteristics were modeled using reporting data for out-of-state units. However, the total out-of-state TRU population was scaled up to 131,160, from approximately 58,540 seen in the reporting data. This equates to about 45 percent of the estimated out-of-state TRU fleet voluntarily reporting.

2.1.4. Railcar and DSC

There are currently 3,954 railcars registered in the ARBER database, with 67 percent of the railcars falling between 23 and 25 horsepower, and the remaining 33 percent over 25 horsepower. Railcar registration is currently voluntary, and this amount could increase with more complete registration in the future.

The 2019 ARBER population of domestic shipping containers (DSC) reports about 400 units with an average age of 4.3. These are included in the 2019 railcar population, based on discussion with industry indicating that DSCs and railcars have similar operational practice. They both are used almost exclusively by large companies, are not captive to California, are reported voluntarily, and spend only a small fraction of time in California. Based on the limited amount of data available for these categories, the out-of-state TRU age distribution was used for this category, similar to the 2011 inventory

2.1.5. 2019 Population and Age Distribution

Table 2 gives population and average age for each TRU category after scaling adjustments.

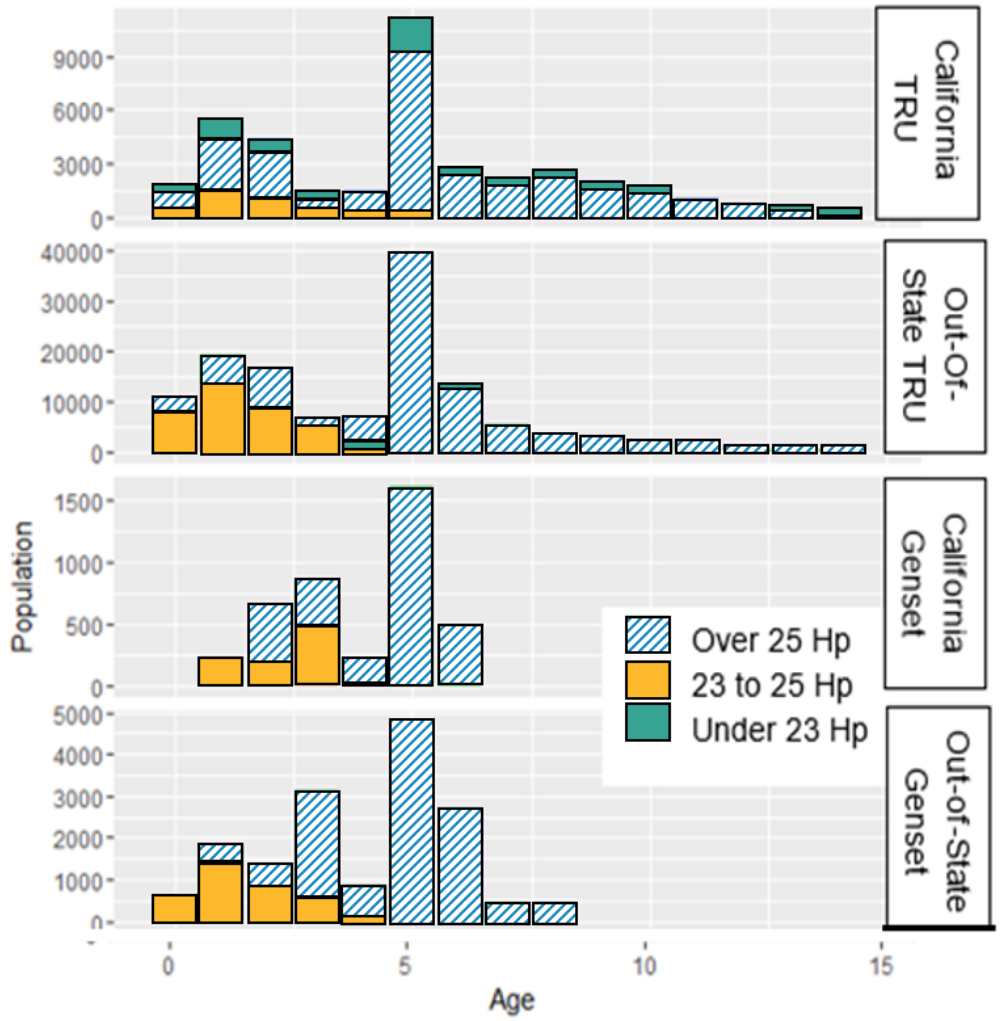
Table 2. 2019 Population and Average Age by Category

Category	Population	Average Age (years)
California-based TRU	39,938	5.1
Out-of-state TRUs	131,164	4.2
California-based TRU gen set	4,074	3.9
Out-of-state TRU gen set	16,200	4.0
Railcar and DSC	3,954	4.2

[7] Annual population of out of state trucks are being used for this analysis

Figure 6 displays the base year 2019 age distributions by category. The spike at age five, or model year 2012, corresponds to a regulatory deadline in the TRU ATCM as well as the last available year of Tier 4i engines in the 25 to 25 horsepower range. It should be noted the low age of units between 23 and 25 horsepower is not indicative of high turnover, but a result of their recent emergence in the market.[8]

Figure 6. Base Year TRU Age Distribution by Category



2.2. Engine Model and Average Horsepower

To determine the engine horsepower for each unit reported in ARBER, the inventory matches the engine model to the manufacturer's horsepower rating. ARBER's engine model input field is an open text field, so typed responses varied. As such, algorithms were used to verify

[8] Railcars are not shown as they follow the out of state TRU age distribution due to limited data.

the engine model. For example, the common model TK486V is often entered as "486 v", "486_v","tk-486 v", “486 tkv”, “tkv486”, “tk48v6”, and approximately 272 other variants.

Table 3 reports average horsepower for each TRU category and the engine horsepower bin. The average horsepower for each category is weighted by the population of each engine model in the reporting data. Only California-based TRUs have a group for units under 23 horsepower because all single body trucks are assumed to be California based units, and all trailer units are over 23 horsepower.

Table 3. Average Horsepower by Category

Category	Average Horsepower: Below 23 Hp Bin	Average Horsepower: 23 to 25 Hp Bin	Average Horsepower: 25 Hp and Over Bin
California-based TRU	17.2	24.8	33.8
Out-of-state TRU	-	24.7	33.7
California-based gen set	-	24.8	33.2
Out-of-state gen set	-	24.8	33.2
Railcar and DSC	-	24.7	33.7

2.3. Annual Activity

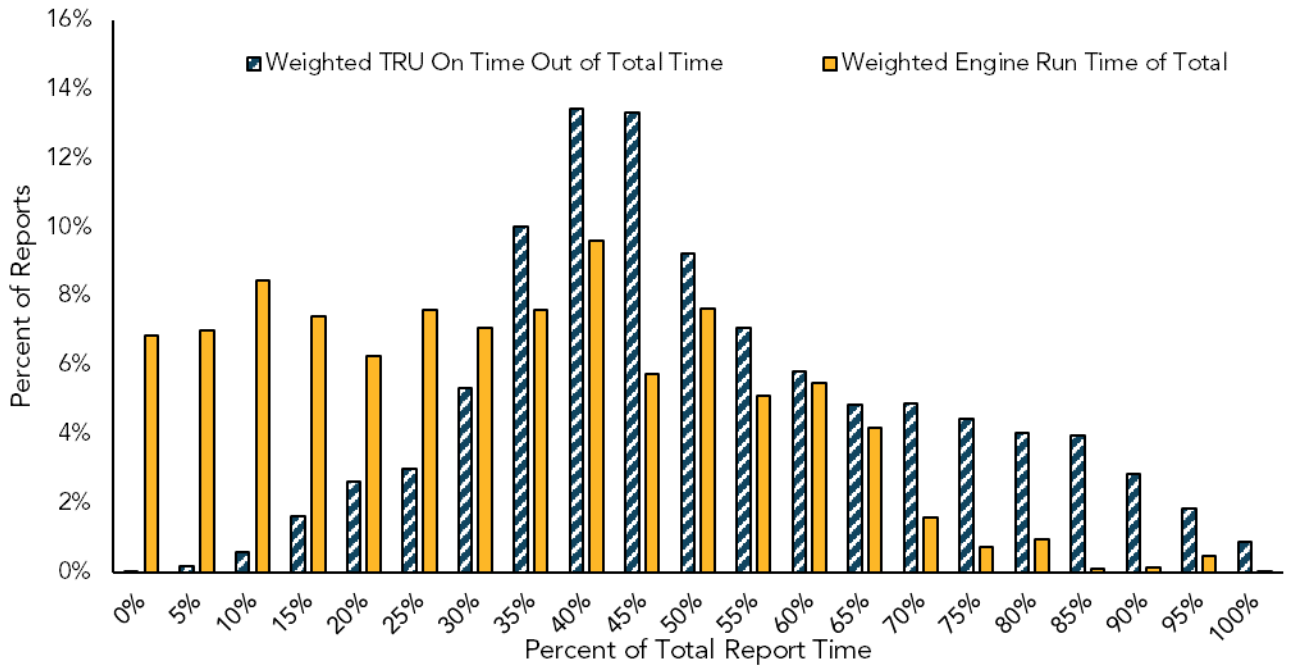
In the 2011 inventory, annual activity was based on a facility survey. The survey covered 54 different facilities that monitored TRU activity and provided the average total TRU activity, annually. For example, if a TRU visited a facility twice, one week apart, and had accumulated a total of 30 hours in that time, that TRU would be scaled up by 52 weeks to estimate 1,560 hours of annual use. The results from that survey are described in detail in the 2011 inventory analysis, which determined trailer TRUs had an average annual activity of 1,697 hours and 1,360 hours per year for truck TRUs.

For this 2021 TRU inventory update, CARB acquired telematics data from a number of trailer TRUs, detailing total time, time the unit (but not engine) was on, time the engine was on, whether the trailer was stationary or moving, and (in limited cases) the fuel use. The telematics data generally was recorded every 15 minutes, showing the changes in time, engine on time, and other metrics from the last recorded point. For example, one entry data point might show 900 seconds passing (15 minutes), with 900 seconds (15 minutes) of unit on time and 360 seconds (6 minutes) of engine on time during those 15 minutes.

After significant quality assurance, 811 telematics reports were used, representing 867,300 hours or 99.0 years of total time passing (engine on or not), and 285,000 hours of

engine run time. The TRU unit was on (engine running or not running) for an average of 51.8 percent of total recorded time, equivalent to 12.4 hours per day, or 4,500 hours per year. The engine was running for an average of 32.8 percent (weighted by total time of each report), equivalent to 7.9 hours per day, or 2,876 hours per year (the average percent of engine time-on **not** weighted by time was 32.5 percent, showing the data was not significantly influenced by outliers). Figure 7 compares the distribution of TRU on time (patterned in blue and white) and engine on time (colored in yellow). The blue-white bars represent the percent of time the unit was turned on, and yellow bars represent the percent of time the engine was running. The telematics data show that the TRU engines are generally running about 62.5 percent of the time that a TRU unit is turned on.

Figure 7. Telematics Data: TRU Unit On and Engine On



The telematics data, although detailed in temporal information, did not provide information on TRU models, ownership, or other variables to determine if the activity data represented all TRU operation in the State. To incorporate the telematics data while not overinflating the total activity statewide (from units potentially not represented by the telematics data), the 2011 facility survey data and the 2018 telematics data were combined to determine average TRU activity.

For each data source, CARB weighted the percent of engine time on by the duration of the report, to calculate a time-weighted average of engine run time. From the 2011 facility survey data, each facility was weighted by the number of trailer TRUs and multiplied by the average time period for a TRU report. Each telematics data point represents a single unit and was weighted according to the length of that telematics report. Table 4 shows how the

following two example facility reports and two telematics data points would be averaged to calculate TRU average on time rate.

Table 4. Example TRU Activity Average Calculation

Data Source	Number of TRUs	Average Time Period of Reports	TRU On Time Average for Facility	Total TRU Days	Average Rate: TRU on time
Facility 1 Report	50	10 day average	20%	50 x 10 = 500 days	500 days x 20 Percent
Facility 2 Report	10	5 day average	30%	10 x 5 = 50 days	50 days x 30 Percent
Telematics 1 Data	1	60 days	35%	1 x 60 = 60 days	60 days x 35 Percent
Telematics 2 Data	1	100 days	40%	1 x 100 = 100 days	100 days x 40 Percent
			Total	710 days	24.8 Percent Weighted Average

This can also be expressed in the calculation as follows:

$$\frac{[(500 \text{ days x } 20 \text{ percent}) + (50 \text{ days x } 30 \text{ percent}) + (60 \text{ days x } 35 \text{ percent}) + (100 \text{ days x } 40 \text{ percent})]}{710 \text{ total days}}$$

= Average of 24.8 percent of time on.

Based on the average time-on of 24.8 percent, the annual activity would be 24.8 percent of 365 days per year, 24 hours per day, or 2,170 hours per year. This methodology gives higher weight to the facilities with larger number of units, reporting over a longer period, and to telematics data recorded over a longer period. Facility reports with few units, or a short period between reports, and telematics data recorded over a short period, have little impact on average activity. Table 5 and Table 6 show the results and overall information on the facility surveys, telematics data, and resulting activity average

Table 5. Trailer TRU Activity Data Sources and Average

Data Source	TRU Hours Represented	TRU Units Represented
Facility Survey	1,197,382	6,035
Telematics Data	867,368	811

Table 6. Trailer TRU Activity Average

Data source	Percent of Engine Time	Average Annual Hours
Facility Survey	19.5%	1,712
Telematics Data	32.8%	2,876
Overall Average (Time Weighted)	25.1%	2,201

The final result is an average trailer activity of about 42 percent weighted toward the new telematics data, and 58 percent weighted to the facility survey, based on total TRU hours represented by each. Telematics data for truck TRUs were not available in any statistically significant quantity, so facility survey results were used and unchanged from the 2011 inventory. The facility survey represented 459 trucks, with an average activity of 1,360 hours per year. Gen sets and railcars are also unchanged from the 2011 inventory, at 1,000 hours annually for both categories. This is based on discussions with gen set and railcar owners and TRU program staff in 2009 and 2010 and described in full in the 2011 inventory report.

2.4. Portion of Activity within California

The trailer, gen set, and railcar TRU populations have activity split between California and other states or countries. Truck TRUs, generally assigned to local or regional delivery duties, are assumed to be captive to California. Therefore, all truck TRU hours are assumed to be within California.

The division of activity for the trailer, gen set, and railcar TRUs, is based on the same methodology as the out-of-state trailer TRU population. The TRUs are modeled on the truck activity patterns from EMFAC2017, for the categories of freight trucks that are associated with refrigerated trailers or refrigerated transport

The International Registration Program (IRP) tracks vehicle miles traveled (VMT) for interstate trucks entering California, so it is possible to determine the percent of annual VMT both inside and outside of California in an average year. The California VMT for out-of-state trucks is estimated to be around 12.4 percent of their total VMT, meaning approximately 1 out of 8 for every mile driven is within California.

California-based trucks in EMFAC also include California IRP trucks (trucks based in California but registered in IRP that spend a significant portion of VMT outside of the State). Overall,

VMT for California based freight trucks (the combined average of both IRP and non-IRP trucks) is approximately 78 percent in California and 22 percent outside California. Table 7 lists total annual hours, hours within California, and compares this against the previous 2011 inventory estimate of hours spent within California.

Table 7. TRU Activity Totals and In-State Totals

Category	2021 Model Annual Hours	2021 Model Annual Hours Within California	2011 Model Annual Hours Within California
California Trailer TRU	2,201	1,719	1,325
Out-of-state Trailer TRU	2,201	272	210
Truck TRU	1,360	1,360	1,360
California Gen set	1,000	781	781
Out-of-state Gen set	1,000	124	124
Railcar and DSC	1,697	322	322

2.5. Moving and Non-Moving Time Periods

The telematics data also included stationary and moving time for TRUs. Data was limited to include whether the trailer was moving for the entire period of the report (generally 15 minutes), was stationary the entire time, or had some portion moving and some stationary. The telematics data also included information that determined the engine on-time during these periods.

The period where the trailer was moving only a portion of the time could represent anything from a trailer arriving a location in the middle of a recording interval, to traffic conditions that had significant start and stop movement, to several very short stops during the period. Unfortunately, this data can only definitively determine that total stationary time for trailer TRUs makes up between 33 and 65 percent of all engines on time where the 65 percent value is the 33 percent stationary lower limit plus the possible 32 percent that could also be stationary. In short, 33 percent represents a lower limit, and 65 percent an upper limit.

Table 8. Trailer TRU Stationary Activity Analysis

Movement Category	Hours	Percent
Stationary with Engine On	96,900	33%
Split Stationary/Moving with Engine On	94,598	32%
Moving with Engine On	105,103	35%

An equal split of the portion where the TRU movement could not be quantified would place 49 percent of the total TRU engine time as stationary and 51 percent of TRU engine time as taking place during truck movement. This compares reasonably well with the 2011 inventory

split of 50 percent time stationary and 50 percent time moving. This information informs both the spatial distribution of TRU emissions as well as the total hours at a facility per year but does not change the total emissions in the State.

2.6. TRU Load Factor (LF)

Table 9 provides the 2011 inventory load factors. The methodology behind these load factors is described in detail in the 2011 inventory documentation and is generally based on a combination of engine certification cycle data and engine torque and speed curves.

Table 9. 2011 TRU Inventory Load Factors

Model	Horsepower Bin	Load Factor
TRU (California-based and Out-of-State)	25-50	0.46
TRU	11-25	0.56
TRU	<11	0.56
Generator Set	All	0.33
Railcar	All	0.46

The telematics data described previously did include limited data on fuel use by TRUs. Fuel data from the telematics report were recorded 3.6 percent of the time, but still comprises slightly over 36,400 hours of fuel use consumption data. A load factor can be calculated from this fuel use, with several assumptions built in.

Fuel use in off-road diesel inventories is calculated using Equation 2.

Fuel Use = Horsepower*Hours*Load Factor*Fuel Consumption Rate (Equation 2)

Therefore, load factor can be determined if the other variables are known. In the telematics data, specific engine model data or horsepower information is not available. However, the vast majority of the telematics data is from trailer TRUs. The telematics data was based on 2016 to 2017 data, a time period when 23 to 25 horsepower TRUs were being sold but made up a small fraction of market share. For this analysis, CARB assumed the trailer TRUs had an average horsepower over 25 horsepower (i.e., 33.8 Hp). The fuel use rates were based on U.S. EPA[9] values for engines of 25 to 50 horsepower, or 0.408 pounds per horsepower-hour.

Using this data, it is possible to determine a time-weighted load factor of 0.467, which compares favorably with the 2011 TRU inventory load factor for trailers of 0.46. As there is no

[9] *https://nepis.epa.gov/Exe/ZyPURL.cgi?Dockey=P100UXEN.TXT*

significant difference between this newly calculated load factor and the previous factors, the 2021 TRU inventory will continue to use the 2011 load factors, with one minor difference.

Based on discussions with manufacturers, TRU engines have improved efficiency between 2011 and 2019, with the largest improvements beginning around 2013. The primary evidence for this trend can be seen in the published data on fuel per hour consumption from manufacturers. Beginning in 2013, the inventory reflects a load factor reduction of 17 percent to simulate efficiency improvement for the 2013 and newer trailer TRUs. For units between 23 and 25 horsepower, the efficiency improvement is used to reduce the engine brake horsepower rating, and thus these units hold the same load factor as earlier trailer TRU units. A reduction in the load factor of 17 percent for the 25 to 50 horsepower units results in the same total effective power (maximum horsepower multiplied by the load factor) for all 2013 and newer trailer units, either above 25 horsepower or below 25 horsepower.

The telematics data, in theory, could show a lower load factor due to these efficiency improvements. However, during the time the telematics data was collected, only around 20 percent of TRU units were 2013 or newer. A 17 percent efficiency improvement in 20 percent of units would only show up as a 3.4 percent reduction overall in load. This minor reduction was not seen in the telematics data, possibly due to the majority of TRU units being pre-2013 model year, or simply due the magnitude of the reduction falling within the margin of error. The model assumes no efficiency improvement for engines below 23 horsepower, as no supporting information was available. Table 10 shows the previous and new load factors.

Table 10. 2021 TRU Load Factors

Category	Below 23 Hp	Between 23 and 25 Horsepower: (All Years)	Over 25 Horsepower: 2012 and Older	Over 25 Horsepower: 2013 and Newer
California TRU	0.56	0.46	0.46	0.38
Out-of-State TRU	-	0.46	0.46	0.38
California Gen sets	-	0.33	0.33	0.27
Out-of-State Gen set	-	0.33	0.33	0.27
Railcars	-	0.46	0.46	0.38

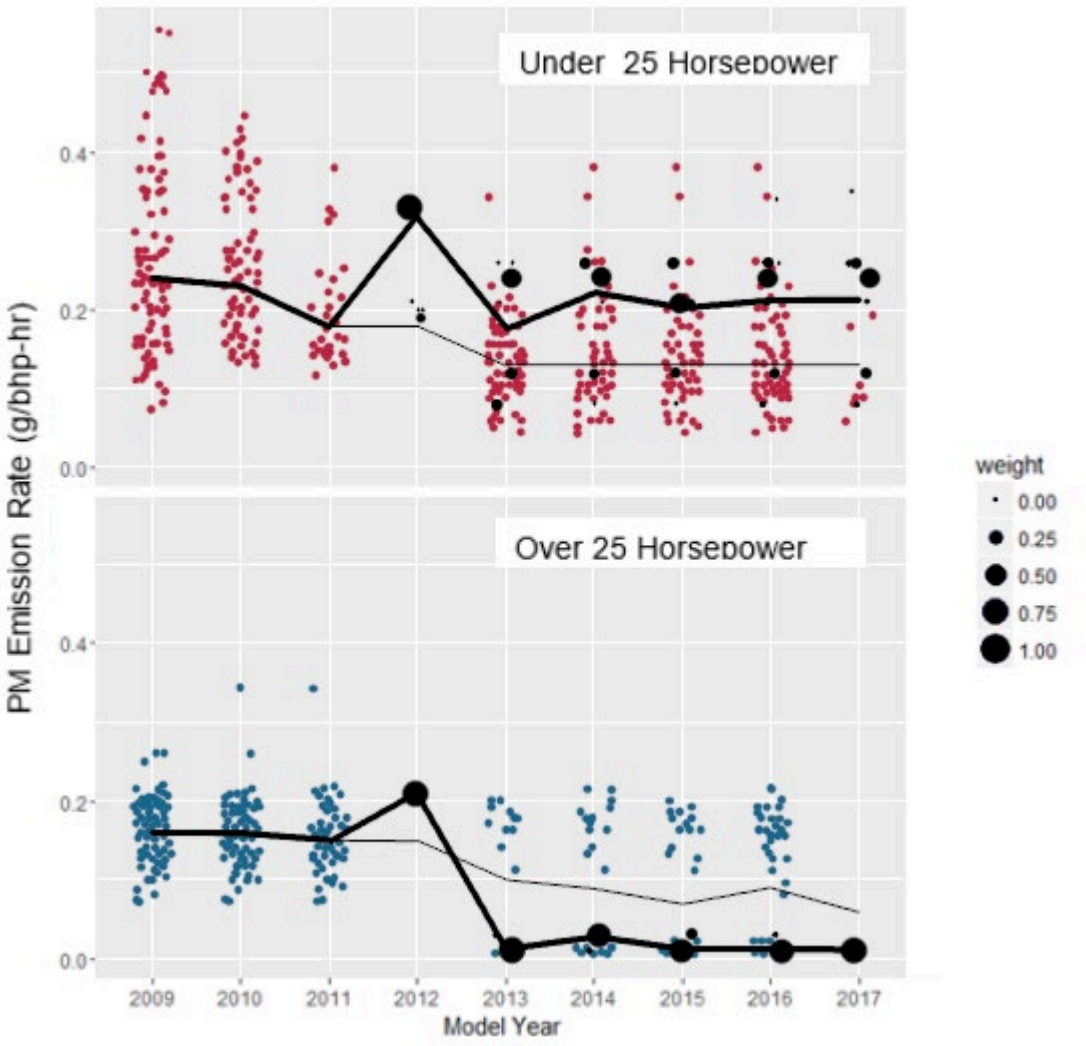
2.7. Emission Factors (EF)

The model utilizes a combination of the 2017 emission factors[10] for all diesel engines and a new analysis for engines certified to the TRU-specific certification cycle. The general off-road 2017 emission factors were developed based on certification test data covering all off-road diesel engines. The TRU-specific emissions factors were developed by including only tests based on TRU-specific certification cycles, and then weighting these tests using the engine families reported in ARBER. The TRU specific certification data are only available for PM and engine model years 2012 and newer. Therefore, the adjustment is made for PM only for engine model year 2012 and after and no adjustments are made for NOx. Each red data point in Figure 8 represents a general off-road diesel engine family. The fine black solid lines represent the overall off-road diesel emission factors (used in other categories).

Each blue data point represents a TRU specific engine family. The size of the black dot represents market share of the engine family. The solid black line is the TRU specific PM emission factor and is derived by taking a population weighted average of the black data points. The TRU specific PM emissions factors for engine model 2018 and after are estimated by averaging the 2014 to 2017 data points.

[10] 2017 Emission Factors, *https://ww3.arb.ca.gov/msei/ordiesel.htm*

Figure 8. PM Emission Factor Comparison



Notable is the fact that over 25 horsepower TRUs have PM emissions from certification below the average for off-road diesel engines, while engines under 25 horsepower have emissions significantly above the average for off-road diesel engines.

3. Forecasting and Growth

3.1. Population Forecast

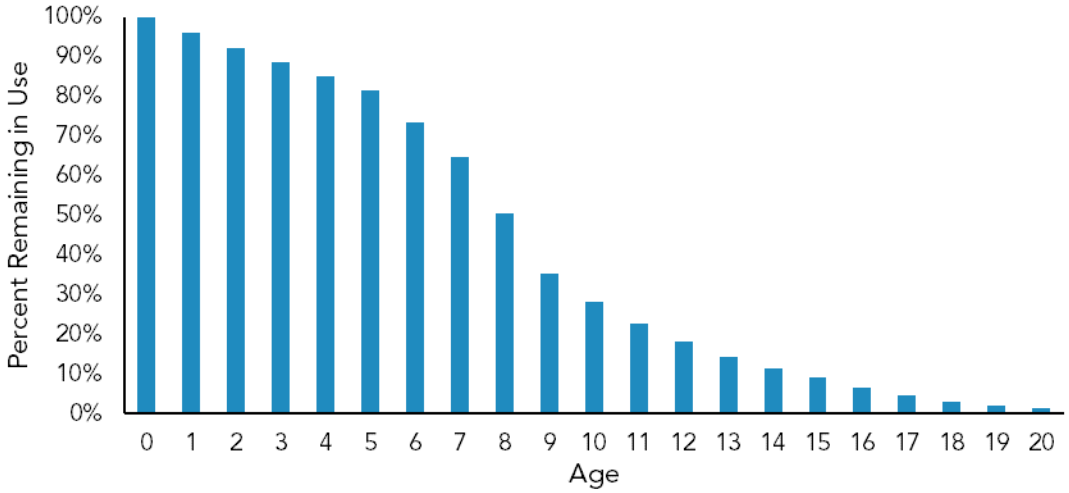
The 2021 TRU model forecasts future year population distributions in any given year by applying a series of actions to the previous year's population, in an iterative process (i.e., 2020 population is based on base year 2019, and 2021 is based off iterations on 2020, and so on). There are three distinct steps in this process: turnover, growth and purchasing, and compliance. In the first step, the model estimates the number of units that will likely retire in the year utilizing the survival curve, which characterizes the retirement behavior for

different ages. Then newly purchased units are calculated to reflect the population growth. Lastly, the population is adjusted by compliance actions such as forced retirement and/or replacement, based on enforcement and reporting data for real world compliance choices over the past 7 years. The following subsections cover model parameters used for these steps.

3.2. Population Turnover

Population turnover, or survival curves, describe what percent, on average, of purchased equipment are still in service after a set amount of time. Figure 9 shows a survival curve, which indicates the percent of the population still in service at each age, out to age 20. At age 3, 90 percent are still in service. By age 8, 50 percent are in service. By age 20, all are retired from service.

Figure 9. Example Survival Curve

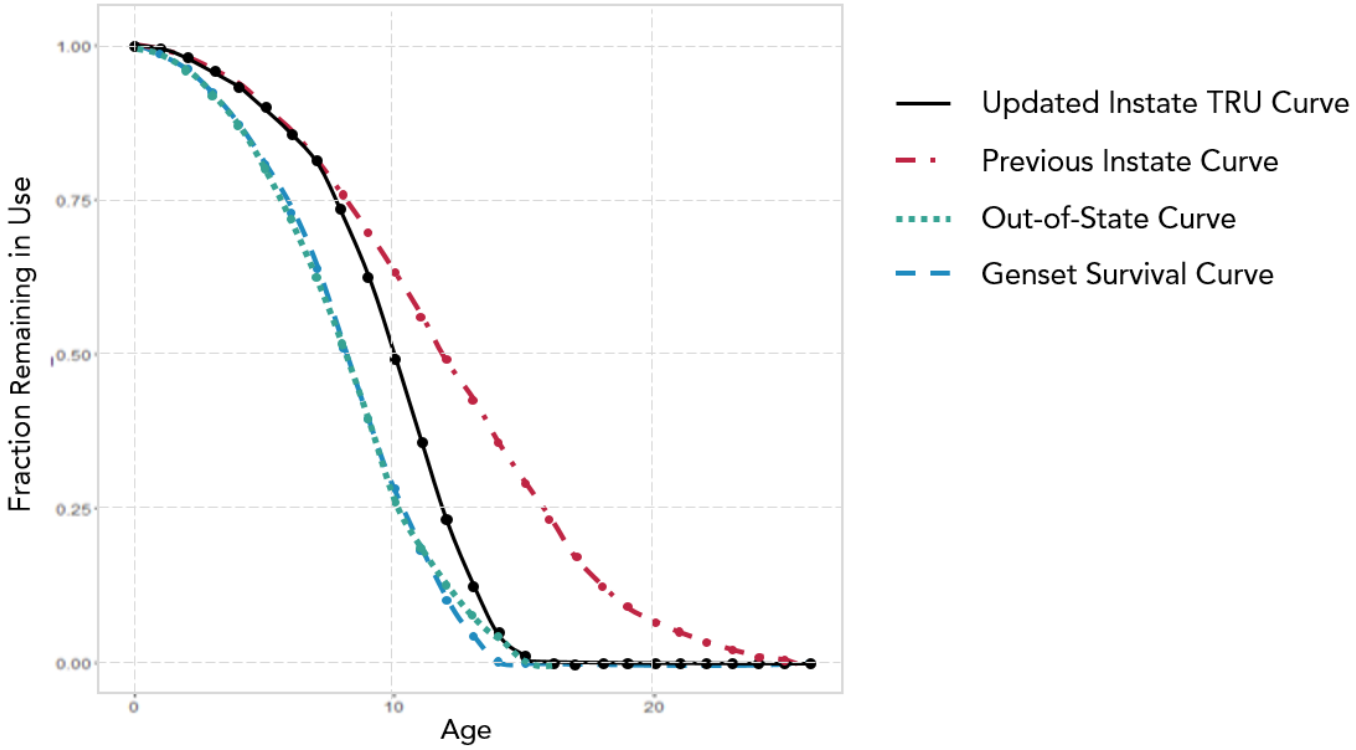


Survival curves are based the 2011 inventory model, with one significant adjustment. The general methodology for developing the survival curves is described in the 2011 inventory documentation, however it can generally be described as an iterative process where the previous decades of TRU sales data was compared to the 2011 inventory age distribution (as reported in ARBER). The goal of survival curve application was finding a curve that could be applied to sales data and resulted in the real world age distribution seen in the reporting data. The in-state and out-of-state populations have different survival curves, as out-of-state TRUs are significantly younger and are retired at a younger age, on average.

The adjustment to the 2011 survival rates came from comparing the in-state survival curve to the age distribution shown previously in Figure 9. While the survival curve extends to 25 years, the existing age distribution shows no units older than 15 years. Although the TRUs have been subject to the TRU ATCM, units older than 7 years with no aftertreatment are not in compliance, meaning there is no reason to suspect that age 10 and older units are retiring

primarily due to the TRU ATCM (as they are already out of compliance, or are already in compliance via aftertreatment and do not need to retire to meet regulatory requirements). To reflect this shift in retirement patterns, the new survival curve reaches zero at approximately 16 years, instead of the previous 25 years. The survival curves for different TRU populations are shown below in Figure 10.

Figure 10. TRU Survival Curve



3.3. Purchasing Trends

After applying the survival curve, the inventory models new purchases that replace or are added to the TRU fleet. New purchases for units with a 25 to 50 horsepower engine meeting the Tier 4 Final emission standards for MY 2013 and newer are classified as ULETRU (ultra-low emission TRU) and no further compliance action is required for these units. For engine horsepower below 25, the model assumes no Level 3 retrofit device installed at the time of purchase, again based on reporting data.

For the trailer, rail, and TRU gen sets, the percent of new units purchased with engines in the 23 to 25 horsepower bin was based on the reporting data from ARBER. In-state TRUs show that, on average, 60 percent of units have greater than 25 horsepower engines, and 40 percent have engines between 23 and 25 horsepower. All other units show that only 20 percent of TRU purchases have engines greater than 25 horsepower, and 80 percent have engines that are between 23 and 25 horsepower. At the time of this inventory, all new

gen sets registered were in the 23 to 25 horsepower range, however the data does not include enough years to be certain this is an ongoing trend. Future inventories will revisit this metric to determine the impact and longevity of trailer, rail, and gen set units in the 23 to 25 horsepower range.

Table 11. New Purchasing by Horsepower Bin

Category	Before 2015 25+ Hp / 23-25 Hp	2015 25+ Hp / 23-25 Hp	2016 and after 25+ Hp / 23-25 Hp
California Based TRU	100 / 0	70 / 30	60 / 40
Out-of-State TRU	100 / 0	20 / 80	20 / 80
California Based Gen set	100 / 0	20 / 80	20 / 80
Out-of-state Gen set	100 / 0	20 / 80	20 / 80
Rail	100 / 0	20 / 80	20 / 80

3.4. Compliance Choices

Following the application of survival curves and purchasing functions in the inventory, the inventory applies compliance choices for TRUs subject to the TRU ATCM. The TRU ATCM requires that fleet owners/operators take actions to reduce diesel particulate emissions once the engine becomes seven years old. Fleet owners have the choice of replacing the TRU unit, installing a retrofit device, or using alternative technology such as electric standby to allow the unit to run on supplied electric power while at a facility.

The compliance paths for TRUs includes;

- Install Level 3 retrofit
- Install alternative technology
- Replace unit with a new TRU with current MY engine.

In the 2019 reporting data, 86.2 percent of over 25 horsepower units complied (due either to age or actions taken), and 95.4 percent of units under 25 horsepower were in compliance, with an overall compliance rate of 89.0 percent.

For many owners of TRUs, both company and individuals, one of the primary compliance paths is the replacement of TRUs with newer units or shifting older TRUs out of the State and maintaining a fleet under 7 years of age. These actions are represented in the age distribution and are not identifiable specifically as compliance choices (i.e., there is no way to differentiate all these actions from the normal course of business). This compliance choice is implicit in the overall 89 percent compliance rate (e.g., these TRUs show up as newer units that are in compliance with the ATCM).

To model non-compliance in some units, the inventory uses the trend over the past two years for units that did not comply with turnover, retrofits, or alternative technology. For units facing their age 7 compliance date, the report shows that 31 percent take a specific action beyond natural turnover, over the past two years. It should be noted that this does not mean the compliance rate is 31 percent, as the overall compliance rate is (as described previously) 89 percent.

To determine the compliance parameters, TRUs with engine model years 2009 and 2010 were assessed directly from ARBER reporting data in 2016 and 2010 (the compliance year for those units). Of the 2,739 TRUs facing requirements, 885 (31 percent) either replaced the unit, or installed a Level 3 (ULETRU) retrofit, while 1,854 took no action. For TRUs under 23 horsepower, 270 faced compliance requirements, and 52 took some action, while 218 took no action (19 percent took action). Note that the number of TRUs facing compliance requirements does not include Tier 4 Final engines, those already retrofit or with alternative technology already installed, or those turned over in the normal course of business. These TRUs make up the bulk of all units, which is why the overall compliance rate is much higher, at 89 percent.

Table 12. Compliance Action Average in 2016 and 2017

	23 Horsepower and Above (Trailers, Rail, Gen sets)	**Below 23 Horsepower (Trucks)**
Replace TRU	313	35
Install ULETRU Retrofit	572	14
Install Alternative Technology	0	3
No Action Taken (out of compliance)	1,854	218

In each forecasted year, the units taking action to comply with the ATCM are modeled based on the TRU data between 2011 and 2018. The compliance paths are also split between under 23 horsepower units (all trucks) and over 23 horsepower units (trailers, rail, and gen sets). For over 23 horsepower units, almost 80 percent of the units taking action install a Level 3 retrofit, while 20 percent replace the unit. For under 23 horsepower units, only 50 percent install retrofits while 30 use alternative technology provisions, and 22 percent replace the unit. The numbers have been updated from the 2011 TRU inventory, and the results from both are shown below in Table 13

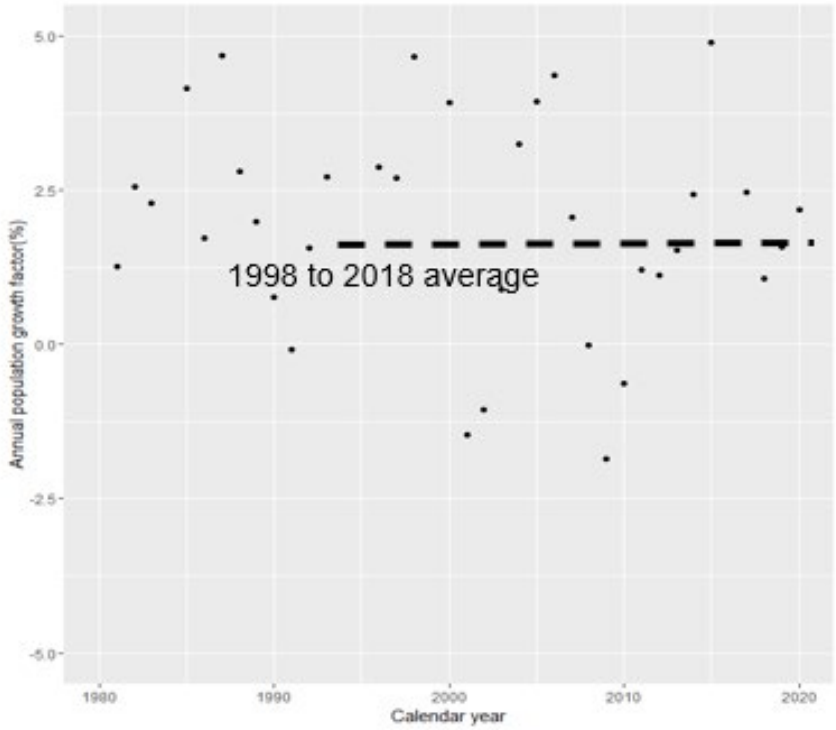
Table 13. Compliance Choices in 2011 and 2021 TRU Inventory

	Compliance Action	2011 TRU Inventory	2021 TRU Inventory
Compliance Rate for Age 7 TRUs	----	100%	31%
Over 23 Hp TRUs Compliance Choices (Trailers)	Install Level 3 retrofit	65%	78%
Over 23 Hp TRUs Compliance Choices (Trailers)	Alt tech	0%	3%
Over 23 Hp TRUs Compliance Choices (Trailers)	Replace unit	35%	19%
Under 23 Hp TRUs Compliance Choices (Trucks)	Install Level 3 retrofit	42%	48%
Under 23 Hp TRUs Compliance Choices (Trucks)	Alt tech	9%	30%
Under 23 Hp TRUs Compliance Choices (Trucks)	Replace unit	49%	22%

3.5. TRU Industry and Section Growth

The annual population growth rate is determined primarily by the ACT research's reefer population trend. As the model is focusing on mid to long-term projection (not just the next year's estimate), regression is conducted for the dataset of the past 20 years population trend from ACT research's reefer population data. Figure 11 below shows the annual population growth rate of nationwide reefers, from 1998 to 2018 averaging out to 1.6 percent annual growth.

Figure 11. ACT Research National Reefer Population Growth



IBIS World Reports for 2017, shown in Table 14 below, shows that industry trends for sectors using refrigerated units such as frozen food production and overall supermarket and grocery stores in the U.S. are growing at 1.6 percent annually as well, supporting this growth rate.

Table 14. IBIS World Reports Growth by NAICS

Sector	Category	Average Annual Growth 2011 to 2016
Manufacturing	Frozen food production in the US (NAICS 31141)	1.6%
Retail	Supermarkets & Grocery Stores in the US (44511)	1.6%

Note that this growth rate is applied only to the 2019 and future years. From 2011 to 2018, the growth rate is based on the average annual change in TRUs reported in ARBER.

3.6. Composite Population Forecast

The combination of turnover, purchasing, and growth results in the composite forecast (and backcast) are shown below in Figures 12 and 13. The 23 to 25 horsepower category, that is now a significant portion of new sales, grows as a proportion of the population until about 2025 where they reach an equilibrium (their percent of the population is equal to their

percent of new sales from Table 11). California-based TRUs and out-of-state TRUs are shown in the graphs below.

Figure 12. California TRU Population Forecast

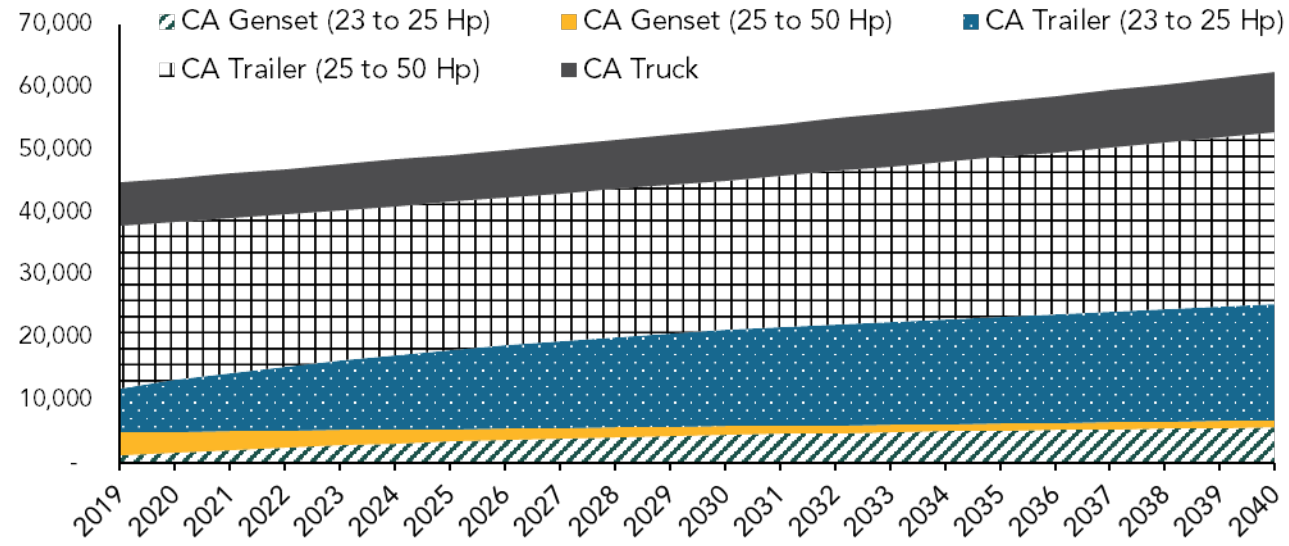
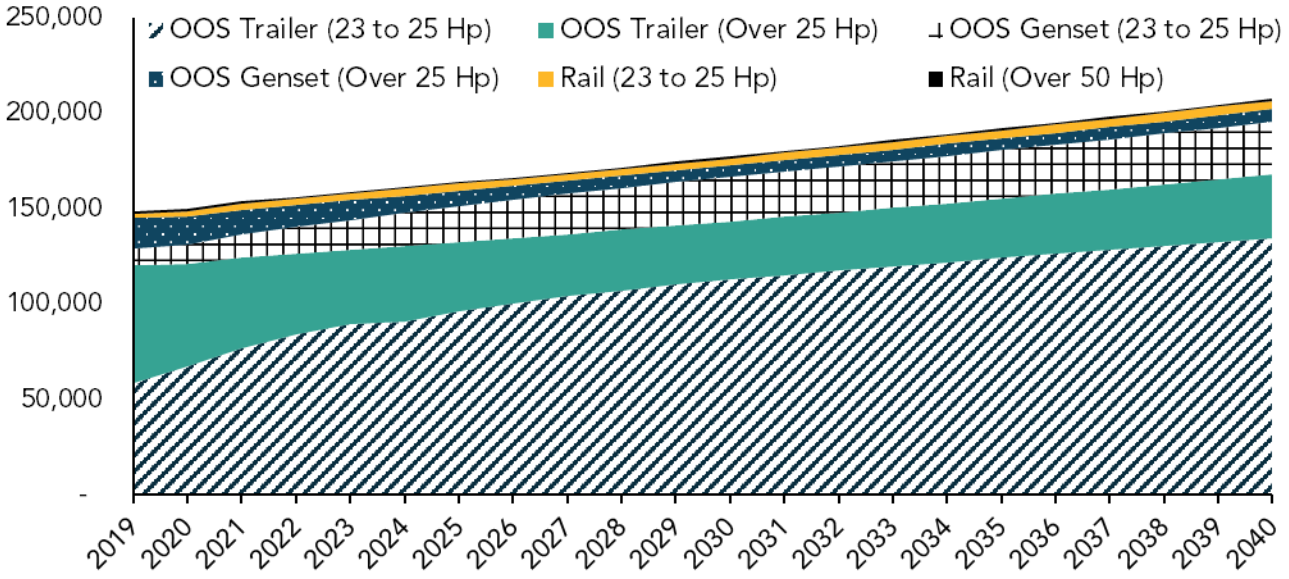


Figure 13. Out of State TRU Population Forecast



4. Summary of Proposed Amendments

CARB staff are proposing amendments to the TRU ATCM (Proposed Amendments) to transition diesel-powered truck TRUs to zero emission, as well as require a diesel PM emission standard for newly-manufactured TRUs in the remaining categories and the use of lower global warming potential refrigerant. The Proposed Amendments would require the following:

1. Beginning December 31, 2023, all truck TRU fleets shall turnover at least 15 percent each year to full zero-emission technology. All truck TRUs that operate in California shall be full zero-emission by December 31, 2029. This is modeled by a linear reduction in the activity, fuel, and emissions from diesel-powered truck TRUs beginning in 2024 and ending with a 100 percent reduction by 2030. This equates to an approximate annual reduction of 15 percent in truck TRU activity from 2024 to 2030.
2. Beginning December 31, 2022, all MY 2023 and newer trailer TRU, DSC TRU, railcar TRU, and TRU gen set engines shall meet a PM performance standard of 0.02 g/bhp-hr. This is modeled by reducing PM emissions for new sales of trailer TRUs, DSC TRUs, railcar TRUs, and TRU gen sets by 85 percent beginning in 2023, for those TRUs that do not already meet the 0.02 PM standard.

5. Emissions Results

The emissions results provided in this section reflect all previously described inputs, trends, and modeling. Figure 14 and Figure 15 show the statewide PM2.5 emissions in the baseline and under the Proposed Amendments, respectively. The population of 23 to 25 horsepower trailer TRUs (in-state trailer TRUs in brown and out-of-state trailer TRUs in grey) are forecast to dominate PM2.5 emissions under the baseline scenario.

Figure 14. Statewide PM2.5 Emissions by TRU Category in Baseline

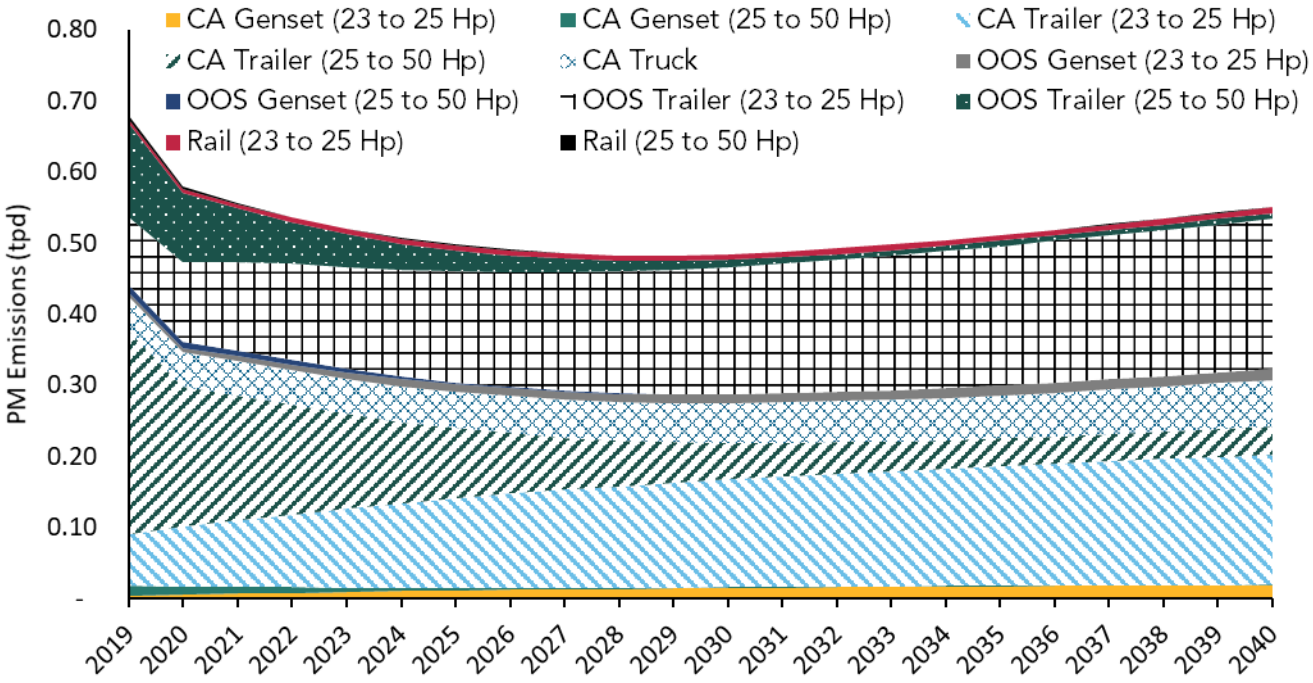
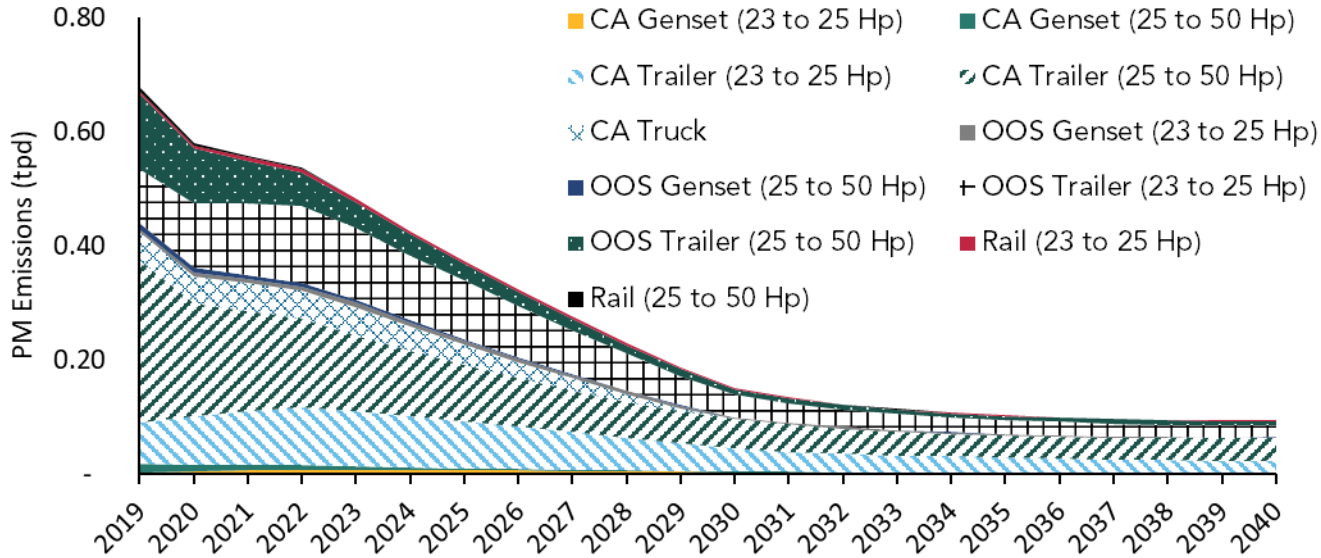


Figure 15. Statewide PM2.5 Emissions by TRU Category under Proposed Amendments



Under the Proposed Amendments, NOx emissions are only reduced by the requirement for California truck TRUs to transition to zero-emission, with no change in the trailer emissions. Figure 16 below shows the NOx emissions from TRUs, excluding truck TRUs, followed by the NOx emissions from truck TRUs in the baseline and under the Proposed Amendments in Figure 17.

Figure 16. Statewide NOx Emissions from TRUs Excluding Trucks.

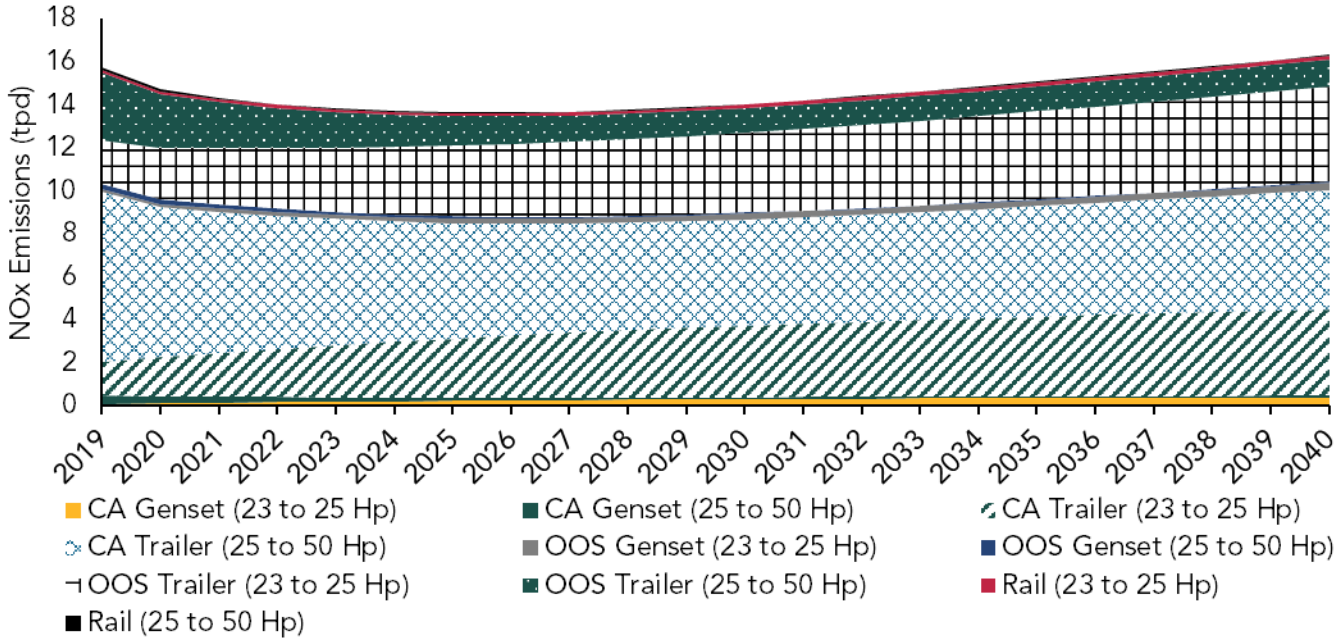
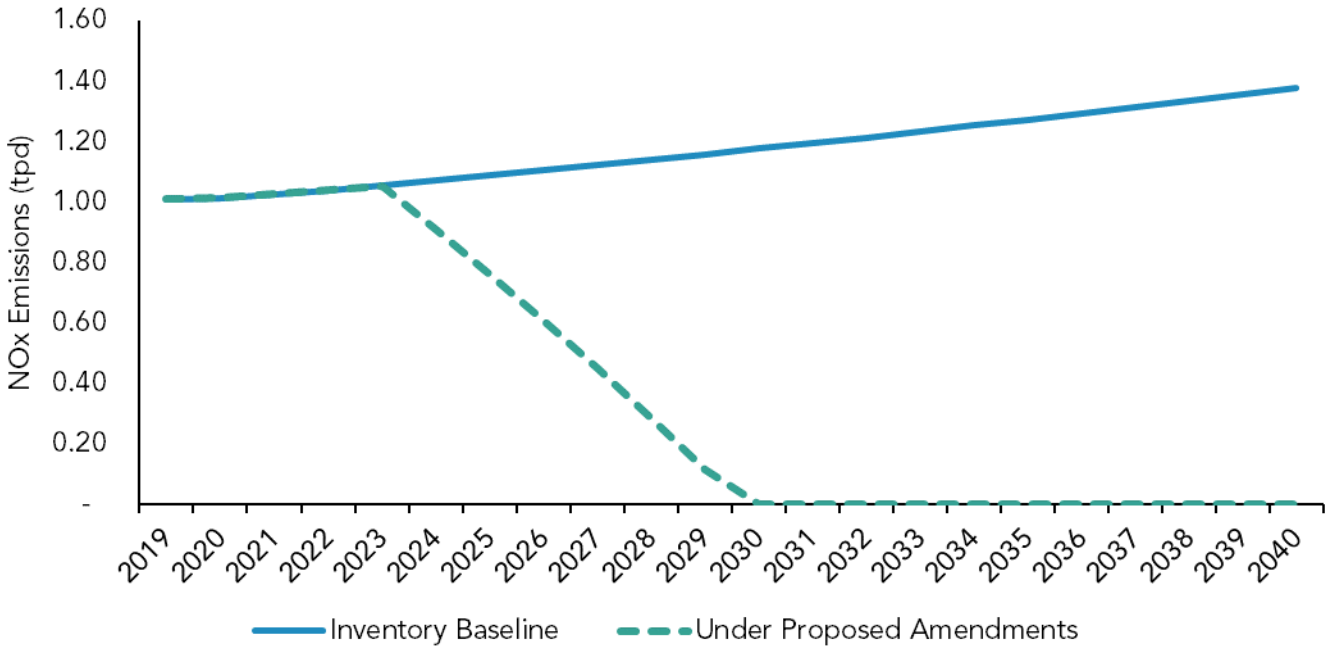


Figure 17. Statewide NOx Emissions from Truck TRUs



5.1. SRIA Emissions Results with 100 Percent Compliance

Per Department of Finance regulations (California Code of Regulations, title 1, sections 2000--2004),[11] the Proposed Amendments are a major regulation requiring a Standardized Regulatory Impact Assessment (SRIA) because the economic impact of the regulation is projected to exceed $50 million in a 12-month period. The following emissions results show the impacts of the Proposed Amendments relative to the SRIA baseline, in which full compliance with existing regulations is assumed.

Figure 18 shows the statewide PM2.5 emissions from TRUs in the SRIA baseline. The full compliance assumption causes significant turnover in 2020 to force compliance with the TRU ATCM, with an associated drop in PM emissions. The population of 23 to 25 horsepower trailers (in-state trailers in blue and out-of-state trailers in green) are forecast to dominate PM2.5 emissions.

[11] California Code of Regulations § 2000-2004, Division 3, Standardized Regulatory Impact Assessment for Major Regulation. (web link: https://govt.westlaw.com/calregs/Document/IAA1C7210595511E3BFC8D5B3615C797F?viewType=FullText&originationContext=documenttoc&transitionType=CategoryPageItem&contextData=(sc.Default)&bhcp=1#co_anchor_IA8F81D2F7A734A449389719B2F838650)

Figure 18. Statewide PM2.5 Emissions by TRU Category in Baseline with Full (i.e., 100 Percent) Compliance

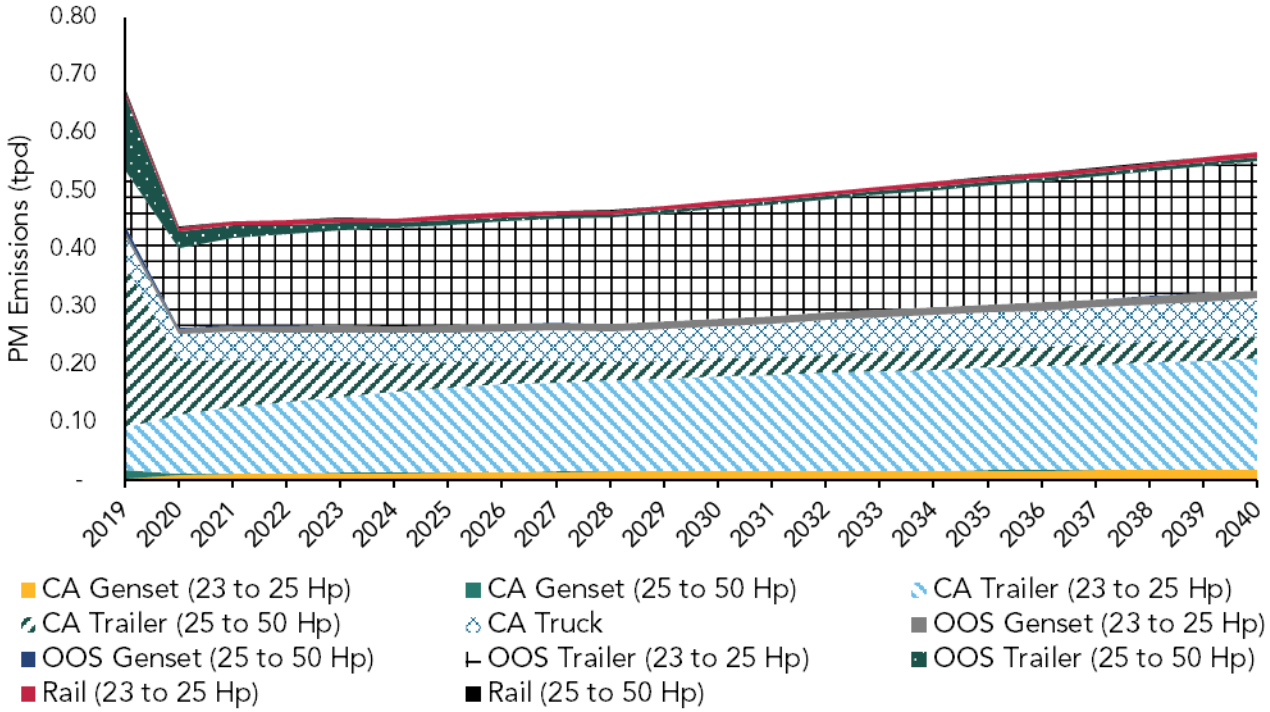


Figure 19 shows the statewide PM2.5 emissions that would result from the Proposed Amendments based on the SRIA baseline. Beginning in 2024, PM2.5 emissions are reduced as newly manufactured units are required to meet ULETRU.

Figure 19. Statewide PM2.5 Emissions by TRU Category under the Proposed Amendments with 100 Percent Compliance

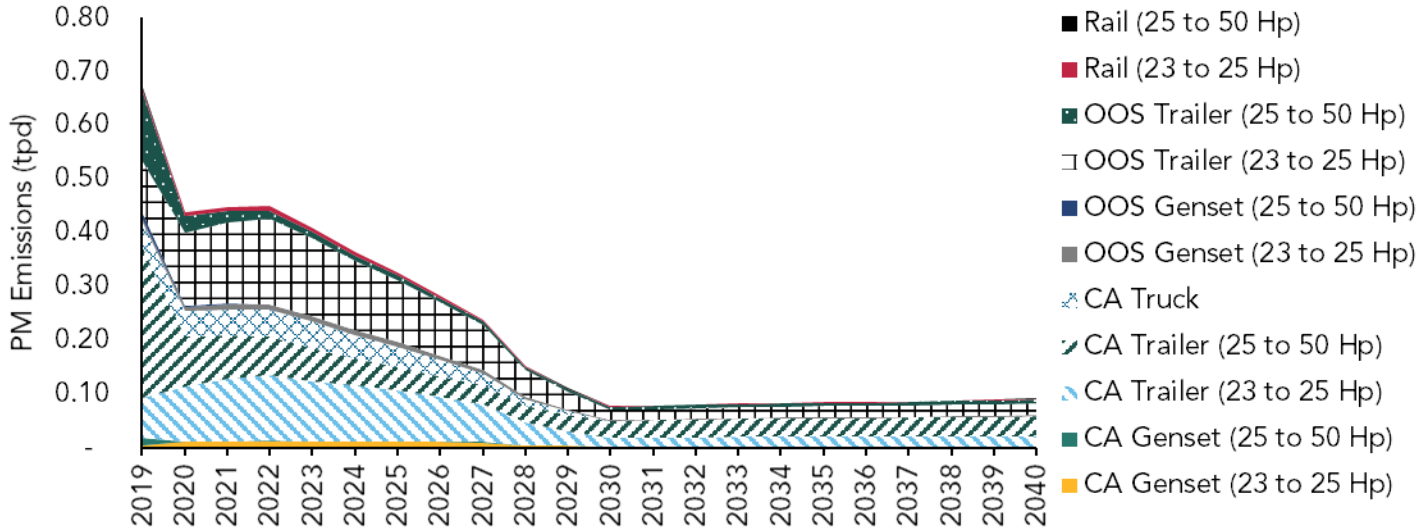


Figure 20 shows the Baseline statewide NOx emissions from TRUs. By 2035, NOx emissions will be slightly higher than 2019.

Figure 20. Baseline Statewide NOx Emissions by TRU Category with 100 Percent Compliance

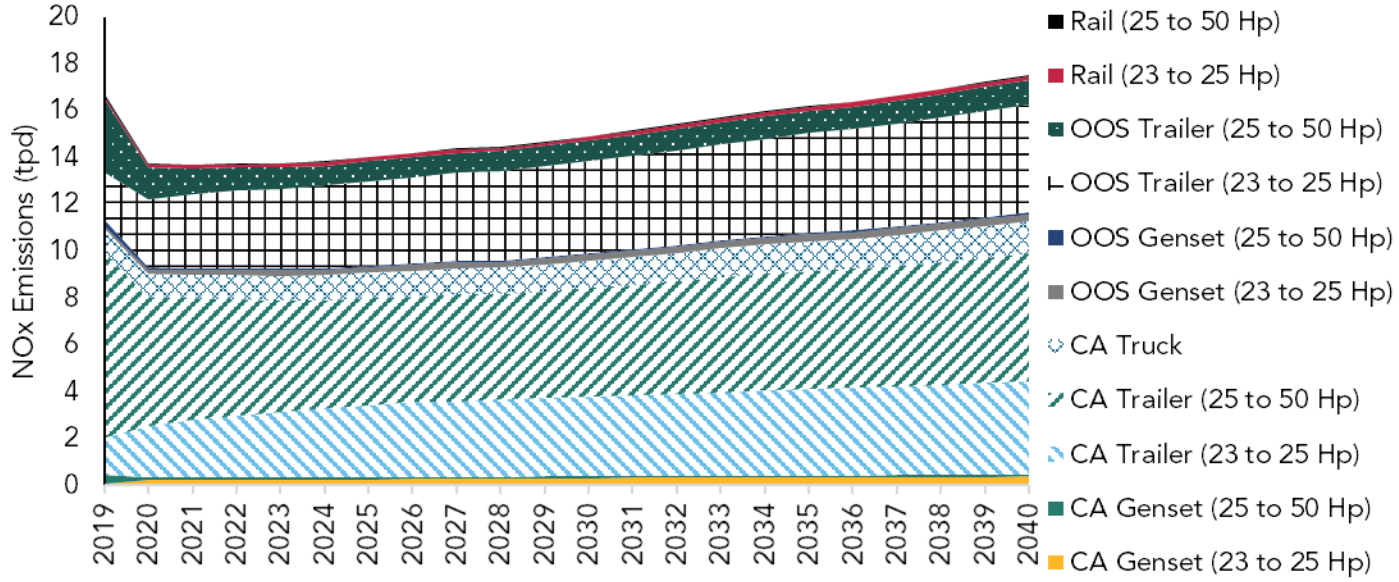


Figure 21 shows the statewide NOx emissions that would result from the Proposed Amendments based on the SRIA baseline. Beginning in 2024, NOx emissions are reduced slightly as truck TRUs begin to transition to zero-emission.

Figure 21. Statewide NOx Emissions by TRU Category under the Proposed Amendments with Full (i.e., 100 Percent) Compliance

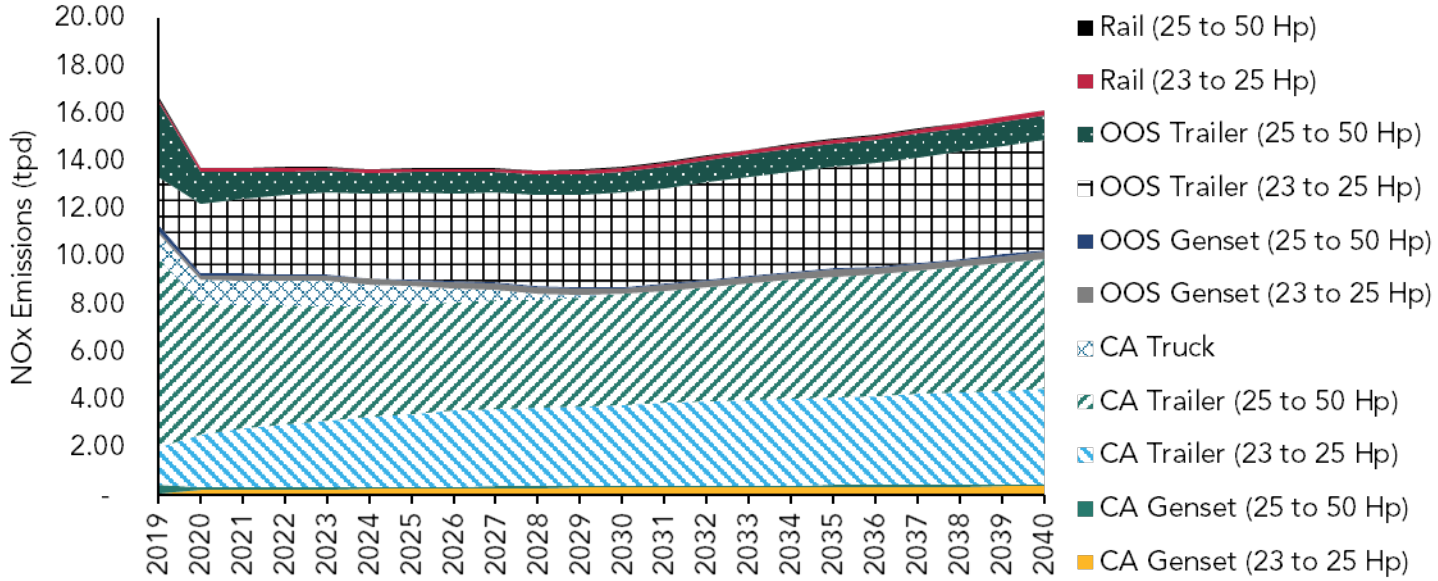
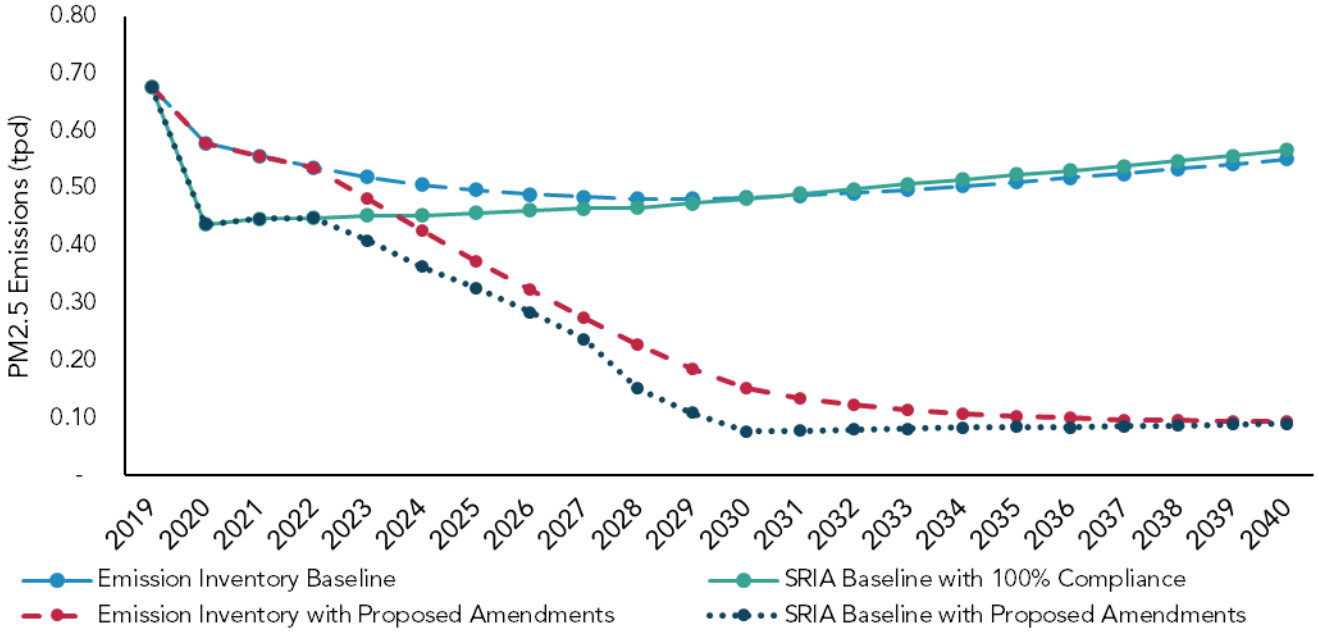


Figure 22 shows the impact of assuming full compliance for the SRIA in a comparison of PM2.5 under the baseline inventory, SRIA baselines, and the Proposed Amendments.

Figure 22. PM2.5 Emissions under Inventory and SRIA Compliance Scenarios



Appendix I

Health Analyses: Transport Refrigeration Units

Proposed Amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate

Date of Release: July 27, 2021
Date of Hearing: September 23, 2021

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I. Overview

California Air Resources Board (CARB) staff are proposing amendments to the Airborne Toxic Control Measure for In-Use Diesel-Fueled Transport Refrigeration Units (TRU) and TRU Generator Sets, and Facilities Where TRUs Operate (TRU ATCM; title 13, California Code of Regulations, section 2477), hereafter referred to as the "Proposed Amendments." In support of this effort, staff conducted health analyses to evaluate the health impacts of emissions from the diesel engines that power TRUs when operating at a cold storage warehouse (CSW) and a grocery store. These health analyses compare the current and future impacts of the TRU ATCM (Baseline) to the current and future impacts of the Proposed Amendments.

Exposure to diesel particulate matter (PM) has both potential cancer and noncancer chronic health impacts. This document presents two separate analyses, a health risk assessment (HRA) and a PM mortality and illness analysis. Each quantifies different health effects and each is equally important.

The HRA focuses on diesel PM emitted from diesel engines that power TRUs. The mortality and illness analysis focuses on "primary" (directly emitted) fine particulate matter (PM2.5) emissions and "secondary" PM2.5 formed in the atmosphere from oxides of nitrogen (NOx) from these same engines. Exposure to these pollutants can result in health outcomes that include premature death from cardiopulmonary disease, hospitalizations for cardiovascular and respiratory illnesses, and emergency room visits for asthma. The approaches used in each of these health analyses are outlined below:

<u>Health Risk Assessment</u>

- Develop a diesel PM emissions inventory that estimates the amount of diesel PM released annually from TRUs.
- Conduct air dispersion modeling to estimate the ground-level concentrations of diesel PM that result from these emissions.
- Estimate the potential health impacts from the modeled exposures.

<u>Mortality and Illness Analysis</u>

- Develop a PM2.5 and NOx emissions inventory that reflects the anticipated amount of each pollutant released annually from TRUs under the Baseline and the Proposed Amendments.
- Estimate statewide PM2.5 noncancer mortality and illness impacts associated with exposure to primary PM2.5 emitted from the diesel engines that power TRUs and secondary PM2.5 from NOx emissions.

To evaluate the effectiveness of the Proposed Amendments in reducing health impacts in communities that have facilities where TRUs typically operate, staff evaluated two facility types, a CSW and a grocery store.

Cold Storage Warehouse

- CARB staff evaluated two types of vehicles that are equipped with TRUs, trucks and semi-trailers. The CSW analysis evaluated the impacts of diesel PM emissions from the diesel engines that power TRUs when the truck or trailer, on which the TRU is mounted, is parked either at a loading dock or in a staging area, traveling to or from the facility, and moving around within the facility boundaries.

Grocery Store

- CARB staff evaluated two types of vehicles that are equipped with TRUs, trucks and semi-trailers. Throughout the year, grocery stores receive daily deliveries from both trucks and trailers; however, during the holiday seasons, some grocery stores have one or more semi-trailers parked for an extended period behind the store to provide additional storage for refrigerated or frozen products. For the purposes of this analysis, these are referred to as seasonal trailers. The grocery store analysis evaluated the impacts of diesel PM emissions from the diesel engines that power TRUs when the truck or trailer, on which the TRU is mounted, is parked and unloading, traveling to or from the grocery store, and moving within the grocery store parking lot, as well as seasonal trailers.

The assumptions used to determine potential cancer risk are not based on a specific facility. Instead, a representative generic facility was developed based on industry practice and operations. Actual potential risk estimates will vary for any one facility due to site-specific parameters, including the number of TRUs operating, hours of TRU activity, operating schedules, site configuration, site meteorology, distance to receptors, duration of exposure, and inhalation rate.

II. Health Risk Assessment for Facilities with Transport Refrigeration Unit Operations

A. Health Risk Assessment Overview

Risk assessment is a complex process that requires the analysis of many variables to model real-world situations. The standard approach used for this HRA involves four steps: 1) hazard identification, 2) exposure assessment, 3) dose-response assessment, and 4) risk characterization.

1. Hazard Identification

Hazard Identification is the process of determining the substances, or causing agents, that can cause an increase in adverse health effects (i.e., cancer, reproductive, developmental) and their likely impacts to humans. For this assessment, the pollutant of concern is diesel PM from the diesel engines that power TRUs. In 1998, CARB identified diesel PM as a toxic air contaminant based on its potential to cause cancer and other health impacts under the AB 1807 Toxic Air Contaminant Identification and Control Program (CARB, 1998).

2. Exposure Assessment

Exposure assessment is an estimate of the level, duration, and frequency of exposures of an individual or population to a substance. This involves emissions quantification, modeling of environmental transport, evaluation of environmental fate, identification of exposure routes and exposed populations, and estimation of exposure levels. At facilities where TRUs operate, the receptors that are most likely to be exposed include residents and off-site workers. On-site workers could also be impacted by the emissions; however, they are not included in this HRA because the California Department of Industrial Relations, Division of Occupational Safety and Health (Cal/OSHA) has jurisdiction over on-site exposure to workers who are employed at the facility. Diesel PM only has health values for the inhalation pathway. As a result, inhalation is the only pathway evaluated. The magnitude of exposure is assessed through diesel PM emission estimates and computer air dispersion modeling, resulting in downwind ground-level concentrations of diesel PM at near-source locations.

3. Dose-Response Assessment

Dose-response describes the amount of exposure (the dose) and its relation to the likelihood and severity of adverse health effects (the response). The assessment characterizes the relationship between exposure to a pollutant and the incidence or occurrence of an adverse health effect. This step of the HRA uses the health values developed by the Office of Environmental Health Hazard Assessment (OEHHA). OEHHA supplies these dose-response relationships in the form of cancer potency factors (CPF) for carcinogenic effects and reference exposure levels (REL) for

non-carcinogenic effects. See the OEHHA guidelines (OEHHA, 2015), for a list of health factors.

Staff used an inhalation CPF of 1.1 milligrams per kilogram body weight day $(mg/kg\text{-}day)^{-1}$ and a chronic REL of 5.0 micrograms per cubic meter (µg/m3) for diesel PM emitted by the diesel engines that power TRUs. Diesel PM does not have an associated acute REL.

4. Risk Characterization

Finally, risk characterization communicates the results of the evaluation of the risks as well as the assumptions and uncertainties inherent in the assessment. Modeled concentrations, which are determined through exposure assessment, are combined with CPF and REL values determined under the dose-response assessment. This step integrates the information used to quantify the potential cancer and noncancer risks.

B. Selection of Facilities with TRU Operations

TRUs typically operate at refrigerated warehouses or distribution centers (WHDC), grocery stores, port facilities, intermodal railyards, and other locations that are often near sensitive receptors, such as schools, hospitals, elder care facilities, and residential neighborhoods. CARB staff conducted an analysis to estimate the number and types of facilities where TRUs operate as well as their contribution to statewide diesel PM emissions with the purpose of determining the applicability of the Proposed Amendments at these facilities. More information on these facility types and their TRU operations can be found in Appendix F to the Staff Report.

Based on this analysis, the facility types with the highest estimated contribution of statewide diesel PM emissions from diesel-powered TRUs are refrigerated WHDCs (which includes CSWs) and grocery stores. Therefore, CARB staff modeled a generic CSW and a generic grocery store to characterize existing health risk and the effectiveness of the Proposed Amendments.

C. Emission Inventory Summary

HRAs rely on information about the type of operation and the amount of pollutants emitted by the sources of study. Although TRUs operate across the State, their impact is often concentrated in communities near facilities where a large number of TRUs may be operating simultaneously and continously. In addition, the diesel engines that power TRUs emit a significant amount of PM2.5, due in part to a less stringent PM emission standard for smaller diesel engines (i.e., less than 25 horsepower).

TRUs operating in California are subject to the TRU ATCM, which requires all in-use TRUs and TRU generator sets that operate in California to reduce their PM emissions in accordance with a compliance schedule based on a seven-year operational life for

the equipment. This can be achieved by using a TRU equipped with an engine certified to the United States Environmental Protection Agency (U.S. EPA) Tier 4 final off-road engine standards for 25-50 horsepower engines, installing a Level 3 filter (with at least 85 percent PM control) on the TRU engine, replacing the TRU, or using a qualifying alternative technology.

The 2021 update to the statewide emission inventory for TRUs, which was previously released in 2011, reflects improvements to a number of parameters, including, but not limited to:

- Population and age distribution of in-use TRUs.
- Annual TRU engine activity and the portion of activity that occurs within the State.
- Turnover (replacement of old units) and purchasing trends (addition of new units).

The emission inventory reflects a substantial increase in the number of trailer TRUs equipped with engines between 23 and 25 horsepower. This increase began with 2013 model year units. The emergence of trailer TRUs with engines between 23 and 25 horsepower is notable because the U.S. EPA Tier 4 final PM emission standard for these smaller horsepower engines is 15 times higher than the Tier 4 final PM standard for engines above 25 horsepower. Emissions from these smaller and dirtier engines will become responsible for the majority PM emissions from TRUs in the near future, if current trends continue.

The emissions inventory for any given year is calculated by combining the population of TRUs, the hours of activity of TRUs, the horsepower of the TRU engine, load factors, emission factors, and fuel correction factors, in the following equation:

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

Where:

Population =	Count of equipment population
Activity =	Time the engine is running (hours)
HP =	Horsepower of the engine (max brake horsepower)
LF =	Load factor (unit-less)
EF =	Emission factor specific to horsepower and model year and pollutant (grams/kW-hr)
FCF =	Fuel correction factor based on calendar year (unit-less)

Detailed information on the data sources and methodology used in the statewide TRU emission inventory can be found in Appendix H to the Staff Report.

Table II.C.1 shows the diesel PM emission factors for truck and trailer TRUs used in each health analysis presented in this document. Staff analyzed health impacts in the following years:

- 2019: Serves as a baseline year, in which the Proposed Amendments are not yet implemented
- 2024: First year of implementation of the zero-emission truck TRU requirement beginning December 31, 2023 and second year of implementation of the more stringent PM emission standard requirement beginning December 31, 2022.
- 2030: Proposed Amendments fully implemented December 31, 2029

Table II.C.1. Health Risk Assessment TRU Emission Factors for Diesel PM

Year	Baseline Truck TRU Emission Factor	Proposed Truck TRU Emission Factor	Baseline Trailer TRU Emission Factor	Proposed Trailer TRU Emission Factor
2019	1.74	1.74	2.08	2.08
2024	1.68	1.42	1.26	1.12
2030	1.67	0.00	0.99	0.49

Note: Emission factors listed in grams per hour.

The values in the "Baseline Emission Factor" columns represent the rate at which diesel PM would be emitted from a diesel engine that powers a TRU if the Proposed Amendments were not implemented. The values in the "Proposed Emission Factor" columns represent the rate at which diesel PM would be emitted from a diesel engine that powers a TRU if the Proposed Amendments were to be implemented.

D. Air Dispersion Model

The selection of an air dispersion model depends on many factors, such as characteristics of emission sources (e.g., point, area, volume, or line), the type of terrain (e.g., flat or complex) at the emission source locations, and the relationship between sources and receptors. For this HRA, CARB staff selected U.S. EPA's AERMOD, Version 18081 (U.S. EPA, 2018b) to simulate the impacts of TRU diesel PM emissions on nearby receptors. AERMOD is a steady-state plume model that incorporates air dispersion based on a planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources and distances up to 50 kilometers (km) in both flat and complex terrain.

1. Meteorological Data

AERMOD requires hourly meteorological data as inputs to the model. Meteorological parameters include wind speed, wind direction, atmospheric stability, and ambient temperature. These parameters are recorded by meteorological stations. To aid in the selection of representative data, CARB staff evaluated ten meteorological stations.

Each station's average wind speed, wind direction, surface characteristics, and proximity to refrigerated WHDC hubs were compared. Additionally, a sensitivity study was conducted using each meteorological dataset to provide a relative comparison of ground-level concentrations.[1] Of the ten meteorological stations, three were chosen for their collective range of meteorological conditions and land cover type, community interest and concern over the prevalence of nearby refrigerated WHDCs, and proximity of the meteorological station to refrigerated WHDC hubs and grocery stores. The three stations chosen were Watsonville Municipal Airport (Watsonville), Fresno Yosemite International Airport (Fresno), and Banning Station (Banning). The modeled concentrations that resulted from using each of these meteorological datasets were averaged to produce the potential statewide averaged cancer risk from TRUs.

The Watsonville, Fresno, and Banning AERMOD-ready meteorological data files were processed using U.S. EPA's AERMET processor and the AERMINUTE and AERSURFACE pre-processors. More detail on each station's meteorological data processing is described below.

Watsonville Municipal Airport Meteorological Data

Watsonville's AERMOD-ready meteorological data files were processed by CARB staff for years 2013-2017. The following options were used in AERMET to aid in the development of those files:

- One-Minute ASOS Wind Data File.
- 1-Minute ASOS wind speed threshold of 0.5 m/s.
- Adjust Surface Friction Velocity (ADJ_U*).
- AERSURFACE options:
  - Airport site.
  - Site surface moisture: Dry, Wet, Average, Wet, and Wet for years 2013-2017, respectively.
  - Assign Month/Season: default values (U.S. EPA, 2013).

In AERMOD, the wind direction rotation adjustment option was selected for Watsonville with an input of 45 degrees. This option aligned Watsonville's prevailing winds with the area sources in each model to provide health-protective downwind cancer risk estimates.

Watsonville's wind rose is shown in Figure II.D.1. The wind rose presents the frequency of winds at the specified wind direction sector and wind speed class during the years 2013-2017.

[1] See Section II.H for a detailed description of the meteorological station sensitivity study.

Fresno Yosemite International Airport Meteorological Data

Fresno Yosemite International Airport's AERMOD-ready meteorological data files were processed by the San Joaquin Valley Air Pollution Control District for years 2013-2017.[2]

In AERMOD, the wind direction rotation adjustment option was selected for Fresno with an input of 38 degrees. This option aligned Fresno's prevailing winds with the area sources in each model to provide health-protective downwind cancer risk estimates. Figure II.D.2 shows the wind rose for the Fresno Yosemite International Airport station. The wind rose presents the frequency of winds at the specified wind direction sector and wind speed class during the years 2013-2017.

Banning Station Meteorological Data

Banning Station's AERMOD-ready meteorological data files were processed by the South Coast Air Quality Management District for years 2011-2015.[3]

For the Banning Station data, the wind direction rotation adjustment was not selected because the prevailing winds were already aligned with each model's area sources to provide health-protective downwind cancer risk estimates. Figure II.D.3 shows the wind rose for the Banning Municipal Airport stations. The wind rose presents the frequency of winds at the specified wind direction sector and wind speed class during the years 2011-2015.

[2] Additional detail on how the San Joaquin Valley Air Pollution Control District processed Fresno's meteorological data.is available on their website at: https://www.valleyair.org/busind/pto/Tox_Resources/AirQualityMonitoring.htm#met_data.
[3] Additional detail on how the South Coast Air Quality Management District processed Banning's meteorological data is available on their website at: http://www.aqmd.gov/home/air-quality/meteorological-data/data-for-aermod.

Figure II.D.1. Wind Rose for Watsonville Municipal Airport

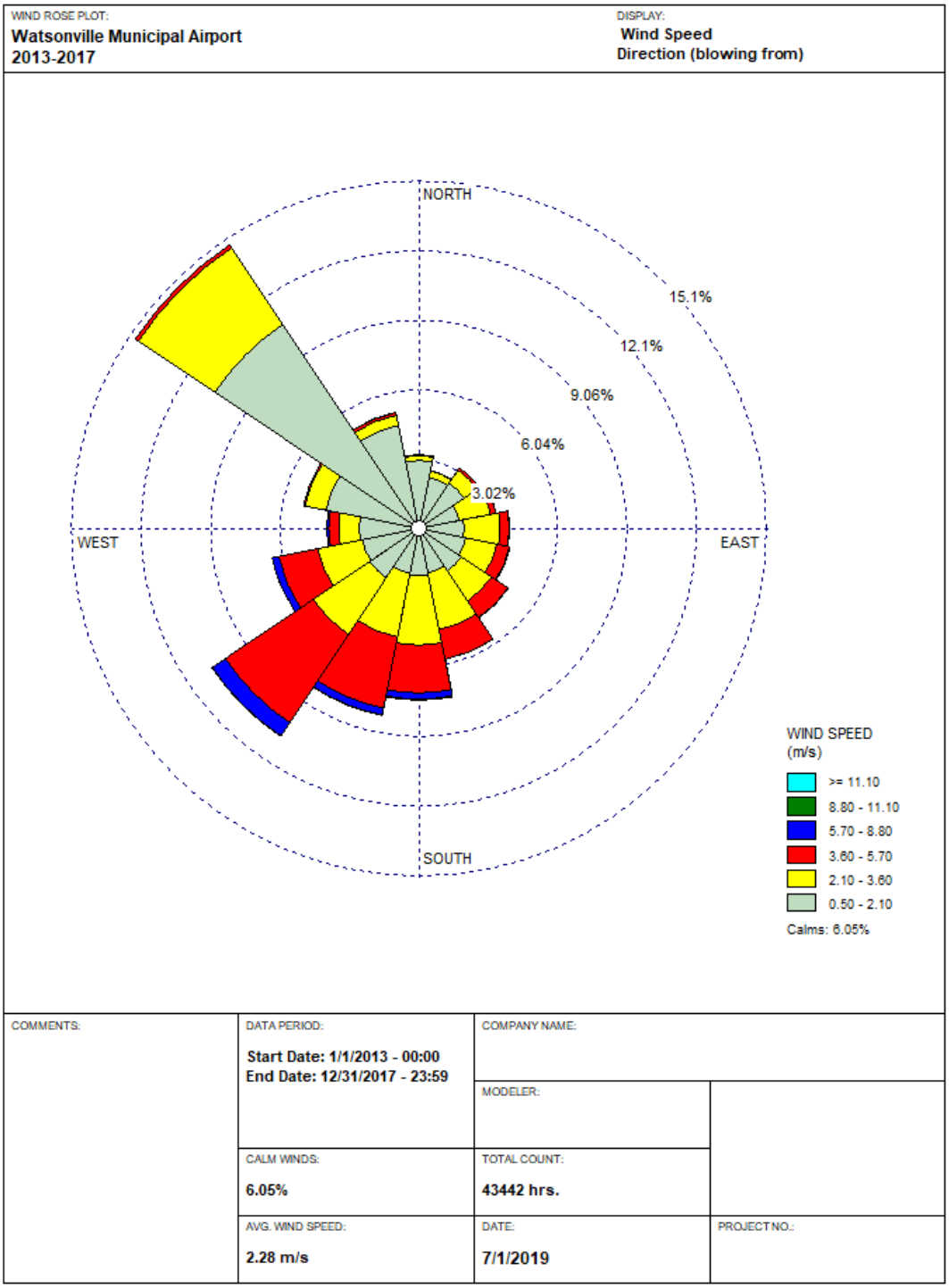
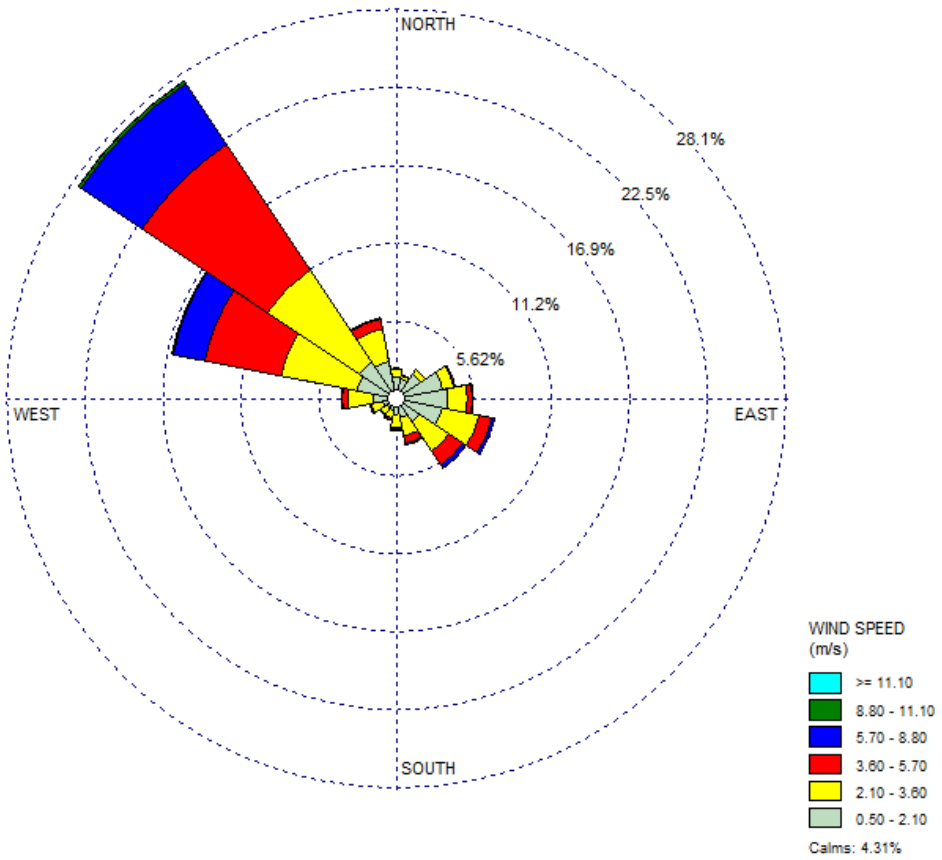


Figure II.D.2. Wind Rose for Fresno International Airport

WIND ROSE PLOT:
Fresno Yosemite International Airport
2013-2017

DISPLAY:
Wind Speed
Direction (blowing from)



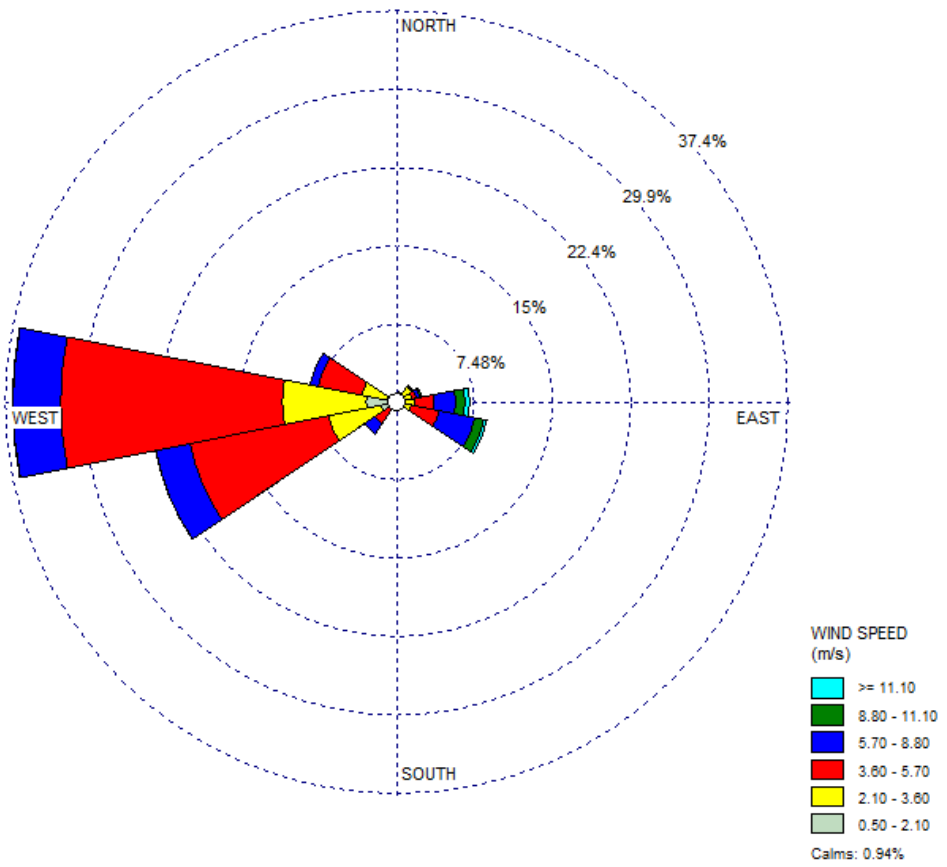
COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2013 - 00:00 **End Date: 12/31/2017 - 23:59**	MODELER:	
	CALM WINDS: **4.31%**	TOTAL COUNT: **43534 hrs.**	
	AVG. WIND SPEED: **2.95 m/s**	DATE: **7/1/2019**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

Figure II.D.3. Wind Rose for Banning Station

WIND ROSE PLOT:
Banning Station
2011-2015

DISPLAY:
Wind Speed
Direction (blowing from)



COMMENTS:	DATA PERIOD:	COMPANY NAME:	
	Start Date: 1/1/2011 - 00:00 **End Date: 12/31/2015 - 23:59**	MODELER:	
	CALM WINDS: **0.94%**	TOTAL COUNT: **42850 hrs.**	
	AVG. WIND SPEED: **4.23 m/s**	DATE: **7/1/2019**	PROJECT NO.:

WRPLOT View - Lakes Environmental Software

E. Risk Exposure Scenarios

To analyze the health impacts from TRUs at a CSW and grocery store, staff evaluated exposure scenarios for inhalation cancer risk and noncancer chronic risk. Staff calculated the health impacts using the methodology consistent with the OEHHA Guidance Manual. For the Proposed Amendments, health impacts were evaluated for years 2019, 2024, and 2030. The description of the exposure scenarios and assumptions are presented below.

1. Exposure Scenarios for Inhalation Cancer Risk

The OEHHA Guidance Manual provides a description of the risk algorithms, recommended exposure variates, and health values for calculating potential cancer risk. Potential cancer risk is calculated by converting an annual average concentration to a dose and then comparing it to a pollutant-specific health value.

Staff calculated potential cancer risk values for two exposure scenarios, residential exposure and off-site worker exposure.

- 30-Year Individual Residential Cancer Risk: An individual residential cancer risk evaluation assumes that a resident is exposed to the emission source for 30 years. This assumes an individual will live at a single location for that timeframe.
- Off-Site Worker Cancer Risk: An off-site worker cancer risk evaluation assumes that an individual who works at a facility near a grocery store or refrigerated warehouse and distribution center is exposed to the emission sources for 25 years, 8 hours per day, and 250 days per year. For this HRA, the sources are assumed to emit continuously. Therefore, no adjustment factor was applied to the annual concentration.

For residential exposure, staff applied the CARB and the California Air Pollution Control Officers Association (CAPCOA) risk management policy (RMP) for inhalation-based cancer risk (CARB & CAPCOA, 2015). The policy recommends using the 95th percentile breathing rates for age bins less than 2 years old and the 80th percentile breathing rates for age bins greater than or equal to 2 years old. Staff also used the recommended Fraction of Time at Home (FAH) value of 0.73 for age bins greater than 16 years of age. For off-site worker exposure, staff used the OEHHA Guidance Manual recommended eight hour breathing rate for moderate intensity activities.

Table II.E.1 summarizes the exposure assumption for each scenario.

Table II.E.1. Summary of Exposure Parameters

Risk Scenario	Consideration			Breathing Rate (BR)	FAH	Pathway Evaluated
	Hours per Day	Days per Year	Years			
Individual Resident (30-year Residential Cancer Risk)	24	350	30	RMP (95th percentile DBRs for age bins less than 2 years and 80th percentile DBRs for age bins greater than 2 years)	1 for age bins less than 16 years[4] 0.73 for age bins greater than 16 years	Inhalation only
Off-site Worker	8	250	25	8-hour moderate intensity BRs	Not applied (all age bins use 1)	

Because people have different breathing rates and different levels of sensitivity to carcinogens at different ages, cancer risk is calculated by age ranges or bins (i.e., third trimester, 0<2, 2<9, 2<16, 16<30, and 16-70). After the risk is calculated for each applicable age bin, the results are summed for the exposure duration of interest (e.g., 30 years) to yield a total cancer risk. Table II.E.2 summarizes the age bin exposure durations for each scenario.

[4] Assumes schools are in the 1/million isopleth.

Table II.E.2. Age Bin Exposure Duration Distribution

Risk Scenario	Exposure Duration Applied for Each Age Bins					Total
	3rd Trimester	0<2	2<16	16<30	16-70	
Individual Resident (30-year Residential Cancer Risk)	0.25	2 years	14 years	14 Years	-	30 years
Off-site Worker	-	-	-	-	25 years	25 years

The bins allow for the use of age-specific exposure variates. Exposure variates include breathing rates, age sensitive factors, fraction of time at home, and exposure duration. For example, age sensitivity factors will multiply the risk by a factor of 10 for age bins less than 2 years of age and use a factor of 3 for age bins between 2 and 16.

2. Exposure Scenarios for Noncancer Chronic Risk

The exposure scenario is identical for residents and off-site workers. The chronic health hazard index (HI) is calculated by dividing the annual average diesel PM concentration by the diesel PM inhalation chronic REL. A health hazard index value above one may indicate potential health impacts and may require further evaluation. To determine potential noncancer chronic risk, staff used the recommended diesel PM reference exposure level of 5 $\mu g/m^3$.

F. Grocery Store Methodology and HRA Results

1. Source Description

Grocery stores range in size from small local markets to supercenter grocery stores. The primary emission sources of diesel PM at these facilities are TRUs mounted on box trucks or semi-trailers. Because of the variability of size and operation, CARB staff elected to model a generic grocery store using three operational scenarios, which are described in the Emission Inventory section.

a) Facility Layout

To develop a generic grocery store layout, CARB staff evaluated various grocery stores throughout California, including stand-alone and those located within a strip

mall. Due to the ubiquitous nature of grocery stores and their prevalence throughout the State, 60 grocery stores were randomly selected from a population of over 3,000 California stores from the Refrigerant Management Program database. CARB staff used aerial photos of each grocery store (an example of which is shown in Figure II.F.1) to develop a generic facility plot and to determine the approximate dimensions and locations of all stationary and mobile sources of emissions from diesel engines that power TRUs at a grocery store.

Figure II.F.1. Aerial Image and Spatial Analysis of a California Grocery Store

Map data: Google, DigitalGlobe

In addition to evaluating the on-site locations of where TRU activity occurs at a grocery store, the aerial photos were used to determine the following parameters:

- Property Boundary: The red outline denotes the total property area associated with the facility within the property boundary.
- Grocery Store Location: The blue outline denotes the area occupied by the grocery store.

- Loading Dock Location: The yellow outline denotes the loading docks and the size of stationary TRU activity area, which includes loading docks and truck/trailer parking. Loading docks are typically found behind a grocery store. If a loading dock could not be found, it was assumed that deliveries would be unloaded somewhere near the facility. Therefore, a minimum of one loading dock would be assumed for each facility.
- Width of the Road: The width of the road entering the facility property and the corresponding speed limit were determined.
- Total on-site TRU Transiting Path Length: This was determined to be any path a TRU may travel on the facility property, which includes entering the property, traveling to any dock doors or parking areas, and exiting the property.
- Distance to Nearest Off-Site Receptors: The white lines indicate the distances from the stationary TRU activity area to the nearest resident, worker, and sensitive receptor (i.e., school, nursing home, residential care facility, daycare center, or hospital). Of the 60 grocery stores analyzed, the nearest resident was found at 3 meters, the nearest worker was found at 6 meters, and the nearest sensitive receptor at 28 meters.

2. Emission Inventory

For this HRA, CARB staff evaluated two types of vehicles that are equipped with TRUs, smaller delivery trucks and semi-trailers. Throughout the year, grocery stores receive deliveries daily from both trucks and trailers. However, during the holiday seasons, some grocery stores have a semi-trailer parked for an extended period behind the store to provide additional storage for refrigerated or frozen products. For the purposes of this analysis, these are referred to as seasonal trailers. The diesel engines that power TRUs on trucks and trailers generate emissions during three different modes of operation: 1) off-site transiting, when the truck or trailer is traveling to the store, 2) on-site transiting, when the truck or trailer is traveling from the street to the point where it unloads, and 3) stationary, when the truck or trailer is parked and unloading. To quantify emissions from each equipment type and for each mode of operation, the following equation was used:

$$Emissions = Emission\ Factor\ \left(\frac{grams}{hour}\right) x\ Activity\ \left(\frac{hours}{week}\ of\ TRU\ engine\ operation\right)$$

Emission factors for truck and trailer TRUs can be found in Table II.F.2.

TRU activity at a grocery store is dependent on the number of truck and trailer trips generated by the facility. CARB staff developed equipment and activity profiles for three grocery store scenarios based on a literature review and survey results:

- One daily truck TRU, one daily trailer TRU, one seasonal trailer TRU.
- Seven daily truck TRUs, two daily trailer TRUs, one seasonal trailer TRU.
- Ten daily truck TRUs, six daily trailer TRUs, one seasonal trailer TRU.

These numbers were determined by evaluating data on the total number of deliveries grocery stores receive each day. For all three scenarios, staff assumed that 50 percent of the total number of smaller delivery trucks and trailers are equipped with TRUs. The emission inventory for grocery stores assumes that delivery trucks equipped with TRUs stay on-site for 0.9 hours and semi-trailers equipped with TRUs stay on-site for 3.5 hours (CARB, 2016 and Trans Now, 2010).

The first activity scenario serves as a baseline scenario for each equipment type. The second scenario, consisting of seven daily truck TRUs and two daily trailer TRUs, is based on a study prepared for Washington State's Department of Transportation (Trans Now, 2010). This activity profile represents potential TRU activity at grocery stores ranging in size from 23,000-53,000 square feet and assumes 50 percent of the total daily truck and trailer traffic is equipped with TRUs. The third scenario, consisting of ten daily truck TRUs and six daily trailer TRUs, is based on a Draft Environmental Impact Report (First Carbon Solutions, 2016). This activity profile represents potential TRU activity at a 192,000 square-foot grocery store.

All three grocery store scenarios include trailer TRUs that stay on-site seasonally. Seasonal trailer TRU operations are based on data from CARB's 2016 Grocery Store Survey. For this HRA, there are a total of three seasonal trailer TRUs which each visit for one month out of the year: one in October, one in November, and one in December. They are assumed to operate 24 hours per day, 7 days per week while at the facility.

For this evaluation, the definition of a truck trip is a truck entering or exiting the facility. This means that when one TRU-equipped truck or trailer enters and exits the facility, it counts as two trips. For on-site and off-site transiting, activity is determined by multiplying the number of trips for each equipment type by its assumed traveling speed and traveled distance. However, for stationary operations, activity is determined by multiplying the number of each equipment type by the residency time of the equipment at the facility (i.e., unloading or storage time). Table II.F.1 summarizes the emission estimate inputs for grocery stores developed for this analysis.

Table II.F.1. Emission Estimate Inputs for a Grocery Store

Facility Characteristics	Assumptions/References	Value
Facility Location	Site reflects a generic grocery store in California.	None
Grocery Store Footprint	Footprint reflects a generic grocery store in California.	None
Facility Height	Height of modeled facility.	30 feet high
Facility Operation (days/week)	24 hours per day, 7 days a week.	8,760 hours per year
TRU Trip Rate	Scenario:	trips/week
	1 Daily Truck TRU 1 Daily Trailer TRU 1 Seasonal Trailer TRU (Oct., Nov., Dec.)	14 14 0.5
	7 Daily Truck TRUs 2 Daily Trailer TRUs 1 Seasonal Trailer TRU (Oct., Nov., Dec.)	98 28 0.5
	10 Daily Truck TRUs 6 Daily Trailer TRUs 1 Seasonal Trailer TRU (Oct., Nov., Dec.)	140 84 0.5
Stationary TRU Engine Runtime Hours	The amount of time a TRU spends stationary and idling at a grocery store (CARB, 2016 and Trans Now, 2010).	Trailer: 3.5 Truck: 0.9
Docking, Parking, and Transiting TRU Emission Factors	CARB Statewide Emission Inventory Model for TRUs (2020 Update) 341 meter on-site transit route at a speed of 5 miles/hour speed 3,048 meter off-site transit route at a speed of 30 miles/hour	Trailer TRU: 2.08 g/hour Truck TRU: 1.74 g/hour

Table II.F.2 summarizes the TRU diesel PM emission results for a generic grocery store. The baseline year for all emission estimates is 2019.

Table II.F.2. Baseline Grocery Store TRU Emissions in 2019

Grocery Store Scenario	Diesel PM Emissions (tons per year)
1 Daily Truck 1 Daily Trailer 1 Seasonal Trailer	0.009
7 Daily Trucks 2 Daily Trailers 1 Seasonal Trailer	0.017
10 Daily Trucks 6 Daily Trailers 1 Seasonal Trailer	0.31

Note: Values are rounded.

3. Air Dispersion Modeling

To run AERMOD, modelers are required to define and setup the project and emissions sources, provide the meteorological data files, and specify the receptor locations. This can be done through four model pathways: control, source, meteorology, and receptor. These pathways are described below.

a) Control Pathway

Control inputs are required to specify the global model options for the model run. For all inputs, staff used the regulatory defaults with exception of those listed in Table.II.F.3.

Table II.F.3. AERMOD Control Inputs – Grocery Store

Control Parameter	Consideration	Model Input
Dispersion Coefficient	The urban dispersion option addresses potential issues associated with the transition from the nighttime urban boundary layer to the daytime convective boundary layer. Selecting the urban dispersion option allows AERMOD to model enhanced dispersion during nighttime stable conditions due to the urban heat island effect. The height of the urban boundary layer is dependent on population (U.S. EPA, 2018b). An area may be considered urban if the land use type(s) within a 3 km radius of the source accounts for 50 percent or more of the following categories: industrial, commercial, and/or residential. The majority of California grocery stores are located in an urban environment. A population of 500,000 was selected based on research and a sensitivity study performed by CARB staff. More details of that research and sensitivity study are provided in Section II.H.2.	Urban Population: 500,000
Terrain Option	Modeling a generic facility does not require terrain data. The terrain was considered flat for this HRA.	Flat

b) Source Pathway

Source inputs require source identification and a defined source type (e.g., point, area, volume, or open pit). Each source type requires specific parameters to define the source. For example, the required inputs for an area source are emission rate, release height, and dimensions. Table II.F.4 describes six source inputs that were used for this HRA.

Table II.F.4. AERMOD Source Inputs – Grocery Store

Source Parameter	Consideration	Model Input
Source Type	Area sources were used to model both stationary and mobile source releases for the following reasons: • Enough data was available to model with an area source. The lack of current engine data prevented the use of point sources. • Area sources do not have exclusion zones. Exclusion zones prevented the use of volume sources.	Area Source
Stationary Area Source Dimension	The stationary area source dimensions for both the daily unloading area source and the seasonal parking area source are set to 7.4 meters (i.e., the width of two trailers) by 21.34 meters (i.e., the length of a tractor trailer) (Nova Technology, 2013).	Daily: 21.34 x 7.4 meters Seasonal: 21.34 x 7.4 meters
On-site Roadway Area Source Dimensions	The median on-site transiting path length of 341 meters was determined using data from CARB staff's grocery store spatial analysis. The on-site transiting path width of 3.3 meters represents a one-lane arterial/collector roadway (U.S. EPA, 2015).	341 x 3.3 meters
Off-site Roadway Dimensions	Following guidance from CAPCOA's Health Risk Assessments for Proposed Land Use Projects, an off-site roadway length of 3,048 meters was used in the model (CAPCOA, 2009). The off-site transiting width was set to 12.6 meters. This includes a two-lane roadway width of 6.6 meters and an additional 6 meters of width to account for wake effects.	3,048 x 12.6 meters

Table II.F.4. AERMOD Source Inputs – Grocery Store (Cont.)

Source Parameter	Consideration
Release Height	<u>Stationary and On-site Transiting:</u> Release heights were determined for each meteorological station location and is the sum of the average heavy-duty vehicle height of 4 meters (U.S. EPA, 2015) and the plume rise/effective stack height. The plume rise/effective stack height was determined for each meteorological station using U.S. EPA's *Effective Stack Height/Plume Rise* instructional document (U.S. EPA, 1974). Release heights for each meteorological station are listed below. Watsonville: 4.0 meters + 2.4 meters = **6.4 meters** Banning: 4.0 meters + 1.6 meters = **5.6 meters** Fresno: 4.0 meters + 2.0 meters = **6.0 meters** <u>Off-site Transiting:</u> Release Height: 0.5 X Top of Plume Height = 0.5 X 6.8 meters = **3.4 meters** Where: • Vehicle Height: **4.0 meters** (U.S. EPA, 2015) • Top of Plume Height: 1.7 X Vehicle Height = 1.7 X 4.0 meters = **6.8 meters**

Table II.F.4. AERMOD Source Inputs – Grocery Store (Cont.)

Source Parameter	Consideration
Initial Vertical Dimension (σ_z)	<u>Stationary Sources and On-site Transiting:</u> Initial Vertical Dimension on or adjacent to a building (i.e., Sigma Z, SZINIT): Building Height / 2.15 = 9.14 meters (30 feet) / 2.15 = 4.25 Initial Vertical Dimension NOT on or adjacent to a building: • Watsonville: Vertical Dimension of the Source / 4.3 = 6.4 meters / 4.3 = **1.49 meters** • Banning: Vertical Dimension of the Source / 4.3 = 5.6 meters / 4.3 = **1.30 meters** • Fresno: Vertical Dimension of the Source / 4.3 = 6.0 meters / 4.3 = **1.40 meters** Where: • Vertical Dimension of the Source = Release Height <u>Off-site Transiting (U.S. EPA, 2012):</u> Sigma Z (i.e., SZINIT, Initial Vertical Dimension): Top of Plume Height / 2.15 = 6.8 meters / 2.15 = **3.16 meters** Where: • Vehicle Height: **4 meters** (U.S. EPA, 2015) • Top of Plume Height: 1.7 X Vehicle Height = 1.7 X 4 meters = **6.8 meters**

c) Receptor Inputs

A uniform polar receptor grid was chosen for the grocery store HRA. Additionally, discrete receptors were placed ten meters away from the stationary area sources to capture fence line concentrations. Table II.F.5 describes the receptor inputs that were used.

Table II.F.5. Receptor Grid Inputs

Receptor Parameter	Consideration	Model Input
Receptor Grid Type	A uniform polar grid sets a ring of receptors at specific distances from the origin. The polar grid contained 36 radials set 10 degrees apart. Eighty-six rings were placed at various distances from the center of the polar grid, extending out to 7,000 meters away. A discrete receptor was placed at the origin of the uniform polar grid to capture downwind fence line ground-level concentrations.	Uniform Polar and Discrete Receptors
Receptor Height	The receptor height was set to an average breathing height of 1.2 meters.	1.2 meters

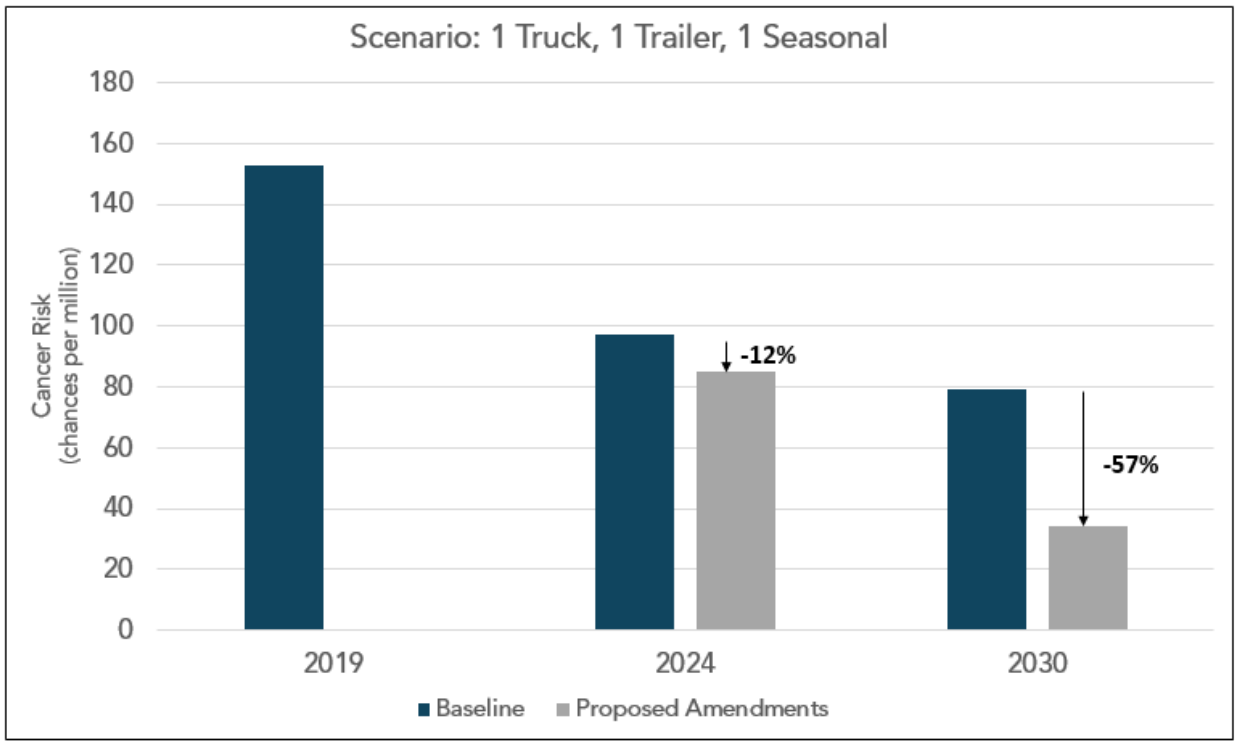
4. Health Risk Assessment – Summary of Cancer Risk

For the generic grocery store model, CARB staff evaluated the potential downwind cancer risk at nearby receptors under the Proposed Amendments and the Baseline. The Proposed Amendments would provide reductions in potential cancer risk to individual residents and off-site workers when compared to the Baseline.

a) Individual Residential Cancer Risk

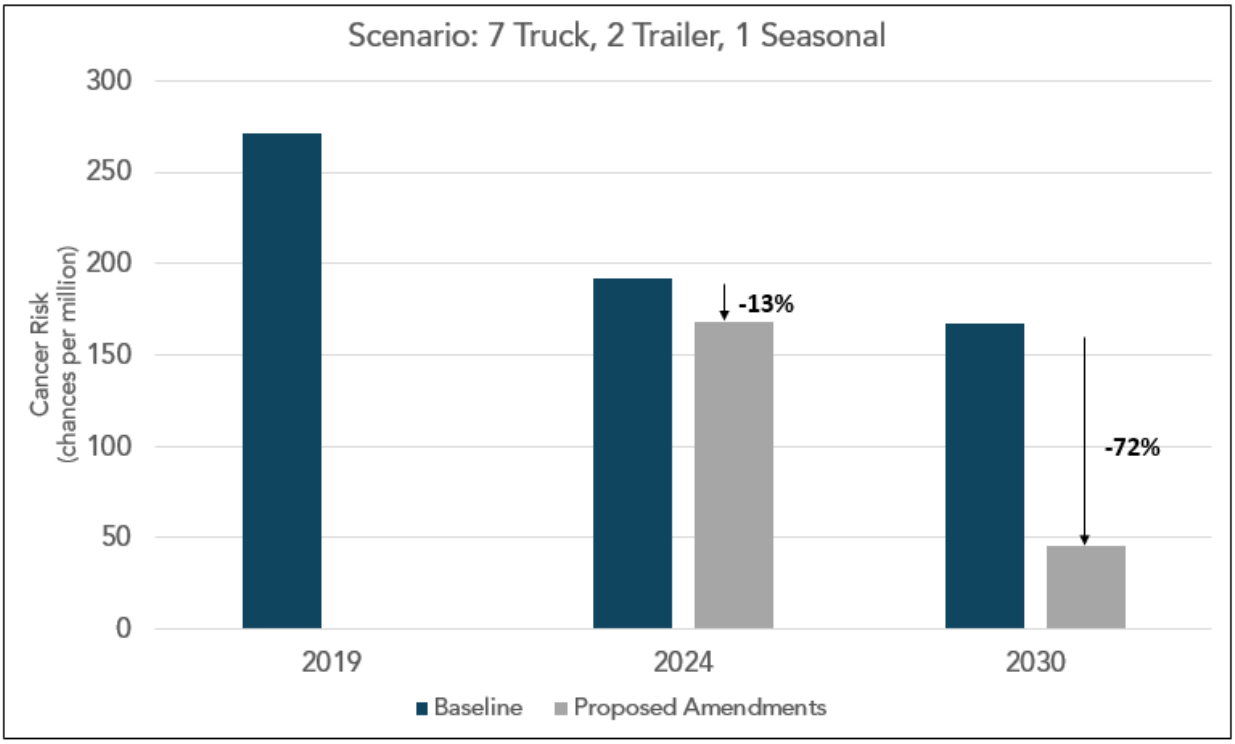
As shown in Figure II.F.2., the potential residential cancer risk for the one daily truck, one daily trailer, and one seasonal trailer scenario is reduced by approximately 12 percent in 2024, and 57 percent in 2030 when compared to the Baseline.

Figure II.F.2. Potential Individual Resident Cancer Risk and Risk Reduction for the Grocery Store 1 Truck, 1 Trailer, 1 Seasonal Scenario



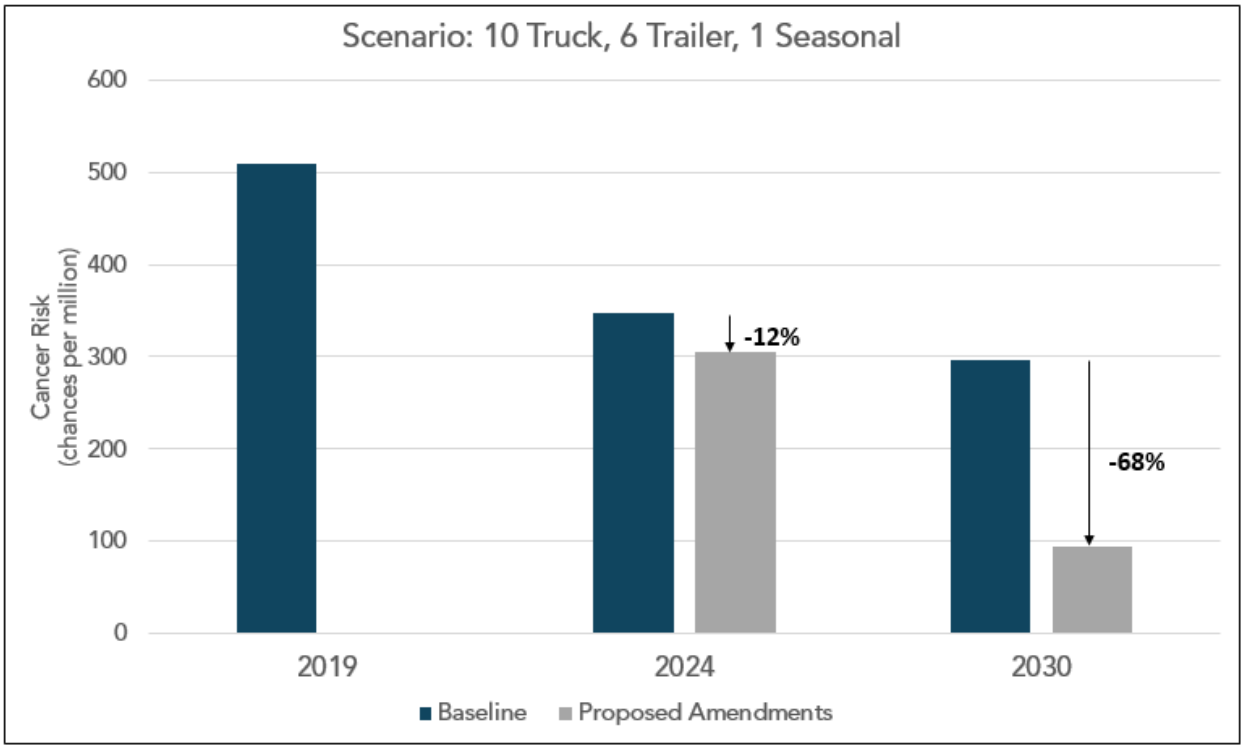
As shown in Figure II.F.3., the 7 daily truck, 2 daily trailer, and 1 seasonal trailer scenario achieves an estimated reduction in residential cancer risk of approximately 13 percent in 2024, and 72 percent in 2030 when compared to the Baseline.

Figure II.F.3. Potential Individual Resident Cancer Risk and Risk Reduction for the Grocery Store 7 Trucks, 2 Trailers, 1 Seasonal Scenario



As shown in Figure II.F.4., the 10 daily truck, 6 daily trailer, and 1 seasonal trailer scenario achieves an estimated reduction in residential cancer risk of approximately 12 percent in 2024, and 68 percent in 2030 when compared to the Baseline.

Figure II.F.4. Potential Individual Resident Cancer Risk and Risk Reduction for the Grocery Store 10 Trucks, 6 Trailers, 1 Seasonal Scenario



These figures highlight the reduction in cancer risk by the year 2030 after implementation of the Proposed Amendments. They also show that the amount of risk reduction achieved in the years leading up to 2030 is dependent on equipment type. This is due to the different requirements and implementation schedules for truck and trailer TRUs under the Proposed Amendments.

Table II.F.6 shows the potential cancer risk for individual residents under the Baseline for the year 2019. The three grocery store scenarios show potential cancer risk ranging from approximately 150 to 510 chances per million at the facility fence line.

Table II.F.6. Grocery Store Individual Resident Cancer Risk – Year 2019 (chances per million)

Scenario	Total Hours of TRU Engine Operation		Downwind Distance (m) from Grocery Store Fence Line															
	Per Week	Per Year	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck 1 Daily Trailer 1 Seasonal Trailer	202	3,940	150	110	74	45	31	23	14	10	7	6	5	4	3	2	2	2
7 Daily Trucks 2 Daily Trailers 1 Seasonal Trailer	274	7,717	270	200	130	81	56	41	26	18	14	11	9	7	6	5	4	3
10 Daily Trucks 6 Daily Trailers 1 Seasonal Trailer	402	14,334	510	370	250	150	100	77	48	33	25	20	16	14	10	8	7	6

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy (RMP) method (95th percentile/80th percentile daily breathing rates (DBR)). FAH equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

For the years 2024 and 2030, Table II.F.7 and Table II.F.8 show the potential cancer risk for the three grocery store scenarios under the Baseline. The risk ranges from approximately 97 to 350 chances per million in 2024 and approximately 79 to 300 chances per million in 2030. After implementation of the Proposed Amendments, the potential cancer risk is reduced to a range of approximately 85 to 310 chances per million in 2024 and a range of approximately 34 to 94 chances per million for the year 2030.

Table II.F.7. Grocery Store Individual Resident Cancer Risk – Year 2024 (chances per million)

Control Measure	Downwind Distance (m) from Grocery Store Fence Line															
	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck, 1 Daily Trailer, 1 Seasonal Trailer (Baseline TRU Engine Hours: 202 per week; 3,940 per year)																
Baseline	97	69	47	29	20	14	9	6	5	4	3	2	2	1	1	<1
Prop. Am.	85	61	41	25	17	13	8	6	4	3	3	2	2	1	1	<1
7 Daily Trucks, 2 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 274 per week; 7,717 per year)																
Baseline	190	140	94	58	40	29	18	13	10	8	6	5	4	3	3	3
Prop. Am.	170	120	82	51	35	26	16	11	8	7	6	5	4	3	3	2
10 Daily Trucks, 6 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 402 per week; 14,334 per year)																
Baseline	350	250	170	110	72	53	33	23	17	14	11	10	7	6	5	4
Prop. Am.	310	220	150	92	63	46	29	20	15	12	10	8	6	5	4	4

Table II.F.8. Grocery Store Individual Resident Cancer Risk – Year 2030 (chances per million)[1]

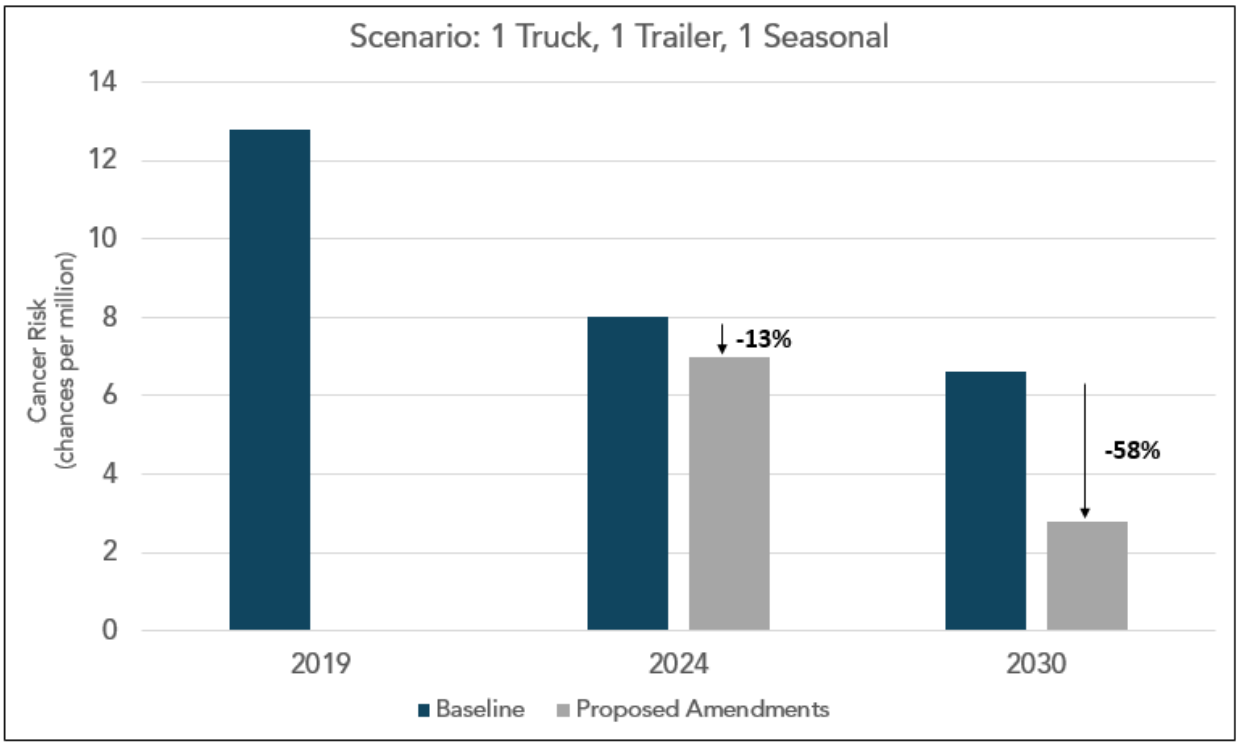
Control Measure	Downwind Distance (m) from Grocery Store Fence Line															
	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck, 1 Daily Trailer, 1 Seasonal Trailer (Baseline TRU Engine Hours: 202 per week; 3,940 per year)																
Baseline	79	56	38	23	16	12	7	5	4	3	2	2	2	1	<1	<1
Prop. Am.	34	24	16	10	7	5	3	2	2	1	<1	<1	<1	<1	<1	<1
7 Daily Trucks, 2 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 274 per week; 7,717 per year)																
Baseline	170	120	82	51	35	26	16	11	9	7	6	5	4	3	3	2
Prop. Am.	46	33	22	14	9	7	4	3	2	2	1	1	<1	<1	<1	<1
10 Daily Trucks, 6 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 402 per week; 14,334 per year)																
Baseline	300	210	150	90	61	45	28	20	15	12	10	8	6	5	4	4
Prop. Am.	94	68	46	28	19	14	9	6	4	3	3	2	2	1	1	<1

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy (RMP) method (95th percentile/80th percentile daily breathing rates (DBR)). FAH equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

b) Off-site Worker Cancer Risk

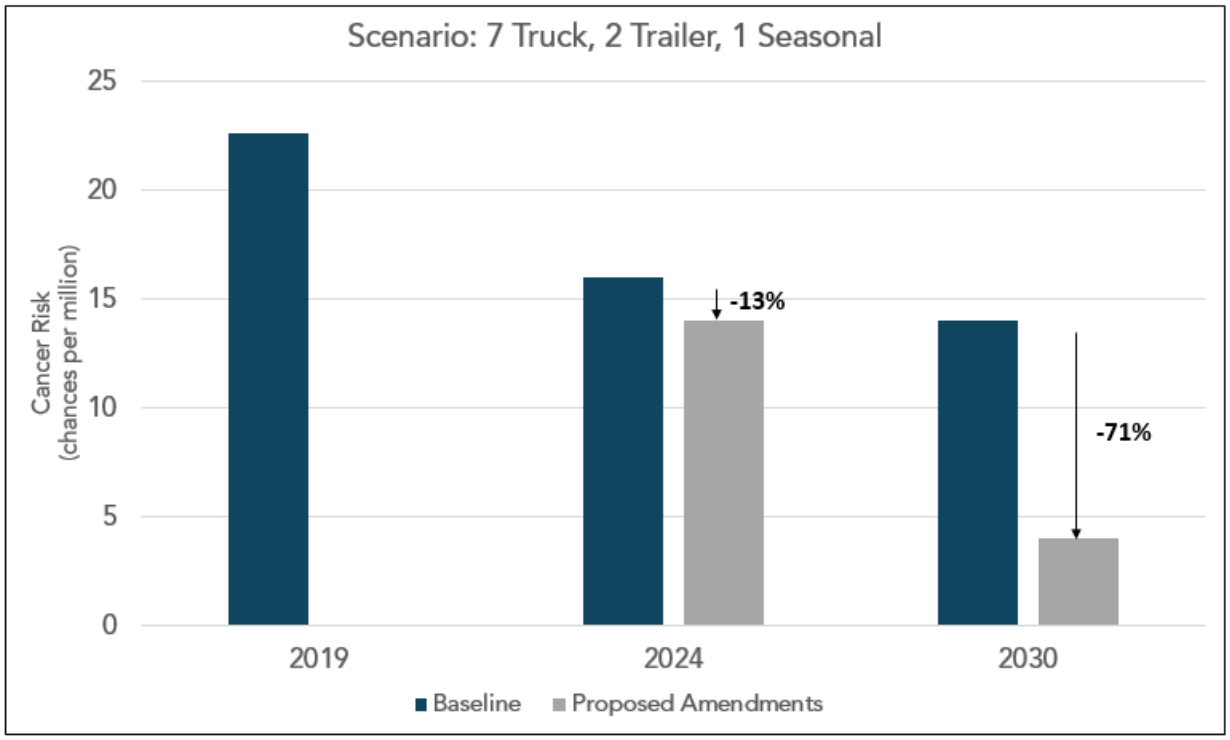
As shown in Figure II.F.5., off-site worker cancer risk for the one daily truck, one daily trailer, and one seasonal trailer scenario is reduced by approximately 13 percent in 2024, and 58 percent in 2030 when compared to the Baseline.

Figure II.F.5. Potential Off-site Worker Cancer Risk and Risk Reduction for the Grocery Store 1 Truck, 1 Trailer, 1 Seasonal Scenario



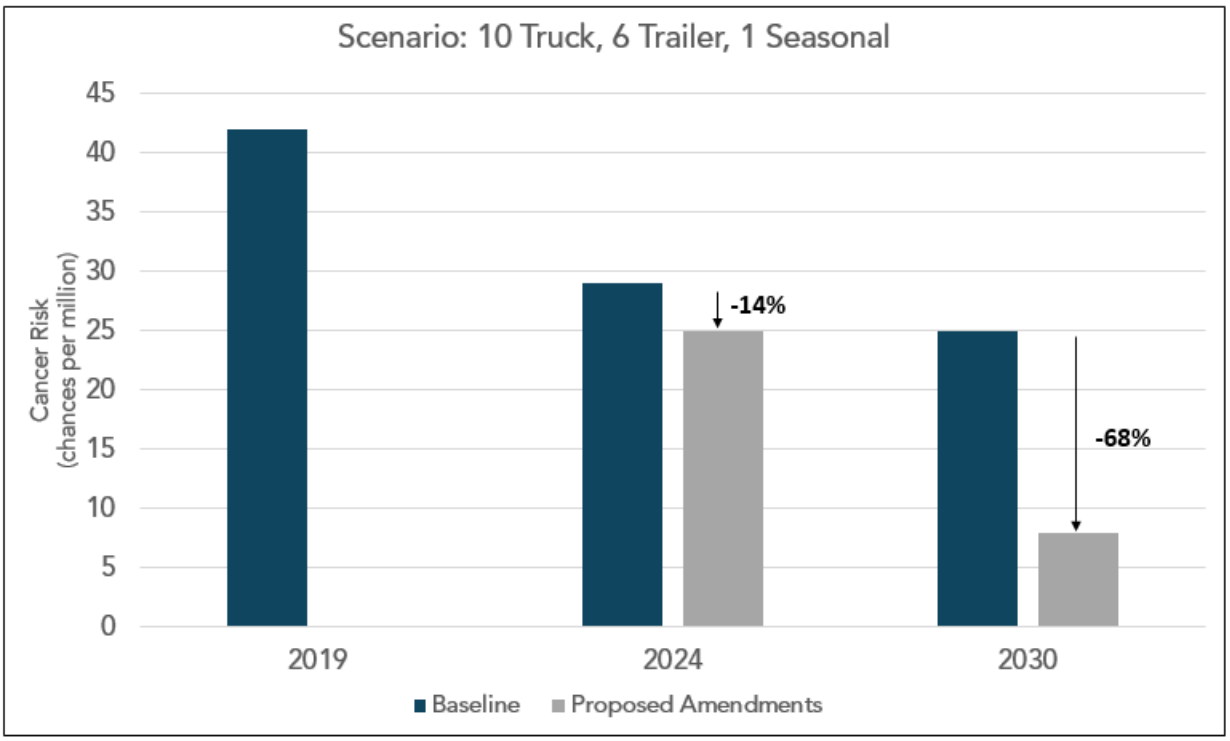
As shown in Figure II.F.6., the 7 daily truck, 2 daily trailer, and 1 seasonal trailer scenario achieves an estimated reduction in off-site worker cancer risk of 13 percent in 2024, and 71 percent in 2030 when compared to the Baseline.

Figure II.F.6. Potential Off-site Worker Cancer Risk and Risk Reduction for the Grocery Store 7 Trucks, 2 Trailers, 1 Seasonal Scenario



As shown in Figure II.F.7., the 10 daily truck, 6 daily trailer, and 1 seasonal trailer scenario achieves an estimated reduction in off-site worker cancer risk of approximately 14 percent in 2024, and 68 percent in 2030 when compared to the Baseline.

Figure II.F.7. Potential Off-site Worker Cancer Risk and Risk Reduction for the Grocery Store 10 Trucks, 6 Trailers, 1 Seasonal Scenario



These figures highlight the reduction in off-site worker cancer risk in 2030 with implementation of the Proposed Amendments. These figures also show that the amount of cancer risk reduction achieved in the years leading up to 2030 is dependent on equipment type. This is due to the different requirements and implementation schedules for truck and trailer TRUs under the Proposed Amendments.

Table II.F.9 shows the potential cancer risk for off-site workers under the Baseline for the year 2019. The three grocery store scenarios show cancer risk ranging from approximately 13 to 42 chances per million at the facility fence line.

Table II.F.9. Grocery Store Off-site Worker Cancer Risk – Year 2019 (chances per million)[5]

Scenario	Total Hours of TRU Engine Operation		Downwind Distance (m) from Grocery Store Fence Line															
	Per Week	Per Year	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck 1 Daily Trailer 1 Seasonal Trailer	202	3,940	13	9	6	4	3	2	1	1	1	<1	<1	<1	<1	<1	<1	<1
7 Daily Trucks 2 Daily Trailers 1 Seasonal Trailer	274	7,717	23	16	11	7	5	3	2	1	1	1	1	1	<1	<1	<1	<1
10 Daily Trucks 6 Daily Trailers 1 Seasonal Trailer	402	14,334	42	31	21	13	9	6	4	3	2	2	1	1	1	1	1	1

[5] Off-site worker cancer risk estimates are based on a 25-year exposure duration with 95th percentile 8-hour DBR for moderate activity levels. All numbers are rounded.

For 2024, Table II.F.10 shows the potential cancer risk for the three grocery store scenarios ranging from approximately 8 to 29 chances per million at the facility fence line under the Baseline. After implementation of the Proposed Amendments, the range reduces to approximately 7 to 25 chances per million at the facility fence line.

Table II.F.10. Grocery Store Off-site Worker Cancer Risk – Year 2024 (chances per million)[6]

Control Measure	Downwind Distance (m) from Facility															
	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck, 1 Daily Trailer, 1 Seasonal Trailer (Baseline TRU Engine Hours: 202 per week; 3,940 per year)																
Baseline	8	6	4	2	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Proposed Am.	7	5	3	2	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
7 Daily Trucks, 2 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 274 per week; 7,717 per year)																
Baseline	16	12	8	5	3	2	2	1	<1	<1	<1	<1	<1	<1	<1	<1
Proposed Am.	14	10	7	4	3	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
10 Daily Trucks, 6 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 402 per week; 14,334 per year)																
Baseline	29	21	14	9	6	4	3	2	1	1	<1	<1	<1	<1	<1	<1
Proposed Am.	25	18	12	8	5	4	2	2	1	1	<1	<1	<1	<1	<1	<1

[6] Off-site worker cancer risk estimates are based on a 25-year exposure duration with 95th percentile 8-hour DBR for moderate activity levels. All numbers are rounded.

For 2030, Table II.F.11 shows the potential cancer risk for the three grocery store scenarios ranging from approximately 7 to 26 chances per million at the facility fence line under the Baseline. After implementation of the Proposed Amendments, the range reduces to approximately 3 to 8 chances per million at the facility fence line.

Table II.F.11. Grocery Store Off-site Worker Cancer Risk – Year 2030 (chances per million)[7]

Control Measure	Downwind Distance (m) from Facility															
	0	10	25	50	75	100	150	200	250	300	350	400	500	600	700	800
1 Daily Truck, 1 Daily Trailer, 1 Seasonal Trailer (Baseline TRU Engine Hours: 202 per week; 3,940 per year)																
Baseline	7	5	3	2	1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Proposed Am.	3	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
7 Daily Trucks, 2 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 274 per week; 7,717 per year)																
Baseline	14	10	7	4	3	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Proposed Am.	4	3	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
10 Daily Trucks, 6 Daily Trailers, 1 Seasonal Trailer (Baseline TRU Engine Hours: 402 per week; 14,334 per year)																
Baseline	26	18	13	8	5	4	2	2	1	1	<1	<1	<1	<1	<1	<1
Proposed Am.	8	6	4	2	2	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

[7] Off-site worker cancer risk estimates are based on a 25-year exposure duration with 95th percentile 8-hour DBR for moderate activity levels. All numbers are rounded.

5. Health Risk Assessment – Summary of Noncancer Chronic Results

For the generic grocery store, CARB staff evaluated the noncancer chronic HI using the modeled diesel PM concentrations. For this assessment, the HI is a ratio of the modeled annual average concentrations of diesel PM at each receptor point divided by the chronic inhalation REL. OEHHA has adopted a chronic REL of 5 μg/m^3. An HI value above one may indicate potential health impacts and may require further evaluation. CARB staff used the highest modeled annual average concentration in the downwind direction and determined the HI for each grocery store scenario. These results are summarized in Table II.F.12. For each scenario the HI value is below one.

Table II.F.12. Summary of the Grocery Store Noncancer Chronic Hazard Indices

Control Measure	Downwind Distance (m) from Facility		
	2019	2024	2030
1 Daily Truck, 1 Daily Trailer, 1 Seasonal Trailer			
Baseline	0.04	0.03	0.02
Proposed Am.	-	0.01	0.01
7 Daily Trucks, 2 Daily Trailers, 1 Seasonal Trailer			
Baseline	0.07	0.05	0.04
Proposed Am.	-	0.05	0.01
10 Daily Trucks, 6 Daily Trailers, 1 Seasonal Trailer			
Baseline	0.14	0.09	0.08
Proposed Am.	-	0.08	0.02

Note: Dashes are used for the Proposed Amendments in 2019 because the Proposed Amendments are not yet implemented.

G. Cold Storage Warehouse Methodology and HRA Results

1. Source Description

CSWs range in size depending on the location, and type of operation. The primary emission sources of diesel PM at these facilities are the diesel engines that power TRUs mounted either on box trucks or on semi-trailers. Because of the variability in size and operation, CARB staff elected to model a generic CSW that could accommodate a range of TRU engine activity, ranging from 500 hours per week, representing a small warehouse, to 8,000 hours per week, representing a large warehouse.

a) Facility Layout

To develop a generic CSW, CARB staff evaluated 50 CSWs located throughout California. The CSWs were randomly selected from a population of California facilities from various sources, including databases (i.e., ParcelQuest and Manta), surveys, facility reports, online searches, and facility tours. CARB staff used aerial photos of each CSW (an example of which is shown in Figure II.G.1) to develop a generic facility plot, and to determine the approximate dimensions and locations of all stationary and mobile sources of emissions from the diesel engines that power TRUs at a CSW.

Figure II.G.1. Aerial Image and Spatial Analysis of a California Cold Storage Warehouse

Map data: Google, DigitalGlobe

In addition to evaluating the on-site locations of where TRU activity occurs at a CSW, the aerial photos were used to determine the following parameters:

- Property Boundary: The red outline denotes the total property area associated with the facility within the property boundary.
- Warehouse Location: The blue outline denotes the area occupied by the cold storage warehouse.

- Loading Dock and Parking Location: The yellow outline denotes the loading docks and the size of stationary TRU activity area, which includes both the loading docks and areas where trailers would stage or park.
- Width of the Road: The width of the road entering the facility property and the corresponding speed limit were determined.
- Total on-site TRU Transiting Path Length: This was determined to be any path a TRU may travel on the facility property, which includes entering the property, traveling to any dock doors or parking/staging areas, and exiting the property.
- Distance to Nearest Off-Site Receptors: The white lines indicate the distances from the stationary TRU activity area to the nearest resident, worker, and sensitive receptor (i.e., school, nursing home, residential care facility, daycare center, or hospital).

2. Emission Inventory

CARB staff developed an equipment and activity profile to represent TRU-engine runtime, ranging from 500 to 8,000 hours per week. Staff assumed that the facility operates 24 hours per day, 7 days per week. The model accounts for both on-site and off-site transiting as well as stationary TRU engine operations.

The emission inventory for a CSW assumes that every truck or trailer equipped with a TRU enters a facility fully loaded and leaves fully loaded. Each model also assumes that the TRU stays on-site for approximately four hours (i.e., unloading for two hours and loading for another two hours – for a total of four hours). The number of inbound and outbound loads at the facility was determined by dividing the total amount of TRU activity by the assumed amount of residency time for each TRU (CARB, 2011).

Emissions that occur while the TRU is in transit on-site are based on the number of truck trips staff estimated for TRU-engine runtime, ranging from 500 to 8,000 hours per week. For this evaluation, the definition of a truck trip is a truck entering or exiting the facility. One TRU-equipped truck, which enters and then leaves, creates two truck trips. Table II.G.1 summarizes the emission estimate inputs for a CSW developed for this analysis.

Table II.G.1. Emission Estimate Inputs for a Cold Storage Warehouse

Facility Characteristics	Assumptions/References	Value
Facility Location	Site reflects a generic CSW facility in California	None
CSW Footprint	Footprint reflects generic CSW facility in California	None
Facility Height	Height of modeled facility.	29.4 feet high
Facility Operation (days/week)	24 hours per day, 7 days a week.	8,760 hours per year
TRU Trip Rate[8]	A TRU-equipped vehicle enters the facility fully loaded (inbound) and exits the facility fully loaded (outbound) Each TRU entering the facility takes 2 hours to unload and 2 hours to load – 4 hours total. [TRU engine runtime hours/week] ÷ [4 hours/TRU trip] = TRU trips/week	trips/week
	8,000 hours per week	2,000
	5,000 hours per week	1,250
	3,000 hours per week	750
	2,000 hours per week	500
	1,000 hours per week	250
	500 hours per week	125
Docking, Parking, and Transiting TRU Emission Factors	CARB Statewide Emission Inventory Model for TRUs (2020 Update) 775-meter on-site transit route at a speed of 5 miles/hour speed 3,050-meter off-site transit route at a speed of 30 miles/hour	Trailer TRU: 2.08 g/hour Truck TRU: 1.74 g/hour

[8] It is assumed that trailer TRUs account for 90 percent of the trips at a CSW, with the remaining 10 percent of trips coming from truck TRUs

Table II.G.2 summarizes the TRU diesel PM emission results for a CSW. The baseline year for all emission estimates is 2019.

Table II.G.2. Baseline Cold Storage Warehouse TRU Emissions in 2019

	Weekly Hours of Operation					
	500	1,000	2,000	3,000	5,000	8,000
Diesel PM Emissions (tons per year)	0.064	0.127	0.25	0.38	0.64	1.02

Note: Values are rounded.

3. Air Dispersion Modeling

To run AERMOD, modelers are required to define and setup the project and emissions sources, select the meteorological data files, and specify the receptor locations. This is done through four model pathways: control, source, meteorology, and receptor. These pathways are described below.

a) Control Pathway

Control inputs are required to specify the global model options for the model run. Table II.G.3 describes the non-regulatory control inputs that were used for this HRA.

Table II.G.3. AERMOD Control Inputs – Cold Storage Warehouse

Control Parameter	Consideration	Model Input
Dispersion Coefficient	The urban dispersion option addresses potential issues associated with the transition from the nighttime urban boundary layer to the daytime convective boundary layer. Selecting the urban dispersion option allows AERMOD to model enhanced dispersion during nighttime stable conditions due to the urban heat island effect. The height of the urban boundary layer is dependent on population (U.S. EPA, 2018b). An area may be considered urban if the land use type(s) within a 3 km radius of the source accounts for 50 percent or more of the following categories: industrial, commercial, and/or residential. The majority of California cold storage warehouses are typically located in an urban environment. A population of 500,000 was selected based on research, and a sensitivity study performed by CARB staff. More details about the research and sensitivity study are provided in Section II.H.	Urban Population: 500,000
Terrain Option	Modeling a generic facility does not require terrain data. The terrain was considered flat for this HRA.	Flat

b) Source Pathway

Source inputs require source identification and a defined source type (e.g., point, area, volume, or open pit). Each source type requires specific parameters to define the source. For example, the required inputs for an area source are emission rate, release height, and dimensions. Table II.G.4 describes six source inputs that were used for this HRA.

Table II.G.4. AERMOD Source Inputs – Cold Storage Warehouse

Source Parameter	Consideration	Model Input
Source Type	Area sources were used to model both stationary and mobile source releases for the following reasons: • Enough data was available to model with an area source; the lack of current engine data prevented the use of point sources. • Area sources do not have exclusion zones; exclusion zones prevented the use of volume sources.	Area Source
Stationary Area Source Dimension	The stationary area source dimension for docking was set to 350 meters (i.e., the width of about 85 docking spaces) by 21.34 meters (i.e., the length of a tractor trailer) (Nova Technology, 2013). The stationary area source dimension for parking was set to 440 meters (i.e., the width of about 110 parking spaces) by 21.34 meters (i.e., the length of a tractor trailer) (Nova Technology, 2013).	Docking: 21.34 x 350 meters Parking: 21.34 x 440 meters
On-site Roadway Area Source Dimensions	The median on-site transiting path length of 775 meters was determined using data from CARB staff's CSW spatial analysis. The on-site transiting path width of 6.6 meters represents two one-lane arterial/collector roadways (U.S. EPA, 2015).	775 x 6.6 meters
Off-site Roadway Dimensions	Following guidance from CAPCOA's Health Risk Assessments for Proposed Land Use Projects, the off-site roadway length of 3,048 meters was used in the model (CAPCOA 2009). The off-site transiting width was set to 12.6 meters. This includes a two-lane roadway width of 6.6 meters and an additional 6 meters of width to account for wake effects.	3,048 x 12.6 meters

Table II.G.4. AERMOD Source Inputs – Cold Storage Warehouse (Cont.)

Source Parameter	Consideration
Release Height	<u>Stationary and On-site Transiting:</u> Release heights were determined for each meteorological station location and is the sum of the average heavy-duty vehicle height of four meters (U.S. EPA, 2015) and the plume rise/effective stack height. The plume rise/effective stack height was determined for each meteorological station using U.S. EPA's *Effective Stack Height/Plume Rise* instructional document (U.S. EPA, 1974). Release heights for each meteorological station are listed below. Watsonville: 4.0 meters + 2.4 meters = 6.4 meters Banning: 4.0 meters + 1.6 meters = 5.6 meters Fresno: 4.0 meters + 2.0 meters = 6.0 meters <u>Off-site Transiting:</u> Release Height: 0.5 X Top of Plume Height = 0.5 X 6.8 meters = 3.4 meters Where: • Vehicle Height: 4.0 meters (U.S. EPA, 2015) • Top of Plume Height: 1.7 X Vehicle Height = 1.7 X 4.0 meters = 6.8 meters

Table II.G.4. AERMOD Source Inputs – Cold Storage Warehouse (Cont.)

Source Parameter	Consideration
Initial Vertical Dimension (σ_z)	<u>Stationary Sources and On-site Transiting:</u> Initial Vertical Dimension on or adjacent to a building (i.e., Sigma Z, SZINIT): • Building Height / 2.15 = 9.14 meters (30 feet) / 2.15 = **4.25 meters** Initial Vertical Dimension NOT on or adjacent to a building: • Watsonville: Vertical Dimension of the Source / 4.3 = 6.4 meters / 4.3 = **1.49 meters** • Banning: Vertical Dimension of the Source / 4.3 = 5.6 meters / 4.3 = **1.30 meters** • Fresno: Vertical Dimension of the Source / 4.3 = 6.0 meters / 4.3 = **1.40 meters** Where: • Vertical Dimension of the Source = Release Height <u>Off-site Transiting (U.S. EPA, 2012):</u> Sigma Z (i.e., SZINIT, Initial Vertical Dimension): Top of Plume Height / 2.15 = 6.8 meters / 2.15 = **3.16 meters** Where: • Vehicle Height: 4 meters (U.S. EPA, 2015) • Top of Plume Height: 1.7 X Vehicle Height = 1.7 X 4.0 meters = **6.8 meters**

c) Receptor Inputs

A uniform polar receptor grid was chosen for the cold storage warehouse HRA. Additionally, discrete receptors were placed at the fence line and ten meters downwind from the fence line. Table II.G.5 describes the receptor inputs that were used.

Table II.G.5. Receptor Grid Inputs

Receptor Parameter	Consideration	Model Input
Receptor Grid Type	A uniform polar grid sets a ring of receptors at specific distances from the origin. The polar grid contained 36 radials set 10 degrees apart. One-hundred-ten rings were placed at various distances from the center of the polar grid, extending out to 12,000 meters away. A discrete receptor was placed at the origin of the uniform polar grid to capture downwind fence-line ground-level concentrations. An additional discrete receptor was placed ten meters downwind from the origin of the uniform polar grid.	Uniform Polar and Discrete Receptors
Receptor Height	The receptor height was set to an average breathing height of 1.2 meters.	1.2 meters

4. Health Risk Assessment – Summary of Cancer Risk

For a generic CSW, CARB staff evaluated the potential downwind cancer risk at nearby receptors under the Baseline and the Proposed Amendments. As discussed earlier in Section II.E, potential cancer risk was estimated under two exposure scenarios, individual resident and off-site worker.

a) Individual Residential Cancer Risk

The Proposed Amendments would reduce potential cancer risk to individual residents and off-site workers. After implementation of the Proposed Amendments, Figure II.G.2. shows that residential cancer risk is anticipated to be reduced by approximately 12 percent in 2024, and 58 percent in 2030 compared to the Baseline.

Figure II.G.2. Potential Individual Resident Cancer Risk and Risk Reduction for Cold Storage Warehouses[1]

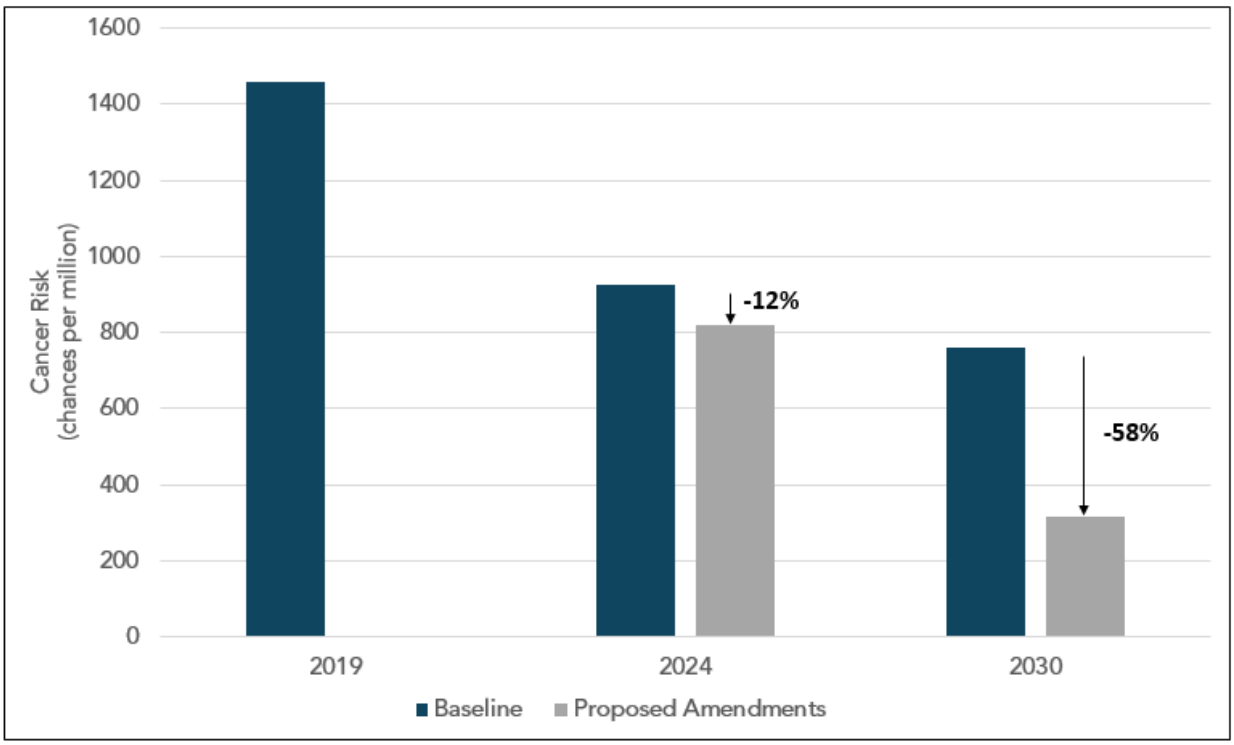


Table II.G.6 shows the potential cancer risk for individual residents under the Baseline for TRU engine hours, ranging from 500 to 8,000 hours per week, for the year 2019. The scenarios show residential cancer risk ranging from approximately 91 to 1,460 chances per million at 25 meters from the facility fence line.

Table II.G.6. Cold Storage Warehouse Individual Resident Cancer Risk – Year 2019 (chances per million)

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	1460	1260	1080	930	600	430	320	260	210	180	160	140	120	110	100	96	90	82
5,000	260,000	910	790	670	580	370	270	200	160	130	110	98	87	78	71	65	60	56	51
3,000	156,000	550	470	400	350	220	160	120	96	80	68	59	52	47	42	39	36	34	31
2,000	104,000	370	310	270	230	150	110	81	64	53	45	39	35	31	28	26	24	22	20
1,000	52,000	180	160	140	120	74	53	40	32	27	23	20	17	16	14	13	12	11	10
500	26,000	91	79	67	58	37	27	20	16	13	11	10	9	8	7	6	6	6	5

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy (RMP) method (95th percentile/80th percentile daily breathing rates (DBR)). FAH equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

Table II.G.7 compares the potential cancer risk for individual residents under Baseline and the Proposed Amendments in 2024. The scenarios show reductions in risk across all activity levels. For example, at 25 meters from the facility, for 8,000 TRU engine hours per week, the Proposed Amendments could reduce residual cancer risk to approximately 820 chances per million compared to the Baseline at around 930 chances per million.

Table II.G.7. Cold Storage Warehouse Individual Resident Cancer Risk – Year 2024 (chances per million)

Baseline

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	930	800	680	590	380	270	210	160	140	110	99	88	79	72	66	61	57	52
5,000	260,000	580	500	430	370	240	170	130	100	84	71	62	55	49	45	41	38	36	33
3,000	156,000	350	300	260	220	140	100	77	61	51	43	37	33	30	27	25	23	21	20
2,000	104,000	230	200	170	150	94	67	51	41	34	29	25	22	20	18	16	15	14	13
1,000	52,000	120	100	85	74	47	34	26	20	17	14	12	11	10	9	8	8	7	7
500	26,000	58	50	43	37	24	17	13	10	8	7	6	5	5	4	4	4	4	3

Proposed Am.

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	820	710	610	520	330	240	180	140	120	100	88	78	70	64	58	54	50	46
5,000	260,000	510	440	380	330	210	150	110	90	75	63	55	49	44	40	36	34	31	29
3,000	156,000	310	270	230	200	130	89	68	54	45	38	33	29	26	24	22	20	19	17
2,000	104,000	210	180	150	130	84	60	45	36	30	25	22	19	17	16	15	14	13	11
1,000	52,000	100	88	76	66	42	30	23	18	15	13	11	10	9	8	7	7	6	6
500	26,000	51	44	38	33	21	15	11	9	7	6	5	5	4	4	4	3	3	3

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy (RMP) method (95th percentile/80th percentile daily breathing rates (DBR)). FAH equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

Table II.G.8 compares the potential cancer risk for individual residents under the Baseline and the Proposed Amendments in 2030. The scenarios show reductions in risk across all activity levels. For example, at 25 meters from the facility, for 8,000 TRU engine hours per week, the Proposed Amendments would reduce residual cancer risk to approximately 320 chances per million compared to the Baseline at about 760 chances per million.

Table II.G.8. Cold Storage Warehouse Individual Resident Cancer Risk – Year 2030 (chances per million)

	Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
	Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Baseline	8,000	416,000	760	650	560	490	310	220	168	130	110	94	81	72	65	59	54	50	47	43
	5,000	260,000	470	410	350	300	190	140	105	84	69	58	51	45	40	37	34	31	29	27
	3,000	156,000	280	250	210	180	120	83	63	50	41	35	30	27	24	22	20	19	17	16
	2,000	104,000	190	160	140	120	77	55	42	33	28	23	20	18	16	15	13	13	12	11
	1,000	52,000	95	82	70	61	39	28	21	17	14	12	10	9	8	7	7	6	6	5
	500	26,000	47	41	35	30	19	14	10	8	7	6	5	4	4	4	3	3	3	3

	Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility																	
	Per Week	Per year	25	50	75	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Proposed Am.	8,000	416,000	320	270	230	200	130	92	70	56	46	39	34	30	27	25	22	21	19	18
	5,000	260,000	200	170	150	130	81	58	44	35	29	24	21	19	17	15	14	13	12	11
	3,000	156,000	120	100	87	76	48	35	26	21	17	15	13	11	10	9	8	8	7	7
	2,000	104,000	79	68	58	51	32	23	18	14	12	10	8	8	7	6	6	5	5	4
	1,000	52,000	40	34	29	25	16	12	9	7	6	5	4	4	3	3	3	3	2	2
	500	26,000	20	17	15	13	8	6	4	3	3	2	2	2	2	2	1	1	1	1

Note: Individual resident cancer risk estimates are based on a 30-year exposure duration using the Risk Management Policy (RMP) method (95th percentile/80th percentile daily breathing rates (DBR)). FAH equals 1 for age bins <16 years and 0.73 for age bin 16-70 years. All numbers are rounded.

b) Off-site Worker Cancer Risk

Under this exposure scenario, the Proposed Amendments would reduce potential cancer risk to off-site workers working in close vicinity to a CSW. After implementation of the Proposed Amendments, Figure II.G.3. shows that risk is anticipated to be reduced by approximately 12 percent in 2024, and 58 percent in 2030 when compared to the Baseline.

Figure II.G.3. Potential Off-Site Worker Cancer Risk and Risk Reduction for Cold Storage Warehouses

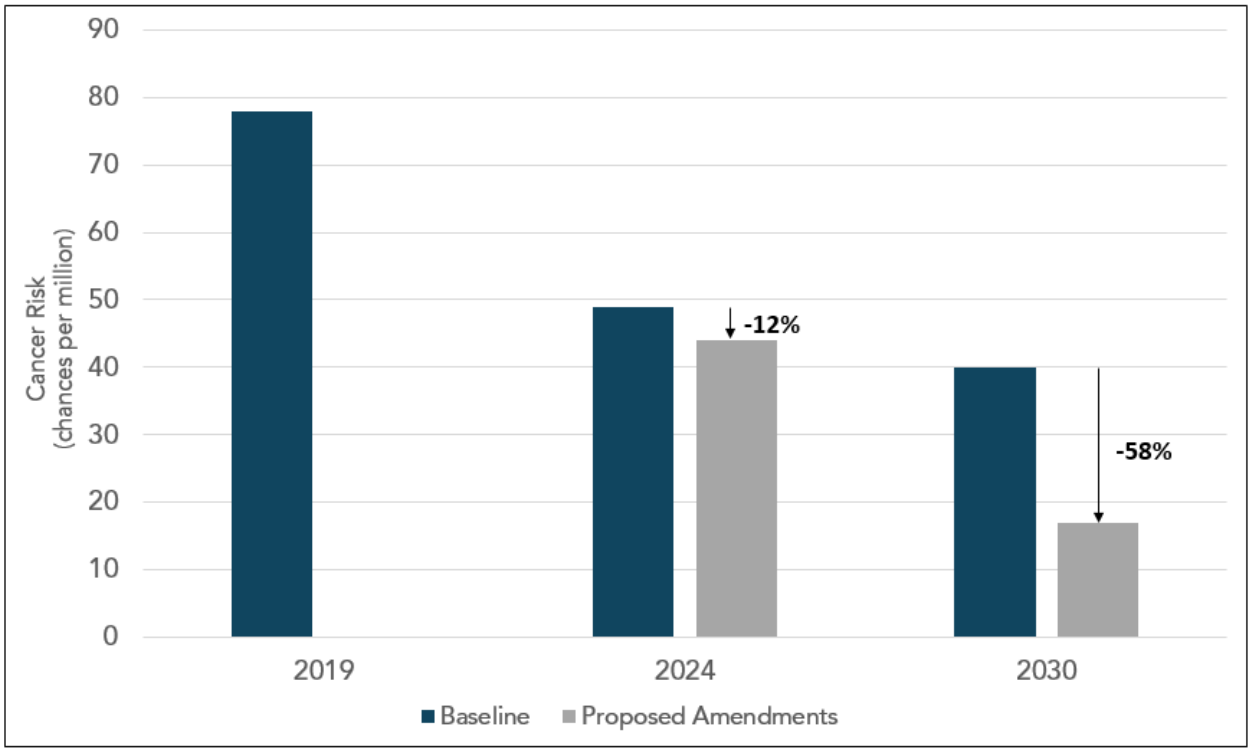


Table II.G.9 shows the potential cancer risk for off-site workers under the Baseline for TRU engine hours, ranging from 500 to 8,000 hours per week, for the year 2019. The scenarios show risk ranging from approximately 5 to 78 chances per million at 100 meters from the facility fence line.

Table II.G. 9. Cold Storage Warehouse Off-Site Worker Cancer Risk – Year 2019 (chances per million)

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility														
Per Week	Per year	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	78	50	35	27	21	18	15	13	12	10	9	9	8	7	7
5,000	260,000	49	31	22	17	13	11	9	8	7	6	6	5	5	5	4
3,000	156,000	29	19	13	10	8	7	6	5	4	4	4	3	3	3	3
2,000	104,000	19	12	9	7	5	4	4	3	3	3	2	2	2	2	2
1,000	52,000	10	6	4	3	3	2	2	2	1	1	1	1	1	1	1
500	26,000	5	3	2	2	1	1	1	1	1	1	1	1	1	< 1	< 1

Table II.G.10 compares the potential cancer risk for off-site workers under the Baseline and the Proposed Amendments in 2024. The scenarios show reductions in cancer risk across all activity levels. For example, at 100 meters from the facility, for 8,000 TRU engine hours per week, the Proposed Amendments could reduce residual cancer risk to approximately 44 chances per million compared to the Baseline at around 49 chances per million.

Table II.G. 10. Cold Storage Warehouse Off-Site Cancer Risk – Year 2024 (chances per million)

	Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility														
	Per Week	Per year	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Baseline	8,000	416,000	49	31	22	17	14	11	10	8	7	7	6	5	5	5	4
	5,000	260,000	31	20	14	11	9	7	6	5	5	4	4	3	3	3	3
	3,000	156,000	19	12	8	6	5	4	4	3	3	2	2	2	2	2	2
	2,000	104,000	12	8	6	4	3	3	2	2	2	2	1	1	1	1	1
	1,000	52,000	6	4	3	2	2	1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	500	26,000	3	2	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

	Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility														
	Per Week	Per year	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
Proposed Am.	8,000	416,000	44	28	20	15	12	10	8	7	6	6	5	5	5	4	4
	5,000	260,000	27	17	12	9	8	6	5	5	4	4	3	3	3	3	2
	3,000	156,000	16	10	7	6	5	4	3	3	2	2	2	2	2	2	1
	2,000	104,000	11	7	5	4	3	2	2	2	2	1	1	1	1	1	< 1
	1,000	52,000	5	3	2	2	2	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
	500	26,000	3	2	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Table II.G.11 shows the potential cancer risk for off-site workers under the Proposed Amendments for the implementation year 2030. The scenarios show reductions in cancer risk across all activity levels. For example, at 100 meters from the facility, for 8,000 TRU engine hours per week, the Proposed Amendments could reduce residual cancer risk to approximately 17 chances per million compared to the Baseline at around 40 chances per million.

Table II.G. 11. Cold Storage Warehouse Off-Site Cancer Risk – Year 2030 (chances per million)

Baseline

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility														
Per Week	Per year	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	40	26	18	14	11	9	8	7	6	5	5	4	4	4	4
5,000	260,000	25	16	11	9	7	6	5	4	4	3	3	3	3	2	2
3,000	156,000	15	10	7	5	4	3	3	3	2	2	2	2	2	1	1
2,000	104,000	10	6	5	3	3	2	2	2	1	1	1	1	1	< 1	< 1
1,000	52,000	5	3	2	2	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
500	26,000	3	2	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

Proposed Am.

Total Hours of TRU Engine Operation		Downwind Distance (m) from Facility														
Per Week	Per year	100	200	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
8,000	416,000	17	11	8	6	5	4	3	3	3	2	2	2	2	2	1
5,000	260,000	11	7	5	4	3	2	2	2	2	1	1	1	1	1	< 1
3,000	156,000	6	4	3	2	2	1	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
2,000	104,000	4	3	2	1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,000	52,000	2	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
500	26,000	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1

5. Health Risk Assessment – Summary of Noncancer Chronic Results

For the generic CSW, CARB staff evaluated the noncancer chronic HI using the modeled diesel PM concentrations. For this assessment, the HI is a ratio of annual average concentrations of diesel PM to the chronic inhalation REL. OEHHA has adopted a chronic REL of 5 μg/m^3. This means that diesel PM concentrations with an HI above one may indicate potential health impacts and may require further evaluation. CARB staff used the highest modeled annual average downwind concentration and determined the HI to be less than one for all activity profiles modeled, these are summarized in Table II.G.12.

Table II.G.12. Summary of the Cold Storage Warehouse Noncancer

Control Measure	Downwind Distance (m) from Facility		
	2019	2024	2030
8,000 Hours of TRU Engine Run-Time per Week			
Baseline	0.39	0.25	0.20
Proposed Am.	-	0.22	0.09
5,000 Hours of TRU Engine Run-Time per Week			
Baseline	0.25	0.16	0.13
Proposed Am.	-	0.14	0.05
3,000 Hours of TRU Engine Run-Time per Week			
Baseline	0.15	0.09	0.08
Proposed Am.	-	0.08	0.03
2,000 Hours of TRU Engine Run-Time per Week			
Baseline	0.10	0.06	0.05
Proposed Am.	-	0.055	0.02
1,000 Hours of TRU Engine Run-Time per Week			
Baseline	0.05	0.031	0.025
Proposed Am.	-	0.028	0.01
500 Hours of TRU Engine Run-Time per Week			
Baseline	0.024	0.016	0.013
Proposed Am.	-	0.014	0.005

Note: Dashes are used for the Proposed Amendments in 2019 because the Proposed Amendments are not yet implemented.

H. Sensitivity Studies

CARB staff performed sensitivity studies to aid in the selection of model inputs. The topics for these sensitivity studies include meteorological station selection and urban population. A detailed discussion of these sensitivity studies is below.

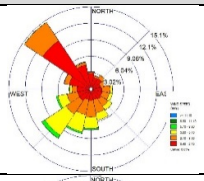
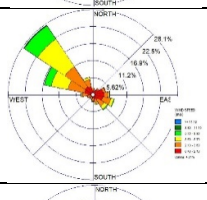
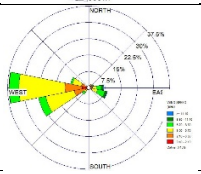
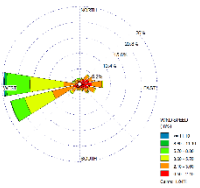
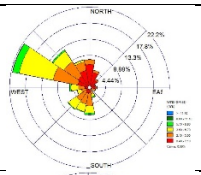
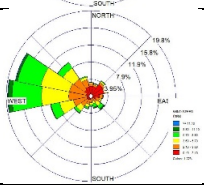
1. Meteorological Station Selection

AERMOD requires hourly surface and upper air meteorological data as inputs to the model, including wind speed, wind direction, cloud cover, ambient temperature, and dew point. Surface stations and radiosondes (i.e., weather balloons) record these meteorological parameters.

To prepare the meteorological data files for input into AERMOD, CARB staff used AERMOD's meteorological preprocessor, AERMET. AERMET extracts surface and upper air information from each station's meteorological dataset, merges the data together, and estimates boundary layer parameters. In addition to meteorological data, boundary layer parameter estimates require surface characteristic values (i.e., albedo, Bowen ratio, and surface roughness) for its calculations. Surface characteristic values are based on the type of land coverage surrounding the surface station.
For this HRA, CARB staff evaluated ten meteorological stations across the State with varying meteorological conditions and land coverage types. Each station's average wind speed, wind direction, land cover, and proximity to refrigerated warehouse and distribution center hubs were compared. Additionally, a sensitivity study was conducted using each meteorological dataset to provide a relative comparison of ground level concentrations.

Table II.H.1 shows the results of the sensitivity study and compares each of the ten meteorological station's meteorological conditions and land cover type.

Table II.H.1. Meteorological Station Comparison

Meteorological Station Location	Average Wind Speed (m/s)	% Calms	Urban	Wind Rose	Maximum Concentration (µg/m³)[9]
Watsonville	2.28	6.05	No		11.09
Fresno	2.95	4.31	Yes		8.61
Banning	4.23	0.15	No		7.39
Los Angeles	3.47	1.04	Yes		6.09
San Diego	2.81	0.99	Yes		12.23
Oakland	3.88	1.22	No		4.59

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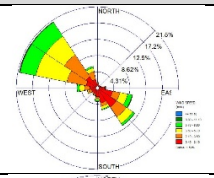
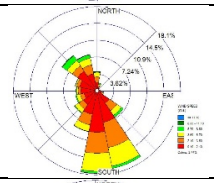
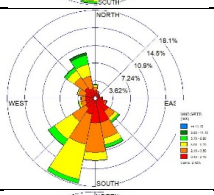
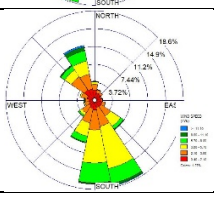
[9] One area source (32.2 x 181.4 meters) was modeled using each station's meteorological dataset. The following inputs were used: an emission rate of 8.012E-06 g/(s-m2), a release height of 5.5 meters, and an initial vertical dimension of 1.28 meters.

Table II.H.1. Meteorological Station Comparison (Cont.)

Meteorological Station Location	Average Wind Speed (m/s)	% Calms	Urban	Wind Rose	Maximum Concentration (µg/m³)[10]
San Jose	3.14	1.58	No		4.39
Sonoma	2.42	2.44	No		9.93
Sacramento - Executive Airport	2.82	2.42	Yes		9.39
Sacramento - International Airport	3.59	1.27	No		6.18

[10] One area source (32.2 x 181.4 meters) was modeled using each station's meteorological dataset. The following inputs were used: an emission rate of 8.012E-06 g/(s-m²), a release height of 5.5 meters, and an initial vertical dimension of 1.28 meters.

Of the ten meteorological stations, three were chosen for their collective range of meteorological conditions and land cover type, community interest and concern over the prevalence of refrigerated WHDCs within its city limits, and proximity of the meteorological station to CSW hubs. The three meteorological stations are Watsonville Municipal Airport (Watsonville), Fresno Yosemite International Airport (Fresno), and Banning station (Banning).

2. Urban Population

The urban heat island effect is the phenomena where urban areas are warmer than surrounding rural areas due to human activities and manmade structures. This temperature difference is most apparent during nighttime stable conditions and can cause the formation of a "convective-like" boundary layer. More convection or mixing of air due to an urban-rural temperature difference increases the dispersion of pollutants.

The urban option allows AERMOD to account for the urban heat island effect and the population input serves as a surrogate to define its magnitude (U.S. EPA, 2018a). Without the urban option, urban areas may see higher ground-level concentrations.

CARB staff compared different population results for each meteorological station. Table II.H.2 summarizes these results.

Table II.H.2. Meteorological Station Population Results

Meteorological Station	Metropolitan Statistical Area or MSA (City Population, 2021) (USCB, 2021)	Population (UCSB, 2021)	3 km radius census block (HARP)[11]
Banning	4,224,851 (Riverside-San Bernardino-Ontario Metro Area)	29,603	13,030
Fresno	930,450 (Fresno Metro Area)	494,665	36,059
Watsonville	262,366 (Santa Cruz – Watsonville Metro Area)	51,199	28,311

Additionally, CARB staff conducted a sensitivity study on the effects of differing population inputs. The focus of this sensitivity study was not the ground-level concentration results themselves, but the relative difference of results due to changes

[11] This refers to the census block population within a 3 km radius of the meteorological station.

in population inputs. The results of this sensitivity study are shown in Figure II.H.1 and Table II.H.4.

Figure II.H.1. Sensitivity Study Results – Population vs. Concentration

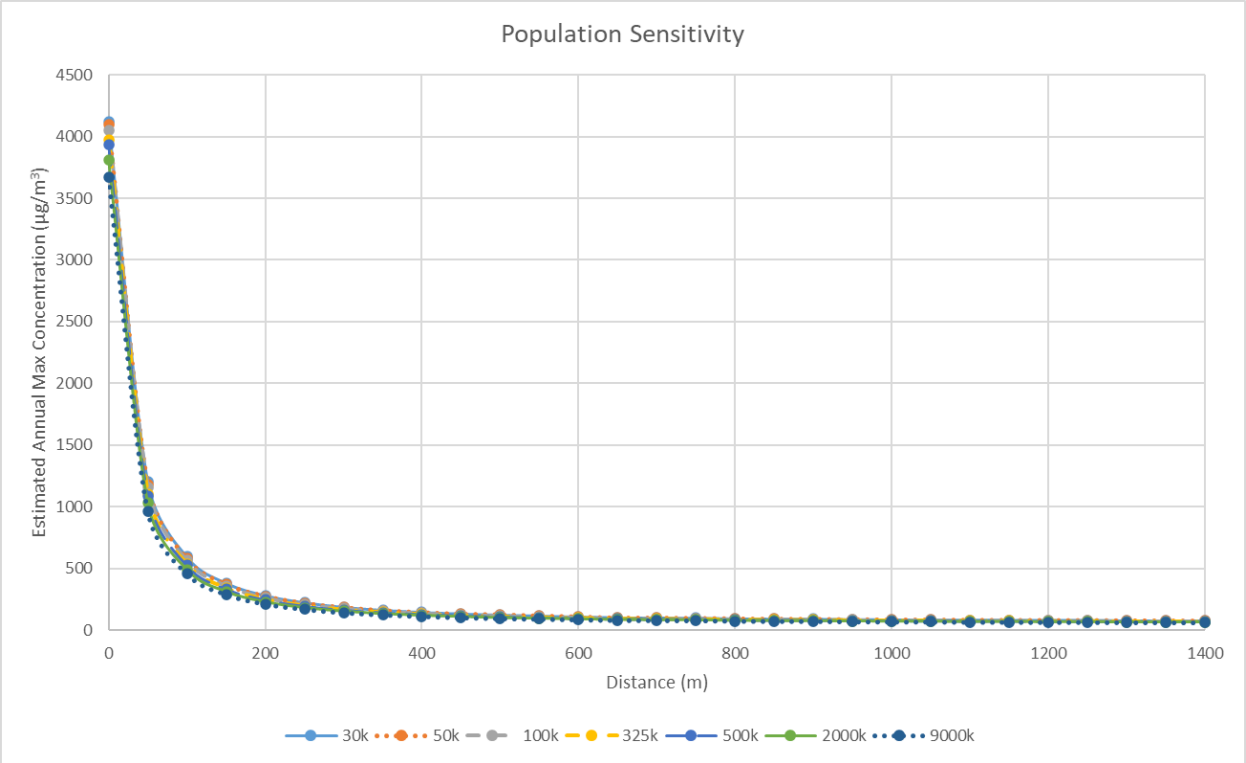


Table II.H.3. Sensitivity Study Results – Population vs. Concentration

Population	30k	50k	100k	325k	500k	2,000k	9,000k
Max Concentration (µg/m³)	4,124	4,094	4,051	3,967	3,934	3,813	3,665

Note: The model was set up similar to the grocery store model with stationary, on-site, and off-site area sources. The Watsonville meteorological dataset was used for each model run.

A population of 500,000 was selected for use in the grocery store and CSW for the following reasons:

- A population of 500,000 is representative of a larger city or smaller county or Metropolitan Statistical Area.
- A population of 500,000 resulted in a ground-level concentration 3,934 µg/m³. This value is similar to the averaged ground-level concentrations that resulted from the use of the low and high-end populations (i.e., 30,000 and 9,000,000 people).

I. Uncertainty Associated with the HRA Analysis

Health risk assessment is a complex process, which requires the integration of many variables and assumptions. The estimated diesel PM concentrations and potential health risks produced by a risk assessment are based on several assumptions, many of which are designed to be health protective so that potential risks to individuals are not underestimated.

1. Health Values

The toxicity of toxic air contaminants is often established by available epidemiological studies, or use of data from animal studies where data from humans are not available. The diesel PM CPF is based on long-term studies of railyard workers exposed to diesel exhaust in concentrations approximately ten times greater than typical ambient exposures. The differences within human populations usually cannot be easily quantified and incorporated into risk assessments. Factors including metabolism, target site sensitivity, diet, immunological responses, and genetics may influence the response to toxicants.

Human exposures to diesel PM are often based on limited availability of data and are mostly derived based on estimates of emissions and duration of exposure. Different epidemiological studies also suggest somewhat different levels of risk. When the Scientific Review Panel (SRP) identified diesel PM as a toxic air contaminant (CARB, 1998), the panel members endorsed a range of inhalation CPF (1.3×10^{-4} to 2.4×10^{3} $(\mu g/m^3)^{-1}$) and a risk factor of 3×10^{-4} $(\mu g/m^3)^{-1}$, as a reasonable estimate of the unit risk. From the unit risk factor an inhalation CPF of 1.1 $(mg/kg\text{-}day)^{-1}$ was calculated by OEHHA, which is used in this HRA. Many epidemiological studies support the finding that diesel exhaust exposure elevates relative risk for lung cancer. However, the quantification of each uncertainty applied in the estimate of cancer potency is very difficult and can be itself uncertain.

2. Air Dispersion Models

As mentioned previously, there is no direct measurement technique to measure diesel PM in ambient air (e.g., ambient air monitoring). This analysis used air dispersion modeling to estimate the concentrations to which the public is exposed. While air dispersion models are based on state-of-the-art formulations using the best science, uncertainties are associated with the models.

The air dispersion model predictions have been improved over the years because of better representations in the model structure. In 2006, the U.S. EPA modeling guidance adopted AERMOD as the preferred model for near-field dispersion of emissions for distances up to 50 km. Many updated formulations have been incorporated into the model structure for better predictions from the air dispersion process. The primary purpose of this HRA analysis is to quantify the improvement in

health impacts that would result from the regulatory proposal. The U.S. EPA preferred air dispersion model, AERMOD, was selected for use in this HRA.

3. Model Inputs

The model inputs include emission rates, modeling source parameters, meteorological conditions, and dispersion coefficients. Each of the model inputs has uncertainty associated with it. Among these inputs, emission rates and meteorological conditions have the greatest effect on modeling results.

This emission rate for each source was estimated from the emission inventory. The emission inventory has several sources of uncertainty, including emission factors, equipment population and age, equipment activity, and load factors. The uncertainties in the emission inventory can lead to over predictions or under predictions in the modeling results. CARB staff estimated TRU emissions based on the best available information regarding past, current, and projected TRU activities.

The modeling parameters also have several sources of uncertainty, including dispersion coefficients, release height, and initial vertical dimension. The inputs for these modeling parameters are based on sensitivity studies conducted by CARB staff.

III. REGIONAL PM2.5 MORTALITY AND ILLNESS ANALYSIS FOR CALIFORNIA AIR BASINS

CARB staff conducted a mortality and illness analysis based on the statewide emission reductions of PM2.5 and NOx that would be achieved by the Proposed Amendments. This section provides a summary of the mortality and illness impacts, which include premature death from cardiopulmonary disease, hospital admissions, and emergency room visits.

A. PM2.5 Mortality and Illness Overview

The Proposed Amendments would reduce NOx, and PM2.5 emissions, resulting in health benefits for individuals in California. CARB analyzed four health outcomes: cardiopulmonary mortality, hospitalizations for cardiovascular illness, hospitalizations for respiratory illness, and emergency room visits for asthma. These health outcomes and others have been identified by U.S. EPA as having a causal or likely causal relationship with exposure to PM2.5 based on a substantial body of evidence (U.S. EPA, 2019).

U.S. EPA has determined that both long-term and short-term exposure to PM2.5 play a causal role in premature mortality, meaning that a substantial body of scientific evidence shows a relationship between PM2.5 exposure and increased risk of mortality. This relationship persists when other risk factors such as smoking, poverty and other factors are taken into account (U.S. EPA, 2019).

U.S. EPA has also determined a causal relationship between nonfatal cardiovascular effects and short and long-term exposure to PM2.5 and a likely causal relationship between non-mortality respiratory effects and short and long-term PM2.5 exposures (U.S. EPA, 2019). These outcomes lead to hospitalizations and emergency room visits and are included in this analysis.

CARB staff evaluated a limited number of statewide non-cancer health benefits associated with reductions in exposure to PM2.5 and NOx emissions resulting from the Proposed Amendments. NOx includes nitrogen dioxide, a potent lung irritant, which can aggravate lung diseases such as asthma when inhaled (U.S. EPA, 2016). However, the most serious quantifiable impacts of NOx emissions occur through the conversion of NOx to fine particles of ammonium nitrate aerosol through chemical processes in the atmosphere. PM2.5 formed in this manner is termed secondary PM2.5. Both directly emitted (primary) PM2.5 and secondary PM2.5 is associated with adverse health outcomes, such as cardiopulmonary mortality, hospitalizations for cardiovascular and respiratory illnesses, and emergency room visits for asthma. As a result, reductions in PM2.5 and NOx emissions are associated with reductions in these adverse health outcomes.

1. Incidence-Per-Ton Methodology

CARB uses the incidence-per-ton (IPT) methodology to quantify the health benefits of emission reductions in cases where air quality modeling results are not available. A description of this method is included on CARB's Methodology for Estimating the Health Effects of Air Pollution webpage (CARB, 2021a). CARB's IPT methodology is based on a methodology developed by U.S. EPA (Fann et al., 2009; Fann et al., 2012; Fann et al., 2018).

The IPT methodology assumes that changes in emissions are approximately proportional to changes in health outcomes. IPT factors are derived by calculating the number of health outcomes associated with exposure to PM2.5 concentrations for a baseline scenario and dividing by the emissions of PM2.5 or a precursor. The calculation is performed separately for each air basin using the following equation:

IPT = (number of health outcomes in air basin)/(annual emissions in air basin)

Multiplying the emission reductions from the Proposed Amendments in an air basin by the IPT factor then yields an estimate of the reduction in health outcomes achieved by the Proposed Amendments. For future years, the number of outcomes is adjusted to account for population growth. CARB's current IPT factors are based on a 2014-2016 baseline scenario, which represents the most recent data available at the time the current IPT factors were computed. IPT factors are computed for the two types of PM2.5: primary PM2.5 and secondary PM2.5 of ammonium nitrate aerosol formed from precursors.

2. Reduction in Health Outcomes

CARB staff estimated the reduction in adverse health outcomes associated with reduced emissions of PM2.5 and NOx due to the Proposed Amendments. These health outcomes include cardiopulmonary mortality, hospital admissions for cardiovascular and respiratory illnesses, and emergency room visits for asthma. Based on the analysis, staff estimates that the total reduction in the number of cases statewide due to the implementation of the Proposed Amendments from 2022 to 2034 would be as follows:

- 177 fewer premature deaths (138 to 217, 95 percent confidence interval (CI))
- 57 fewer hospital admissions for cardiovascular and respiratory illnesses (7 to 106, 95 percent CI)
- 87 fewer emergency room visits for asthma (55 to 119, 95 percent CI)

Tables III.A.1 through III.A.3 show the estimated reductions in adverse health outcomes resulting from the Proposed Amendments by air basin from 2022 to 2034.

The biggest health benefits are expected to occur in the South Coast, San Joaquin Valley, and San Francisco Bay Area air basins.

Table III.A.1. Reductions in Health Outcomes from PM2.5 Emissions as a Result of the Proposed Amendments (2022 to 2034)

Air Basin	Cardiopulmonary Mortality	Cardiovascular and Respiratory Hospital Admissions	Asthma Emergency Room Visits
Great Basin Valleys	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake County	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake Tahoe	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Mojave Desert	2 (2 - 3)	1 (0 - 1)	1 (1 - 1)
Mountain Counties	1 (1 - 1)	0 (0 - 0)	0 (0 - 0)
North Central Coast	1 (1 - 1)	0 (0 - 1)	1 (0 - 1)
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Northeast Plateau	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	5 (4 - 7)	1 (0 - 2)	2 (1 - 3)
Salton Sea	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
San Diego County	5 (4 - 6)	1 (0 - 3)	2 (1 - 3)
San Francisco Bay Area	17 (14 - 21)	6 (1 - 11)	10 (6 - 13)
San Joaquin Valley	15 (12 - 19)	4 (0 - 7)	6 (4 - 8)
South Central Coast	1 (1 - 1)	0 (0 - 1)	0 (0 - 1)
South Coast	95 (74 - 117)	33 (4 - 61)	49 (31 - 67)
Total	146 (114 - 179)	47 (6 - 87)	72 (46 - 99)

Note: The values in parentheses represent the 95 percent confidence intervals of the central estimate. Totals may not add due to rounding.

Table III.A.2. Reductions in Health Outcomes from NOx Emissions as a Result of the Proposed Amendments (2022 to 2034)

Air Basin	Cardiopulmonary Mortality	Cardiovascular and Respiratory Hospital Admissions	Asthma Emergency Room Visits
Great Basin Valleys	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake County	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake Tahoe	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Mojave Desert	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Mountain Counties	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
North Central Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Northeast Plateau	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)

Air Basin	Cardiopulmonary Mortality	Cardiovascular and Respiratory Hospital Admissions	Asthma Emergency Room Visits
Sacramento Valley	1 (1 - 1)	0 (0 - 1)	0 (0 - 1)
Salton Sea	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
San Diego County	1 (1 - 1)	0 (0 - 1)	0 (0 - 1)
San Francisco Bay Area	3 (2 - 3)	1 (0 - 2)	1 (1 - 2)
San Joaquin Valley	6 (5 - 8)	2 (0 - 3)	2 (2 - 3)
South Central Coast	0 (0 - 1)	0 (0 - 0)	0 (0 - 0)
South Coast	19 (15 - 23)	7 (1 - 12)	10 (6 - 14)
Total	31 (25 - 38)	10 (1 - 19)	15 (10 - 21)

Note: The values in parentheses represent the 95 percent confidence intervals of the central estimate. Totals may not add due to rounding.

Table III.A.3. Total Reductions in Health Outcomes as a Result of the Proposed Amendments (2022 to 2034)

Air Basin	Cardiopulmonary Mortality	Cardiovascular and Respiratory Hospital Admissions	Asthma Emergency Room Visits
Great Basin Valleys	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake County	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Lake Tahoe	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Mojave Desert	2 (2 -3)	1 (0 - 1)	1 (1 - 1)
Mountain Counties	1 (1 - 1)	0 (0 - 0)	0 (0 - 0)
North Central Coast	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
North Coast	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Northeast Plateau	0 (0 - 0)	0 (0 - 0)	0 (0 - 0)
Sacramento Valley	7 (5 - 8)	2 (0 - 3)	2 (2 - 3)
Salton Sea	1 (1 - 2)	0 (0 - 1)	1 (0 - 1)
San Diego County	6 (5 - 7)	2 (0 - 3)	2 (2 - 3)
San Francisco Bay Area	20 (16 - 25)	7 (1 - 12)	11 (7 - 15)
San Joaquin Valley	22 (17 - 27)	5 (1 - 9)	8 (5 - 11)
South Central Coast	2 (1 - 2)	0 (0 - 1)	1 (0 - 1)
South Coast	115 (89 - 140)	40 (5 - 74)	59 (37 - 81)
Total	177 (138 - 217)	57 (7 -106)	87 (55 - 119)

Note: The values in parentheses represent the 95 percent confidence intervals of the central estimate. Totals may not add due to rounding.

3. Uncertainties Associated with the Mortality and Illness Analysis

Although the estimated health outcomes presented in this report are based on a well-established methodology, they are subject to uncertainty. Uncertainty is reflected in the 95 percent confidence intervals included with the central estimates in Tables III.A.1 through III.A.3. These confidence intervals take into account uncertainties in translating air quality changes into health outcomes.

Other sources of uncertainty include the following:

- The relationship between changes in pollutant concentrations and changes in pollutant or precursor emissions is assumed to be proportional, although this is an approximation.
- Emissions are reported at an air basin resolution, and do not capture local variations.
- Future population estimates are subject to increasing uncertainty as they are projected further into the future.
- Baseline incidence rates can experience year-to-year variation.

4. Monetization of Health Impacts

In accordance with U.S. EPA practice, staff monetized health outcomes by multiplying the projected number of cases by a standard value derived from economic studies (NCEE, 2010).[12] The valuations assigned to different health outcomes is provided in Table III.A.4.

Table III.A.4. Valuation per Incident Avoided Health Outcomes (2019$)

Outcome	Valuation per Incident[1]
Avoided Premature Deaths	$9,864,695
Avoided Acute Respiratory Hospitalizations	$58,288
Avoided Cardiovascular Hospitalizations	$50,842
Avoided Emergency Room Visits	$834

The valuation for avoided premature mortality is based on willingness to pay (U.S. EPA, 2000). This value is a statistical construct based on the aggregated dollar amount that a large group of people would be willing to pay to avoid a single annual death in the population. This value is not an estimate of how much someone would be

[12] Aside from its role in the formation of secondary PM2.5, NOx is also a precursor to ozone. However, the health impacts associated with NOx-derived PM2.5 generally outweigh the impacts for NOx-derived ozone. As a result, this analysis only monetizes the value of reductions in PM2.5.

willing to pay to prevent the death of any person (U.S. EPA, 2021a), nor does it consider specific mortality-related costs such as hospital expenses.

Unlike premature mortality valuation, the valuation for avoided hospitalizations and emergency room visits is based on a combination of typical costs and the willingness of surveyed individuals to pay to avoid adverse outcomes that occur when hospitalized. These include hospital charges, post-hospitalization medical care, out-of-pocket expenses, and lost earnings for both individuals and family members. It also includes lost recreation value and lost household protection (e.g., valuation of time-losses from inability to maintain a household or provide childcare). These costs are most closely associated with specific cost savings to individuals and costs to the health care system.

CARB staff quantified the total statewide valuation due to avoided adverse health outcomes from 2022 to 2034. These values are summarized in Table III.A.5. The spatial distribution of these benefits follows the distribution of emission reductions and avoided adverse health outcomes. Therefore, most benefits to individuals would occur in the South Coast, San Joaquin Valley, and San Francisco air basins, with fewer benefits in the Sacramento Valley and San Diego County air basins.

Table III.A.5. Statewide Valuation from Avoided Adverse Health Outcomes as a Result of the Proposed Amendments from 2022 to 2034 (2019$)

Outcome	Valuation
Avoided Premature Deaths	$1,749,747,000
Avoided Hospitalizations	$3,092,000
Avoided Emergency Room Visits	$73,000
Total	$1,752,912,000

Note: Values have been rounded to the nearest thousand.

In addition to the health impacts for which valuations were provided, the Proposed Amendments would provide other health benefits that are not currently quantified. These include decreases in vulnerability and impacts in disadvantaged communities, work loss days, school loss days, nervous system and lung impacts, and cancer risk.

B. Potential Future Evaluation of Additional Health Benefits

While CARB's PM2.5 mortality and illness analysis has been, and continues to be, a useful method for valuing the health benefits of regulations, it only represents a portion of those benefits. The full health benefits of the Proposed Amendments are underestimated because not all the adverse health outcomes associated with PM2.5 and additional pollutants such as air toxics are evaluated and monetized. Also, CARB's current evaluation methodology does not take into account all PM2.5 precursor emissions. Expansion of the emissions inputs and health outcomes, including, but not limited to, additional cardiovascular and respiratory illnesses, nonfatal/fatal cancers, nervous system diseases, and work loss days would provide a more comprehensive

picture of the benefits from reduced exposure to air pollution. In addition, in 2021, U.S. EPA issued a Technical Support Document (TSD) for their Cross-State Air Pollution Rule that provided both health functions and health valuation for lung cancer incidence, Alzheimer's disease, and Parkinson's disease, among other health endpoints related to PM2.5 exposures (U.S. EPA, 2021b).

In addition, regulatory sources such as TRUs generate additional pollutants beyond PM 2.5 that contribute to serious health outcomes. For instance, NOx reacts with other compounds to form ozone, which can then cause respiratory problems. Updated health impact functions and valuations for ozone are also provided in the aforementioned Cross-State Air Pollution Rule TSD provided by the U.S. EPA (U.S. EPA, 2021b). Additionally, exposure to TACs emitted from TRUs can lead to cancers.

Expanding CARB's health evaluation and economic valuation methodology to include any of the above additional inputs and health outcomes would allow the public to reach a better understanding of the benefits from reducing air pollution by moving toward zero-emission technologies. As indicated, the scientific literature has demonstrated an array of air pollutant-related health impacts, well beyond what CARB staff have quantified in Tables III.A.1 through III.A.3. Some of these impacts are summarized in the next section.

C. Adverse Impacts to Human Health from Diesel Emissions

Diesel-powered mobile sources emit a complex mixture of air pollutants, including diesel PM and gases. The gaseous pollutants include volatile organic compounds (VOC) and NOx, which can lead to the formation of ozone (O_3) and the secondary formation of PM (CARB, 2021b).

1. Air Toxic Impacts

Diesel PM is a toxic air contaminant (TAC) composed of PM and over 40 known cancer-causing substances, including polycyclic aromatic hydrocarbons, benzene, formaldehyde, acetaldehyde, acrolein, and 1,3-butadiene (CARB, 2021b). CARB listed diesel PM as a TAC in 1998, due largely to its association with lung cancer (CARB, 2021b). In 2012, additional studies on the cancer-causing potential of diesel exhaust published since CARB's listing led the International Agency for Research on Cancer (IARC, a division of the World Health Organization) to classify diesel engine exhaust as "carcinogenic to humans" (CARB, 2021b; IARC, 2012). In California, about 70 percent of known cancer risks from TACs are from diesel engine emissions (CARB, 2021b; Propper et al., 2015).

2. Particle Pollution Impacts

Diesel PM is composed primarily of PM2.5 (CARB, 2021c). Due to its small size, inhaled PM2.5 can reach the lower respiratory tract and potentially pass into the

bloodstream to affect other organs (U.S. EPA, 2021c). In this way, PM2.5 contributes not only to increased cancer risk, but also respiratory and cardiovascular diseases and even premature death (U.S. EPA, 2019). Other adverse health outcomes from PM2.5 include asthma, chronic heart disease, and heart attack (CARB, 2021c U.S. EPA, 2019; WHO Europe, 2013). Moreover, PM2.5 can result in respiratory, cardiac, and mortality effects over short exposure times such as days or weeks (U.S. EPA, 2019). PM2.5 is well known to exacerbate asthma, bronchitis, and heart disease symptoms (U.S. EPA, 2019). Exposures to PM2.5 may also lead to myriad other health outcomes, including metabolic, nervous system, reproductive, and developmental effects (U.S. EPA, 2019). For example, adverse health conditions with possible links to airborne PM2.5 include high blood pressure, insulin resistance, and other risk factors for Type II Diabetes, as well as psychological/cognitive problems (U.S. EPA, 2019). PM2.5 may especially impact women and children via health effects such as pre-term birth, reduced birth weight, and abnormal lung and cardiovascular development (U.S. EPA, 2019).

3. Ozone Pollution Impacts

As a gaseous pollutant from diesel sources, NOx can react with other compounds to form ozone, which is the main component of smog. Based on extensive evidence from scientific studies, the US EPA has determined that short-term exposure from ozone is causally linked to adverse respiratory effects (U.S. EPA, 2020). Ozone can cause irritation and damage to lung tissue and worsen asthma and chronic illnesses including chronic obstructive pulmonary disease and reduced lung function. For instance, a study conducted in the San Joaquin Valley showed that increased ozone pollution led to increased risk for asthma emergency room visits, especially for children and Black residents (Gharibi et al., 2019). Metabolic functions are also likely to be affected by short-term ozone exposure, such as those leading to increased risk for complications and hospitalizations in diabetic individuals (U.S. EPA, 2020). And, similar to PM2.5, other potential health effects from ozone exposure may include impacts on the cardiovascular, nervous, and reproductive systems, and possibly increased risk of mortality (U.S. EPA, 2020).

D. Conclusion

TRUs generate criteria pollutants and TACs that are known to cause a range of serious health impacts including premature deaths. As shown in Tables III.A.1 through III.A.3, CARB estimates that implementation of the Proposed Amendments would result in substantial health and economic benefits, due to reduced cardiovascular/respiratory hospitalizations, asthma emergency room visits, and cardiopulmonary deaths. Despite these substantive benefits, CARB's assessment is limited and thus likely an underestimation, because it does not consider the various other health outcomes that could be avoided with cleaner TRUs. Furthermore, those who live and work around areas with high TRU activity, especially those living in disadvantaged communities, are more heavily impacted by these pollutant exposures. For these individuals, actions like the Proposed Amendments to move to cleaner TRUs are critically important. Sections

V.A.1 and VI.D.1 provide an analysis of the potential cancer risk reductions with the Proposed Amendments, while Sections V.C and VIII provide a discussion of the potential benefits to nearby disadvantaged communities.

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