

APPENDIX A
VENTURA COUNTY
EMISSIONS INVENTORY DOCUMENTATION

**CARB VENTURA COUNTY 70 PPB 8-HOUR OZONE
NAAQS EMISSIONS INVENTORY WRITE-UP
CEPAM 2022 V1.01**

(AUGUST 2022)

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EMISSIONS INVENTORY BACKGROUND

Emissions inventories are required by the Clean Air Act (CAA) and the Ozone SIP Requirements Rule for the 2015 ozone National Ambient Air Quality Standards (NAAQS), also called the Ozone Implementation Rule.¹ Specifically, they are required for those areas that exceed the health-based NAAQS. These areas are designated as nonattainment based on monitored exceedances of these standards. These nonattainment areas must develop an emissions inventory as the basis of a State Implementation Plan (SIP) that demonstrates how they will attain the standards by specified dates. This document describes the emissions inventory included in the Ventura County 70 ppb 8-Hour Ozone SIP, which encompasses ocean going vessel and commercial harbor craft emissions out to 100 nautical miles.

EMISSIONS INVENTORY OVERVIEW

Emissions inventories are estimates of the amount and type of pollutants emitted into the atmosphere by facilities, mobile sources, and areawide sources. They are fundamental components of an air quality plan and serve critical functions such as:

1. the primary input to air quality modeling used in attainment demonstrations;
2. the emissions data used for developing control strategies; and
3. a means to track progress in meeting the emission reduction commitments.

The California Air Resources Board (CARB) and the Ventura County Air Pollution Control District (District) have developed a comprehensive current emissions inventory consistent with the requirements set forth in Section 182(a)-(f) of the federal Clean Air Act². CARB and District staff conducted a thorough review of the inventory to ensure that the emission estimates reflect accurate emissions reports for point sources and that estimates for mobile and areawide sources are based on the most recent approved models and methodologies.

CARB also reviewed the growth profiles for point and areawide source categories and worked with District staff to update them as necessary to ensure that the emission projections are based on data that reflect historical trends, current conditions, and recent economic and demographic forecasts.

The United States Environmental Protection Agency (U.S. EPA) regulations require that the emissions inventory for an Ozone SIP contain emissions data for the two precursors to ozone formation: oxides of nitrogen (NO_x) and volatile organic compounds (VOC)³. The inventory included in this plan substitutes VOC with reactive organic gases (ROG), which, in general, represent a slightly broader group of compounds than those in U.S. EPA's list of VOCs.

¹ Implementation of the 2008 National Ambient Air Quality Standards for Ozone: State Implementation Plan Requirements; (40 CFR part 51 Subpart AA; see also <https://www.epa.gov/ground-level-ozone-pollution/implementation-2008-national-ambient-air-quality-standards-naaqs-ozone>).

² Section 182(a)-(f) of the Act. <https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partD-subpart2-sec7511a.htm>

³ Section 182(a)(1) of the Act. <https://www.govinfo.gov/content/pkg/USCODE-2013-title42/html/USCODE-2013-title42-chap85-subchapI-partD-subpart2-sec7511a.htm>

Agency Responsibilities

CARB and District staff worked jointly to develop the emissions inventory for the Ventura County 8-hour ozone nonattainment area. The District worked closely with operators of major stationary facilities in their jurisdiction to develop the point source emissions estimates. CARB staff developed the emissions inventory for mobile sources, both on-road and off-road. The District and CARB shared responsibility for developing estimates for the nonpoint (areawide) sources such as architectural coatings and agricultural burning. CARB and the District worked with several State and local agencies such as the Department of Transportation (Caltrans), the Department of Motor Vehicles (DMV), the Department of Pesticide Regulation (DPR), the California Energy Commission (CEC), and the Southern California Association of Governments (SCAG) to assemble activity information necessary to develop the mobile and areawide source emissions estimates.

Inventory Base Year

The District selected the base year 2018 for the purposes of the modeling emission inventory since that was the year U.S. EPA designated Ventura County as nonattainment for the 70 ppb 8-Hour Ozone NAAQS⁴. The baseline year of 2018 is the most complete and representative emission year for purposes of inventory and emission modeling and is consistent with the baseline year of 2018 selected by the adjacent South Coast Air Quality Management District (SCAQMD). SCAQMD also performed the photochemical modeling for the attainment demonstration.

40 CFR 51.1315(a) requires that the inventory year be selected consistent with the baseline year for the reasonable further progress (RFP) plan as required by 40 CFR 51.1310(b)⁵, which states that the base year emissions inventory shall be the emissions inventory for the most recent calendar year of which a complete triennial inventory is required to be submitted to EPA under the provisions of subpart A of 40 CFR part 51, Air Emissions Reporting Requirements, 40 CFR 51.1–50. States may also use an alternative baseline emissions inventory provided that the year selected corresponds with the year of the effective date of designation as nonattainment for that NAAQS⁶. The District is using 2017 as the baseline year for the purposes of the RFP calculation only.

Forecasted Inventories

In addition to base year emissions, emissions projections are needed for a variety of reasons, including redesignation maintenance plans, the attainment projected inventory for a nonattainment area (NAA), and air quality modeling for attainment plans⁷.

For stationary and area sources, forecasted inventories are a projection of the base year inventory that reflects expected growth trends for each source category and emissions

⁴ <https://www.epa.gov/green-book/green-book-8-hour-ozone-2015-area-information>.

⁵ 40 CFR 51.1315(a). <https://www.govinfo.gov/content/pkg/CFR-2021-title40-vol2/pdf/CFR-2021-title40-vol2-sec51-1315.pdf>.

⁶ 40 CFR 51.1310(b). <https://www.govinfo.gov/content/pkg/CFR-2020-title40-vol2/pdf/CFR-2020-title40-vol2-sec51-1310.pdf>.

⁷ 40 CFR 51.114. <https://www.govinfo.gov/content/pkg/CFR-2000-title40-vol2/pdf/CFR-2000-title40-vol2-sec51-114.pdf>.

reductions due to adopted control measures. CARB develops emission forecasts by applying growth and control profiles to the base year inventory. The stationary and area source emissions inventory for the Ventura County 70 ppb Ozone SIP is modeled by the California Emission Projection Analysis Model (CEPAM), 2022 Emission Projections, Version 1.01. Emission years presented in this AQMP are the modeling baseline year (2018), the milestone year (2024), the required attainment year (2026), and future years to show continuing emission changes (2030, 2035, and 2040).

Growth profiles for point and areawide sources are derived from surrogates, such as economic activity, fuel usage, population, and housing units, that best reflect the expected growth trends for each specific source category. Growth projections were obtained primarily from government entities with expertise in developing forecasts for specific sectors, or, in some cases, from econometric models. Control profiles, which account for emission reductions resulting from adopted rules and regulations, are derived from data provided by the regulatory agencies responsible for the affected emission categories. Emission reductions from adopted control measures are presented in Chapter 3 of the AQMP.

Projections for on-road mobile source emissions are generated by CARB's EMFAC2017 model, which predicts activity rates and vehicle fleet turnover by vehicle model year, along with activity inputs from the metropolitan planning organization (MPO). Off-road mobile sources are forecasted with category-specific model or, where not available, CARB's OFFROAD2007. CEPAM integrates the emission projections with emission projections from stationary and area source categories derived from these mobile source models to develop a comprehensive forecasted emission inventory. As with stationary sources, the mobile source models include control algorithms that account for adopted regulatory actions.

Temporal Resolution

40 CFR 51.1315(c) requires emissions values included in the base year inventory to be actual ozone season day emissions as defined by 40 CFR 51.1300(q)⁸. Since ozone concentrations tend to be highest during the summer months, the emissions inventory used in the SIP is based on the summer season (May through October).

Geographical Scope

The inventories presented in this Plan consist of emissions for the county of Ventura, including offshore emissions out to 100 nautical miles. Only the South Central Coast Air Basin (SCCAB) is designated as a non-attainment area. The SCCAB includes all emissions from sources on land and out to 3 nautical miles from the coast. The offshore air basins, OC1 and OC2, include emissions from sources from three to 24 miles from the coast and 24 to 100 miles from the coast, respectively.

⁸ 40 CFR 51.1315(c). <https://www.govinfo.gov/content/pkg/CFR-2021-title40-vol2/pdf/CFR-2021-title40-vol2-sec51-1315.pdf>.

Quality Assurance and Quality Control

CARB has established a quality assurance and quality control (QA/QC) process to ensure the integrity and accuracy of the emission inventories used in the development of air quality plans. QA/QC occurs at the various stages of SIP emission inventory development. Base year emissions are assembled and maintained in the California Emission Inventory Development and Reporting System (CEIDARS). CARB inventory staff works with air districts, which are responsible for developing and reporting point source emission estimates, to verify these data are accurate. The locations of point sources, including stacks, are checked to ensure they are valid. Area-wide source emissions estimates are developed by both CARB and District staff, and the methodologies are reviewed by both agencies before their inclusion in the emissions inventory. Mobile categories are verified with CARB mobile source staff for consistency with the on-road and off-road emission models. Additionally, CEIDARS is designed with automatic system checks to prevent errors, such as double counting of emission sources. At the final stage, CEPAM is thoroughly reviewed to validate the accuracy of growth and control application, and the output emissions are compared against prior approved versions of CEPAM to identify data anomalies.

EMISSION INVENTORY COMPONENTS

A summary of the components that make up Ventura County's 70 ppb Ozone SIP emissions inventory is presented in the following sections. These include mobile (on- and off-road) sources, stationary point and area sources, and areawide sources. Natural sources are not included.

Mobile Source Emissions

CARB develops the emission inventory for the mobile sources using various modeling methods. These models account for the effects of various adopted regulations, technology types, fleet turnover, and seasonal conditions on emissions. Mobile sources in the emission inventory are composed of both on-road and off-road sources, described in the sections below.

On-Road Mobile Source Emissions

Emissions from on-road mobile sources, which include passenger vehicles, buses, and trucks, were estimated using outputs from CARB's EMFAC2017 model. The on-road emissions were calculated by applying EMFAC2017 emission factors to the transportation activity data provided by the Southern California Association of Governments (SCAG), the local MPO.

EMFAC2017 includes data on California's car and truck fleets and travel activity. Light-duty motor vehicle fleet age, vehicle type, and vehicle population were updated based on 2016 DMV data. The model also reflects the emissions benefits of CARB's recent rulemakings such as the Pavley Standards and Advanced Clean Cars Program and includes the emissions benefits of CARB's Truck and Bus Rule and previously adopted rules for other on-road diesel fleets.

EMFAC2017 utilizes a socio-econometric regression modeling approach to forecast new vehicle sales and to estimate future fleet mix. Light-duty passenger vehicle population includes 2016 DMV registration data along with updates to mileage accrual using Smog Check data. Updates to heavy-duty trucks include model year specific emission factors based on new test data, and

population estimates using DMV data for in-state trucks and International Registration Plan (IRP) data for out-of-state trucks.

Additional information and documentation on the EMFAC2017 model is available at: <https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-road-documentation>

EMFAC2017 SAFE Vehicles Rules Off-Model Adjustment Removal

On September 27, 2019, U.S. EPA and National Highway Traffic Safety Administration (NHTSA) published the “Safer Affordable Fuel-Efficient (SAFE) Vehicles Rule Part One: One National Program” (SAFE-1).⁹ SAFE-1 revoked California’s authority to set its own greenhouse gas emissions standards and set zero-emission vehicle mandates in California. On April 28, 2021, U.S. EPA reconsidered the 2019 SAFE-1 by finding that the actions taken as a part of SAFE-1 were decided in error and are now entirely rescinded¹⁰.

Therefore, any previously applied off-model adjustments as a result of SAFE-1 were removed in this inventory, resulting in a minor reduction in emissions.

EMFAC2017 ACT Off-Model Adjustment

The Advanced Clean Trucks (ACT) regulation was approved on June 25, 2020 and has two main components, a manufacturers zero-emission vehicle (ZEV) sales requirement and a one-time reporting requirement for large entities and fleets. The first component requires manufacturers to sell ZEVs as a percentage of annual truck and bus sales in California for vehicle model years 2024 and newer.

The ACT regulation impacts some of the underlying assumptions in CARB’s EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, CARB developed off-model adjustment factors in order to reflect the regulation. Adjustment factors were based on calculations in *EMFAC2021*, which models a percentage of California-certified ZEV sales for each EMFAC category and model year. More information on inventory modelling methods can be found in the ACT Initial Statement of Reasons (ISOR) *Appendix F*. These adjustment factors were calculated based on emission estimates using *EMFAC2021* under two scenarios: (1) controlled scenario-estimated emissions with adopted regulations (EMFAC2021 default) and (2) uncontrolled scenario - estimated emissions without accounting for the benefits of adopted regulations, including ACT and other regulations such as Heavy-Duty Omnibus, Opacity, and ICT (described below). These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of the ACT regulation. The ACT off-model adjustment factors were only applied to the medium-and heavy-duty truck sectors.

Additional information on ACT is available at:

<https://ww2.arb.ca.gov/our-work/programs/advanced-clean-trucks>

⁹ 84 FR 51310. <https://www.govinfo.gov/content/pkg/FR-2019-09-27/pdf/2019-20672.pdf>.

¹⁰ 87 FR 14332. <https://www.govinfo.gov/content/pkg/FR-2022-03-14/pdf/2022-05227.pdf>.

Additional information on EMFAC2021’s technical details is available at:

https://ww2.arb.ca.gov/sites/default/files/2021-08/emfac2021_technical_documentation_april2021.pdf

EMFAC2017 Heavy-Duty Omnibus Off-Model Adjustment

On August 27, 2020, CARB adopted the Heavy-Duty (HD) Omnibus regulation, which would establish NOx engine emission standards 90 percent lower than today's technology. The Omnibus Regulation will dramatically reduce NOx emissions by comprehensively overhauling exhaust emission standards, test procedures, and other emissions-related requirements for California-certified heavy-duty engines with engine model years 2024 and newer.

The HD Omnibus regulation impacts some of the underlying assumptions in CARB’s EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, CARB developed off-model adjustment factors based on [EMFAC2021](#) (described above) in order to reflect the regulation. These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of the HD Omnibus regulation. The adjustment factors reflect the impact of all components of the HD Omnibus regulation on in-use (i.e. real-world) NOx emissions and deterioration-related emissions. More details on the inventory analysis for this regulation can be found in [Appendix D](#) of the HD Omnibus staff report.

The HD Omnibus off-model adjustment factors were only applied to on-road heavy-duty vehicles.

Additional information on the HD Omnibus regulation is available at:

<https://ww2.arb.ca.gov/our-work/programs/heavy-duty-low-nox>

EMFAC2017 Innovative Clean Transit Off-Model Adjustment

The Innovative Clean Transit (ICT) regulation was adopted by CARB in 2019 and targets reductions in transit fleets by requiring transit agencies to gradually transition their buses to zero-emission technologies. ICT has helped to advance heavy-duty ZEV deployment, with buses acting as a beachhead in the heavy-duty sector. Based on the size of the transit agencies, they are categorized as small and large agencies. Starting calendar year 2023, large agencies follow the phase-in schedule to have a certain percentage of their new purchases as zero emission buses (ZEB). For the small agencies, the start calendar year will be 2025. By 2030, all the agencies need to have 100% of their new purchases as ZEB.

The ICT regulation impacts some of the underlying assumptions in CARB’s EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, in order to reflect the regulation, CARB developed off-model adjustment factors based on EMFAC2021 (described above). These adjustments, provided in the form of multipliers, were applied to emission outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of ICT. More details on the inventory analysis for this regulation can be found in [Appendix L](#) of the ICT staff report. The ICT off-model adjustment factors were only applied to the urban buses (UBUS) category.

Additional information on the ICT regulation is available at:

<https://ww2.arb.ca.gov/our-work/programs/innovative-clean-transit/ict-regulation>

EMFAC2017 Heavy-Duty Inspection and Maintenance Off-Model Adjustment

On Dec. 9th, 2021, California Air Resources Board adopted Heavy-Duty Inspection and Maintenance (HD I/M) program, which controls emissions effectively from non-gasoline on-road heavy-duty vehicles with a gross vehicle weight rating (GVWR) greater than 14,000 pounds. Starting from calendar year 2023, the program drastically reduces NOx and PM 2.5 emissions by enforcing periodic testing and inspections for heavy-duty trucks operating in California.

The HD I/M regulation impacts some of the underlying assumptions in CARB's EMFAC2017 model, which was used to assess emissions from on-road mobile sources. Therefore, in order to reflect the regulation, CARB developed off-model adjustment factors based on off-model analysis with EMFAC2021. More information on this analysis is provided in *Appendix D* of the HD I/M staff report. Since this regulation was adopted after the release of EMFAC2021, these adjustment factors were calculated based on emission estimates under two scenarios: (1) EMFAC2021 with HD I/M analysis incorporated and (2) EMFAC2021 default, which does not include HD I/M. These adjustments, provided in the form of multipliers, were applied to emissions outputs from the EMFAC2017 model by the CEPAM external adjustment module to account for the impact of HD I/M. These off-model adjustment factors were applied to all diesel heavy-duty diesel categories.

Off-Road Mobile Source Emissions

Emissions from off-road sources are estimated using a suite of category-specific models or, where a new model was not available, the OFFROAD2007 model. Many of the newer models are developed to support recent regulations. The sections below summarize the updates made by CARB to specific off-road categories.

Recreational Marine Vessels

Pleasure craft or recreational marine vessel (RMV) is a broad category of marine vessels that includes gasoline-powered spark-ignition marine watercraft (SIMW) and diesel-powered marine watercraft. It includes outboards, sterndrives, personal watercraft, jet boats, and sailboats with auxiliary engines. This emissions inventory was last updated in 2014 to support the evaporative control measures. The population, activity, and emission factors were revised using new surveys, DMV registration information, and emissions testing.

Staff used economic data from a 2014 UCLA Economic Forecast to estimate the near-term annual sales of RMV (2014 to 2019). To forecast long-term annual sales (2020 and later), staff used an estimate of California's annual population growth as a surrogate.

Additional information is available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-offroad>

Recreational Vehicles

Off-highway recreational vehicles include off-highway motorcycles (OHMC), all-terrain vehicles (ATV), off-road sport vehicles, off-road utility vehicles, sand cars, golf carts, and snowmobiles. A new model was developed in 2018 to update emissions from recreational vehicles. Input factors such as population, activity, and emission factors were re-assessed using new surveys, DMV

registration information, and emissions testing. OHMC population growth is determined from two factors: incoming population as estimated by future annual sales and the scrapped vehicle population as estimated by the survival rate.

Additional information is available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-offroad>

Fuel Storage and Handling

Emissions from portable fuel containers (gas cans) were estimated based on past surveys and CARB in-house testing. This inventory uses a composite growth rate that depends on occupied household (or business units), percent of households (or businesses) with gas cans, and average number of gas cans per household (or business) units.

Additional information is available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-offroad>

Small Off-Road Engines (SORE)

Small off-road engines (SORE) are spark-ignition engines rated at or below 19 kilowatts (i.e., 25 horsepower). Typical engines in this category are used in lawn and garden equipment as well as other outdoor power equipment and cover a broad range of equipment. The majority of this equipment belongs to the Lawn & Garden (e.g., lawnmower, leaf blower, trimmer) and Light Commercial (e.g., compressor, pressure washer, generator) categories of CARB's SORE emissions inventory model.

The newly developed, stand-alone SORE2020 Model reflects the recovering California economy from the 2008 economic recession and incorporates emission results from CARB's recent in-house testing as well as CARB's most recent Certification Database. CARB also has conducted an extensive survey of SORE operating within California through the Social Science Research Center (SSRC) at the California State University, Fullerton (CSUF). Data collected through this survey provides the most up-to-date information regarding the population and activity of SORE equipment in California. The final SORE emissions included the adopted SORE rule in December 2021 as well as the 15-day changes after the Board hearing which allowed the pressure washers (greater than 5 hp) extra time for meeting the regulation. The SORE annual sales were forecasted using historic growth of the number of California households (DOF household forecasts, 2000 – 2008 and 2009 - 2018).

Additional information on SORE baseline emissions (without the adopted rule and 15-day changes) is available at:

https://ww2.arb.ca.gov/sites/default/files/2020-09/SORE2020_Technical_Documentation_2020_09_09_Final_Cleaned_ADA.pdf

Ocean Going Vessels

Ocean going vessels (OGVs) were updated in 2021 based on AIS (transponder) data. These data, along with vessel information supplied by IHS Fairplay provides vessel visit counts, speed, engine size, and other vessel characteristics. The inventory adopts US EPA's methodology for emissions

based on vessel speed, engine model year and horsepower. The inventory includes transit, maneuvering, anchorage and at-berth emissions, updating the 2019 at-berth-only inventory. The comprehensive national model Freight Analysis Framework (FAF) was used to develop growth rates for forecasting.

Additional information on CARB's general OGV update is available at:

https://ww2.arb.ca.gov/sites/default/files/2022-03/CARB_2021_OGV_Documentation_ADA.pdf

Commercial Harbor Craft

Commercial Harbor Crafts (CHC) are grouped into 18 vessel types: articulated tug barge (ATB), bunker barge, towed petrochemical barge, other barge, dredge, commercial passenger fishing, commercial fishing, crew and supply, catamaran ferry, monohull ferry, short run ferry, excursion, ATB tug, push and tow tug, escort/ship assist tug, pilot boat, research boat, and work boat.

The CHC inventory was updated in 2021 and includes vessels used around harbors such as tug and tow boats, fishing vessels, research vessels, barges, and similar. The inventory was updated based on CARB's reporting data required by the CHC regulation for these vessels, as well as inventories from the Ports of Los Angeles and Long Beach and Oakland and Richmond. This supplied vessel characteristics, and the population was scaled up to match U.S. Coast Guard data on the annual number of vessels in California waters. Activity and load factors were based on a mix of reporting data and port-specific inventories. Emission factors were based on certification data for harbor craft engines. Population and activity growth factors were estimated based on historical trends in the past decade.

Additional information on this methodology is available at:

<https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2021/chc2021/apph.pdf>

Locomotives

All locomotive inventories were updated in 2020 and include linehaul (large national companies), switchers (used in railyards), passenger, and Class 3 locomotives (smaller regional companies). Data for each sector was supplied by rail operations, including Union Pacific and Burlington Northern, and Santa Fe Railway (BNSF) for linehaul and switcher operations. Data for other categories was supplied by the locomotive owners. Emission factors for all categories were based on U.S. EPA emission factors for locomotives. The inventory reflects the 2005 memorandum of understanding (MOU) between CARB, Union Pacific, and BNSF. Growth rates were primarily developed from the FAF.

More information is available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road>

Diesel Agricultural Equipment

The agricultural equipment inventory covers all off-road vehicles of all fuel types used on farms or first processing facilities. It was updated in 2021 using a 2019 survey of California farmers and rental facilities, and the 2017 U.S. Department of Agriculture (USDA) agricultural census. Emission factors are based on the 2017 off-road diesel emission factor update. The inventory reflects incentive programs for agricultural equipment that were implemented earlier than August

2019. Agricultural growth rates were developed using historical data from the County Agricultural Commissioners' reports.

Additional information is available at:

https://ww2.arb.ca.gov/sites/default/files/2021-08/AG2021_Technical_Documentation_0.pdf

In-Use Off-Road Equipment

This category covers off-road diesel vehicles over 25 horsepower in construction, mining, industrial, and oiling drilling categories. The inventory was updated in 2022 based on the DOORS registration program required by the offroad equipment regulation. Activity was updated based on a 2021 survey of registered equipment owners, and emission factors were based on the 2017 off-road diesel emission factor update. The inventory reflects the In-Use Off-Road Equipment Regulations, as amended in 2011.

The updated methodology is currently in the process of being posted online. When it is completed, the methodology will be available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road>

Cargo Handling Equipment

The Cargo Handling Equipment (CHE) inventory covers equipment of all fuels used at California ports and intermodal railyards, such as cranes, forklifts, container handling equipment, and more. The inventory population and activity were updated in 2021 based on the port inventories for the Ports of Los Angeles and Long Beach and Richmond, and the CARB reporting data for other ports and railyards, which had a more comprehensive inventory than available through reporting. Load factors were based on the previous inventory in 2007, and emission factors were based on the 2017 off-road diesel emission factor update. The inventory reflects the CHE Airborne Toxic Control Measures (ATCM), adopted in 2005 and completed in 2017.

The updated methodology is currently in the process of being posted online. When it is completed, the methodology will be available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road>

Transportation Refrigeration Units - Diesel

The Transportation Refrigeration Units (TRU) inventory was updated in 2020 based on the TRU reporting program at CARB. The activity was developed based on 2010 surveys of facilities served by TRUs and 2017 to 2019 telematics data purchased from TRU manufacturers. Emission factors were developed specifically for TRUs based on TRU engine certification data reported to U.S. EPA as of 2018. The inventory reflects the TRU ATCM and 2021 amendments. Forecasting was based on IBISWorld reports forecast for related industries, and turnover forecasting was based on the past 20 years equipment population trends.

Additional information is available at:

<https://ww2.arb.ca.gov/sites/default/files/barcu/board/rulemaking/tru2021/apph.pdf>

Portable Equipment

Portable equipment inventory includes non-mobile diesel, such as generators, pumps, air compressors, chippers, and other miscellaneous equipment over 50 horsepower. This inventory was developed in 2017 based on CARB's registration program, 2017 survey of registered owners for activity and fuel, and the 2017 off-road diesel emission factor update. The inventory also reflects the Portable ATCM and 2017 amendments.

Because registration in the Portable Equipment Registration Program (PERP) is voluntary, the PERP registration data was used as the basis for equipment population, with an adjustment factor used to represent the remaining portable equipment in the state. Estimates of future emissions beyond the base year were made by adjusting base year estimates for population growth, activity growth, and the purchases of new equipment (i.e. natural and accelerated turnover).

Additional information is available at:

<https://ww3.arb.ca.gov/msei/ordiesel/perp2017report.pdf>

Large Spark Ignition/Forklifts

The large spark ignition (LSI) inventory includes gasoline and propane forklifts, sweeper/scrubbers, and tow tractors. The inventory was updated in 2020 based on the LSI/forklift registration in the DOORS reporting system at CARB, and the sales data was provided by the Industrial Truck Association (ITA). Activity was based on a survey of equipment owners in the DOORS system, and emission factors were based on U.S. EPA's latest guidance for gasoline and propane engines. The inventory reflects the LSI regulation requirements and 2016 amendments.

The updated methodology is currently in the process of being posted online. When it is completed, the methodology will be available at:

<https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/road-documentation/msei-documentation-road>

Civil and Commercial Aircraft

The District used the Federal Aviation Administration (FAA) Emissions and Dispersion Modeling System (EDMS) model version 5.1.2 and airport-specific aircraft operations and time-in-mode operating profiles based on local airport operational characteristics and the local mixing height to estimate 2008 criteria emissions and fuel consumption by aircraft operating mode for civil and commercial aircraft at civilian airport facilities operating in Ventura County. Civil and commercial aircraft include single and twin-engine piston aircraft, turbine engine and jet powered aircraft and helicopters.

Sources of aircraft activity data include the FAA Air Traffic Activity Data System (ATADS) database and a Caltrans noise study in 1997 for the three largest airports and an EPA methodology for estimating aircraft operations at small facilities that do not report operations data to the FAA for one small private civilian airport and 14 heliports (*Environmental Protection Agency, Calculating Aviation Gasoline Lead Emissions in the 2008 NEI, (March 2009)*). 2008 emissions were projected to 2018 using the ratio of 2018 to 2008 ATADS operations for the two largest

airports responsible for over 76% of county-wide aircraft operation. The District's growth profile is based on the 2020 FAA Terminal Area Forecast for the two largest airports.

Military Aircraft and Vessels

Emissions are associated with military aircraft operations at the U.S. Navy facility Naval Base Ventura County (NBVC) at Point Mugu on the Ventura County mainland and the facility on San Nicolas Island in the outer continental shelf from 24 to 100 nautical miles (OC2) air basin, and with military vessel operations occurring at the U.S. Navy facilities at the Port of Hueneme in Ventura County and large military vessels operating offshore and in the approach corridors to Port Hueneme and San Nicolas Island in the OC2 air basin.

NBVC provided 2017 baseline emissions estimates for military aircraft and vessel activities in the Ventura County attainment area (mainland and three nautical miles offshore), the outer continental shelf from 3 to 24 nautical miles air basin (OC1), and the OC2 air basin (Naval Base Ventura County Mobile Source Emissions 2017 Baseline Emissions and Future Emission Projection for 8-Hour Ozone SIP Planning (February 2021)). Aircraft include transports, piston and jet aircraft, helicopters, and missile launches. Emissions are from landings and takeoffs, touch and go aircraft operations and ground maintenance operations. Military vessels include large military ships, support and operations vessels, tugboats and some non-military vessels utilizing Navy facilities at Port Hueneme. Emissions occur from main propulsion and auxiliary engines during in-port at-berth and maneuvering operations and underway operations.

NBVC provided future year emissions estimates for military aircraft and vessels from planned projects and an additional 4% annual growth allowance through year 2026 within the Ventura County nonattainment area. The 4% annual growth allowance is intended to account for uncertainties in potential projects resulting from future actions and unknown projects. Beyond 2026 through 2040, emissions in the nonattainment area and the OC1 and OC2 basins were assumed to grow at a rate of 4% per year, compounded annually. The only source in the NBVC mobile source emission inventory which was not projected to grow at 4% is the Port Hueneme Vessel Cargo emissions at Berth N3, which are assumed to grow at 2% for all years covered by this emission inventory.

Stationary Point and Area Sources

The stationary source inventory is composed of point sources and area-wide sources. The data elements in the inventory are consistent with the data elements required by the (Air Emissions Reporting Requirements Rule) AERR. The inventory reflects actual emissions from industrial point sources reported to the District by the facility operators through calendar year 2020.

More information regarding the District's facility point source inventory is available at: http://www.vcapcd.org/emissions_inventory.htm

Stationary point sources also include smaller point sources, such as gasoline dispensing facilities and laundering, that are not inventoried individually, but are estimated as a group and reported as a single source category. Emissions from these sources are estimated by both CARB and the District using various models and methodologies. Estimation methods typically use emission factors from permits or literature, but can incorporate data from source testing, direct measurement

by continuous emissions monitoring systems, or engineering calculations. Emissions for these categories are estimated by both CARB and the District.

Emission estimates for the categories below were developed by CARB and the District and have been reviewed by CARB and District staff to reflect the most up-to-date information and methods.

Fuel Combustion

Fuel Combustion includes stationary sources that burn combustible material fuel for heat or energy. The District categorizes fuel combustion emission sources by the type of fuel combusted and the type of facility that is using the fuel.

Natural Gas Combustion

Industrial and commercial natural gas combustion emissions estimates were revised by the District for 2018. Emissions were estimated based on the natural gas consumed by various industrial and commercial sectors (space heating, water heating, and other unspecified). Industrial and commercial natural gas usage reported by the gas utilities to the District for 2018 was distributed to the sectors using allocation factors from Southern California Gas Company. Emission factors were from EPA AP-42 Section 1.4 “Natural Gas Combustion” (July 1998). The growth profile is based on the natural gas usage demand forecasts developed by Southern California Gas Company for Ventura County and considers energy savings benefits from statewide energy efficiency programs and standards.

Stationary Nonagricultural Diesel Engines

This category includes emissions from backup and prime generators and pumps, air compressors, and other miscellaneous stationary diesel engines that are widely used throughout the industrial, service, institutional, and commercial sectors. The emission estimates, including emission forecasts, are based on a 2003 CARB methodology derived from the OFFROAD2007 model.

Additional information on this methodology is available at:
<https://ww3.arb.ca.gov/ei/areasrc/arbfuelcombothet.htm>

Stationary Agricultural Natural Gas Engines

The District updated emissions for 2010 based on fuel use and emission factor data from Emission Reduction Credits (ERC) applications submitted to the District for unpermitted agricultural well pump natural gas engines. Emissions were adjusted by the ratio of known engine fuel use and countywide natural gas fuel use data from the California Energy Commission (CEC) for - 'Ag & Water Pump' NAICS 221311 (Water Supply) - to account for unknown engines. The growth profile for natural gas irrigation pumps was developed by ARB/Pechan.

Agricultural Diesel Irrigation Pumps

This category includes emissions from the operation of diesel-fueled stationary and mobile agricultural irrigation pumps. The emission estimates are based on a 2003 CARB methodology updated in 2018 using statewide population and include replacements due to the Carl Moyer Program.

Additional information on this category is available at:
<https://ww3.arb.ca.gov/ei/areasrc/fullpdf/full1-1.pdf>

Other Liquid Fuel Combustion

Industrial and commercial liquid fuel combustion emissions were projected by the District for 2018 from 2010. State-wide distillate oil, residual oil and liquefied petroleum gas fuel consumption from the U.S. Dept. of Energy Information Administration (EIA) from 2009 was projected to 2010 using the 2010/2009 statewide ratio of either industrial or commercial employment from California Employment Development Department Labor Management Information (LMI) data, then allocated to the county level on the basis of the county/state ratio. Point source fuel use was then subtracted out. Distillate and residual fuel oil categories are subject to ARB's state-wide Diesel Fuel regulations and sulfur content is assumed to be 0.0015%. Emission factors are from EPA AP-42 Section 1.3 "Fuel Oil Combustion" and Section 1.5 "Liquefied Petroleum Gas Combustion". The growth profile is based on industry sector growth rates from SCAG.

Waste Disposal

Composting

The District developed a new methodology for 2018 to estimate ROG and NH₃ emissions from organic material composting operations in support of a proposed District rule to regulate ROG emissions from these sources. Annual 2018 composting, co-composting and chip-and-grind throughput was obtained from an annual survey of composting facilities in Ventura County. ROG and NH₃ emission factors are from the ARB Composting Regulatory Workgroup, ARB Emissions Inventory Methodology for Composting Facilities (March 2015) Table III-1 and III-2. The growth profile is based on population projections from SCAG.

Landfills

The District developed a new point source category methodology for 2018 to estimate the ROG emissions from landfill gas escaping from the landfill surface. The District used the EPA's Landfill Gas Emission Model (LandGEM) to model ROG generation, then used that projection and the quantity of landfill gas collected as reported in surveys to project ROG emissions.

Cleaning and Surface Coatings

Cleaning and surface coatings are generally tracked by the District as an aggregate group and not at the facility level. Some large facilities report cleaning solution and surface coating use to the District.

Laundering

The District updated emissions from dry cleaning establishments using petroleum solvent or perchloroethylene for 2010. Emissions are based on solvent use and type of dry cleaning equipment used at dry cleaning facilities under District permit. Emissions from petroleum solvent were calculated using the solvent density. Because of its toxic effects, perchloroethylene use has been prohibited in California by the state-wide Dry Cleaning Air Toxic Control Measure (*ATCM*). The growth profile for petroleum solvent is based on industry projections from SCAG. Perchloroethylene use for dry cleaning has been eliminated in the District.

Degreasing

This category includes emissions from the use of solvents in degreasing operations (cold cleaning, vapor degreasing and handwipe cleaning) in the manufacturing and maintenance industries. ARB estimated 1993 emissions for this source category based on a 1996 study by E.H. Pechan and Associates, Inc. (Pechan) entitled, Solvent Cleaning/Degreasing Source Category Emission Inventory. To estimate degreasing emissions, Pechan collected activity data by surveying solvent users in two major groups: manufacturing and maintenance.

Emissions were estimated for 32 equipment and solvent pairs using employment in the nine industry groups and three emission variables: an activity factor (AF), which is the net solvent loss per employee accounting for recycled solvent; an emission factor (EF), which is the solvent density; and a user fraction (UF), which is the fraction of employees using a particular equipment/solvent. For the manufacturer's survey, the emission factor for pure solvents is the density of the particular solvent. The emission factor for solvent blends is the density of the solvent multiplied by the total organic gas (TOG) content of the solvent. Exhaust controls were taken into account if used. For the maintenance survey, the emission factors are the density of the solvent with no exhaust controls.

The District revised the Pechan Report methodology for 2010, using 2010 employment data from the U.S Department of Labor *Bureau of Labor Statistics* database, the three Pechan Report variables, an additional variable to account for spray gun cleaning equipment not subject to District Rule 74.6 "Surface Cleaning and Degreasing" and revised control factors to account for exempt emissions. The growth profile is based on total industry output projections from SCAG.

Coatings and Process Solvents

The District updated 2010 ROG emissions in four Coatings & Process Solvent categories: Metal Parts and Products, Wood Furniture Coatings, Thinning and Cleaning Solvent, and Industrial Coatings (unspecified). 2010 national coating and solvent product data from the U.S. Census Bureau publication Current Industrial Reports, Paint & Allied Products: 2010 (July 2011) were allocated to the county level based on the county/national employment ratio using 2010 U.S. Department of Labor Bureau of Labor Statistics employment data. Thinning and clean-up solvent usage was adjusted for solvent usage already accounted for in Architectural Coatings area source categories. Coating and process solvent ROG emissions were determined using the composite emission factors from the corresponding point source emission categories reconciling with each area source category. The composite point source emission factors represent control from applicable district rules. Growth profiles are SCAG industry-specific economic output or total employment projections.

Printing

The District updated 2013 ROG emissions from printing operations. The 2018 emissions have been projected from that 2013 update. ROG emissions from printing facilities with permits were calculated using data from surveys and inspections available to the District. When data from surveys and inspections was not sufficient, the emissions from permitted facilities was scaled based

on permitted ROG emissions and the emissions from permitted facilities and enough data to calculate emissions.

The number of permit-exempt printing facilities was estimated using data from a 2002 source category update and then estimating industry declines from 2002 to 2012. Emissions from permit-exempt facilities were assumed to be equal to the District permit exemption level of 200 pounds per year of ROG.

Petroleum Production and Marketing

Petroleum production and marketing includes emissions from the extraction, transportation, and transfer of oil and gas. It also includes the emissions from the transportation and transfer of finished fuels such as gasoline and diesel fuel. Emissions from fuel combustion as part of the petroleum extraction and marketing process is included as part of the fuel combustion category.

Gasoline Dispensing Facilities

This category uses a 2015 CARB methodology to estimate emissions from fuel transfer and storage operations at gasoline dispensing facilities (GDFs). The methodology addresses emissions from underground storage tanks, vapor displacement during vehicle refueling, customer spillage, and hose permeation. The updated methodology uses emission factors developed by CARB staff that reflect more current in-use test data and accounts for the emission reduction benefits of onboard refueling vapor recovery (ORVR) systems. The emission estimates are based on 2012 statewide gasoline sales data from the California Board of Equalization that were apportioned to the county level using fuel consumption estimates from EMFAC 2014. Emissions were grown based on EMFAC2017.

Additional information on this category is available at:

<https://ww2.arb.ca.gov/arb-petroleum-production-and-marketing-methodologies-petroleum-marketing>

Gasoline Cargo Tanks

This category uses a 2002 CARB methodology to estimate emissions from gasoline cargo tanks. These emissions do not include the emissions from loading and unloading of gasoline cargo tank product; they are included in the gasoline terminal inventory and gasoline service station inventory. Pressure-related fugitive emissions are volatile organic vapors leaking from three points: fittings, valves, and other connecting points in the vapor collection system on a cargo tank. 1997 total gasoline sales were obtained from the California Department of Transportation. The emission factors are derived from the data in the report, "Emissions from Gasoline Cargo Tanks, First Edition," published by the Air and Waste Management Association in 2002.

The initial emission estimates for 1997 were grown to 2012 using a growth parameter developed by Pechan based on gasoline and oil expenditures data. Emissions were grown for subsequent years according to fuel consumption from CARB's EMFAC 2017 mobile sources emission factors model.

Additional information on this methodology is available at:

<https://ww2.arb.ca.gov/arb-petroleum-production-and-marketing-methodologies-petroleum-marketing>

Oil and Gas Production

Most emissions from the oil and natural gas production inventory are based on facility surveys. This category is related to fugitive emissions from production-related fuel consumption, fugitive losses (sumps, pits, pumps, compressors, well heads, separators), vapor recovery and flares, tank and truck working and breathing losses, wastewater treatment, tertiary production, and wet and dry gas stripping. Emissions were calculated using emission factors developed during facility permitting. These factors were developed for classes of equipment using emission models such as GlyCalc and TANKS or obtained from emission factor references such as the Compilation of Air Emission Factors (AP-42).

The District updated 2010 ROG emissions for three Oil and Gas Production categories: Tertiary Oil Wells, Gas Stripping and Oil Production Fugitive Losses Well Heads.

ROG emissions in the Tertiary Oil Wells category are from thermally enhanced oil recovery (TEOR) steam drive and cyclic steam well casing vents. Emissions are calculated using the number of TEOR wells from the California Geologic Energy Management Division (*CalGEM*), 2009 Annual Report of the State Oil & Gas Supervisor, Injection 2009 Table (November 2011) and ROG emission factors developed by Radian Corporation in Assessment of VOC Emissions from Well Vents Associated with Thermally Enhanced Oil Recovery Report No. EPA 909/9-81-003 (September 1981). The controlled ROG emission factor assumes 90% control from vapor recovery systems.

Gas Stripping ROG emissions are from gas plant valves and fittings. Emissions are calculated using the annual million cubic feet of gas processed obtained from the *CalGEM 2010 Annual Report of the State Oil & Gas Supervisor*, Oil and Gas Production by County Table (January 2012) and fugitive gas emission factors developed in a study conducted by KVB entitled Emission Characteristics of Crude Oil Production Operations in California - Final Report No. KVB72 5810-1309 (January 1983). The controlled emission factor assumes 80% control from District Rule 74.10 “Components at Crude Oil and Natural Gas Production and Processing Facilities.”

Oil Production Fugitive Losses Well Heads ROG emissions are from oil production well head maintenance. Well head maintenance refers to opening a producing well to replace or repair rod pumps, sucker rods or tubing, or to perform other well servicing operations, allowing the pressurized gas to escape or vent to the atmosphere. The 2010 methodology was revised to incorporate assumptions in CARB’s, *2007 Oil & Gas Industry Survey Results Draft Report* released in August 2011. Emissions per maintenance event are estimated by determining the volume of well gas released during maintenance operations, which depends on well depth, casing diameter, tubing diameter, well gas pressure and gas temperature. Total annual emissions are determined from emissions per maintenance event, the number of operating wells obtained from the *CalGEM 2010 Annual Report of the State Oil & Gas Supervisor*, January 2012, and well maintenance operations per year from the 2007 ARB Oil & Gas Industry Survey.

The growth profile for the three categories is based on the SCAG industry-specific economic output for oil & gas extraction.

ARB staff updated the statewide emissions inventory for oil and natural gas production, which included the revision of emissions estimates and the addition of emission categories that previously were not estimated. For Ventura County, these categories included fugitive emissions from mud degassing (the practice of extracting entrained gas from drilling mud once it is outside the wellbore and venting the gas to the atmosphere), and pneumatic devices powered by high pressure produced gas for Ventura County. Emissions were calculated with a software tool developed by EPA that generates county-level emissions for upstream oil and gas activity.

This tool uses 2011 as the base year, with activity data taken from CalGEM, an industry database, and default emission factors provided in an associated report. Staff incorporated data from ARB's 2007 Oil and Gas Industry Survey (e.g., typical component counts) and feedback from individual air districts (e.g., minimum controls required to operate in a certain district, with associated control factors) to improve these parameters and further adjust the tool's output. Emissions estimates for 2012 and other years were forecasted using the historical trend in statewide oil production from CalGEM, which assumes a 2.2 percent annual decline.

Additional information on this methodology is available at:

<https://ww2.arb.ca.gov/resources/documents/oil-and-gas-industry-survey>

<https://ww3.arb.ca.gov/ei/areasrc/oilandgaseifinalreport.pdf>

Gasoline Bulk Plants

The District estimated 2012 ROG emissions from gasoline bulk loading facilities not captured in the point source inventory, including aviation gasoline bulk plants located at airports. Emissions are associated with tank breathing and working loss. Working loss emissions are a composite of several processes associated with loading/unloading gasoline into or from the storage tanks. Throughput and emission factors were obtained from the District permits for the facilities. The growth profile for GDFs and Bulk Plants is based on projections of gasoline consumption from ARB's EMFAC model.

LPG Transfer and Dispensing Losses

The District developed a new emission estimation methodology for fugitive ROG emissions from transfer and dispensing of liquefied petroleum gas (LPG) for 2012, based on the South Coast Air Quality Management District emission estimation methodology described in Final Staff Report for Proposed Rule 1177 'Liquefied Petroleum Gas Transfer and Dispensing' Appendix B 'Emission Inventory Calculations' (June 2012). LPG fugitive ROG emissions result from (1) venting of LPG through fixed liquid level gauges (FLLG) used as overfill safety devices on pressurized receiving containers, tanks, and cylinders and (2) volatilization of entrapped LPG when transfer lines are disconnected.

FLLG venting emissions depend on the number of filling events, container filling time and whether gravity or pump assisted pressure filling is used to fill the receiving containers. Disconnect emissions depend on the number of disconnect events and the entrapment volume for a connector type. The number of container filling and disconnect events depends on annual LPG usage and average tank fill volume. LPG usage was estimated for seven different end-use sectors: residential, commercial, sales to retail, internal combustion engines, industrial, agricultural and chemical. Statewide LPG sales by market/end-use sector for 2009 from the American Petroleum Institute

were allocated to Ventura County using allocation surrogates specific to each market sector. Each end-use sector has particular container configurations, fill times, fill volumes and product transfer methods which are used to derive FLLG and connector emission factors in pounds ROG/thousand gallons LPG. The growth profile for this category is based on industry-specific employment projections developed by ARB/REMI.

Industrial Processes

Industrial processes include lubricants and miscellaneous industrial emission sources that are not classified as fuel combustion, waste disposal, cleaning or surface coating, or petroleum production and marketing.

Industrial Lubricants

The District developed a new emission estimation methodology for estimating ROG emissions from industrial lubricants for 2012, based on South Coast Air Quality Management District's emission estimation methodology described in Final Staff Report for Proposed Amended Rule 1144 'Metalworking Fluids and Direct-Contact Lubricants' (May 2010). ROG emissions result from metalworking fluids and direct-contact lubricants such as vanishing oils, lubricants and rust inhibitors used during metalworking and/or metal forming operations in four industrial sectors: petroleum and coal products manufacturing, fabricated metal product manufacturing, machinery manufacturing and transportation equipment manufacturing. The Rule 1144 Staff Report contains an estimate of the baseline metalworking fluids emissions inventory based on a 2006 survey of local manufacturers, distributors and end-users of metalworking fluids and direct-contact lubricants.

Baseline emissions were calculated for individual metalworking fluid types using volume of fluid used (thousand gallons) and sales-weighted average ROG content. The quantity of metalworking fluids and direct contact lubricants in 2006 is assumed to be related to employment in the four industrial sectors. South Coast Air Quality Management District metalworking fluid use was projected to 2011 using the ratio of 2011 to 2006 U.S. Census Bureau County Business Patterns (*CBP*) employment in the four industrial sectors. Then the ratio of 2011 employment in the four sectors between Ventura County and South Coast Air Quality Management District was used to estimate 2011 industrial lubricant use for Ventura County, which was then projected to 2012 using growth in the four industrial sectors from 2011 to 2012. ROG emissions for 2012 were determined using volume of industrial lubricant usage and the average emission factor for all four industrial sectors from the South Coast Air Quality Management District Staff Report. The growth profile is based on total employment projections from SCAG.

Area-Wide Sources

Area-wide sources include categories where emissions take place over a wide geographic area, such as consumer products, architectural coatings, residential fuel combustion, and prescribed burning. Emissions for these categories are estimated by both CARB and the District using various models and methodologies.

Estimates for the categories below were developed by CARB and has been reviewed by CARB staff to reflect the most up-to-date information.

Solvent Evaporation

Consumer Products and Aerosol Coatings

The Consumer Product emission estimates utilized sales and formulation data from the CARB's mandatory survey of all consumer products sold in California for calendar years 2013 through 2015 (2015 Consumer Product Survey). The aerosol coatings estimates utilized sales and formulation data from a survey conducted by CARB in 2010. Based on the survey data, CARB staff determined the total product sales and total ROG emissions for the various product categories. Growth for personal care products is based on real disposable personal income projections per REMI version 2.4.3. No growth is assumed for aerosol coatings. Growth for all other consumer products is based on SCAG population projections.

Additional information on CARB's consumer products surveys is available at:

<https://ww2.arb.ca.gov/our-work/programs/consumer-products-program/consumer-commercial-product-surveys>

Architectural Coatings

Architectural coatings are coatings applied to stationary structures and their accessories. They include house paints, stains, industrial maintenance coatings, traffic coatings, and many other products. Industrial maintenance coatings are high performance architectural coatings formulated for application to substrates, including floors and surfaces, exposed to extreme environmental conditions (e.g., immersion in water, chronic exposure to corrosive agents, frequent exposure to temperatures above 121°C, repeated heavy abrasion). The architectural coatings category reflects emission estimates based on a 2014 comprehensive CARB survey for the 2013 calendar year. The emission estimates include benefits of the 2019 CARB Suggested Control Measure. These SCM were largely adopted by the District as Rule 74.2, Architectural Coatings. These emissions are grown based on SCAG households forecast, 2020.

Additional information about CARB's architectural coatings program is available at:

<https://ww2.arb.ca.gov/carb-solvent-evaporation-methodologies-architectural-coatings-and-cleaningthinning-solvents>

Pesticides

The California Department of Pesticide Regulation (DPR) develops month-specific emission estimates for agricultural and structural pesticides. Each calendar year, DPR updates the inventory based on the Pesticides Use Report, which provides updated information from 1990 through the 2018 calendar year. Agricultural pesticide emission forecasts for years 2019 and beyond are based on the average of the most recent five years. Growth for agricultural pesticides is based on CARB projections of farmland acres per Farmland Mapping and Monitoring Program (FMMP), 2016. Growth for structural pesticides is based on SCAG household projections, 2020.

Additional information about CARB's pesticides program is available at:

<https://ww2.arb.ca.gov/carb-solvent-evaporation-methodologies-agricultural-and-non-agricultural-pesticides>

Asphalt Paving/Roofing

Asphalt paving and roofing emissions were grown from a 1995 estimate developed by the District. ROG emissions are estimated based on tons of asphalt applied in the county and a default emission factor for each type of asphalt operation from an ARB area source methodology document [Methods for Assessing Area Source Emissions in California](#) (December 1982). The growth profile for both categories is based on construction employment forecasts from SCAG.

Miscellaneous Area Source Processes

Residential Wood Combustion

Residential Wood Combustion estimates are based on a 2011 CARB methodology. It reflects survey data on types of wood burning devices and wood consumption rates, updates to the 2002 U.S. EPA National Emission Inventory (NEI) emission factors, and improved calculation approaches.

CARB assumes no growth for this category based on the relatively stagnant residential wood fuel use over the past decade according to the American Community Survey and US Energy Information Administration.

Additional information on this methodology is available at:

<https://ww2.arb.ca.gov/carb-miscellaneous-process-methodologies-residential-fuel-combustion>

Residential Natural Gas Combustion

The inventory for residential natural gas combustion emissions reflects estimates updated by the District for 2018. Emissions are estimated based on the natural gas consumed by various residential uses (space heating, water heating, cooking, other). Natural gas usage provided to the District by SoCalGas in 2018. Emission factors were from EPA AP-42 Section 1.4 “Natural Gas Combustion” (July 1998). The growth profile is based on the housing units forecast from SCAG.

Farming Operations

The livestock emissions estimates reflect animal population data from the *U.S. Department of Agriculture’s (USDA) 2002 Census of Agriculture* and the Ventura County Agriculture Commissioner. The emissions reflect a no-growth assumption based on an analysis of livestock population trends that found no significant growth. CARB updated non-cattle livestock categories for 2017 using more recent activity data.

Unplanned Fires

Emissions from structural and automobile fires were updated for 2018 by the District. Structural fire emissions estimates are based on the number of structural fires, rates of structural and content material loss per fire, average combustible content, and an emission factor per ton of material burned. Automobile fire emissions are based the number of vehicle fires per year and a composite emission factor from EPA’s AP-42 Section 2.5 “Open Burning”, Table 2.5-1 and Section 2.6 “Automobile Body Incineration”, Table 2.6-1 (October 1992). For the 2010 update, the number of structure and automobile fires was obtained from the California Office of the State Fire Marshall, California All Incident Reporting System/National Fire Incident Reporting System

(CAIRS/NFIRS) database, December 2011. The growth profile assumes there will be no growth in fire emissions.

Managed Burning and Disposal

The managed burning and disposal category is based on emissions data reported by the District for 2018. Emissions are calculated using crop-specific tons burned, fuel loadings and emission factors. Total 2018 tonnage burned for each agricultural debris and weed abatement crop type was obtained from the County of Ventura, Fire Protection District, Bureau of Planning and Fire Prevention, Activated Burn Permit Program. Total 2018 burn data for each range improvement and forest management crop type were obtained from the County of Ventura, Fire Department Wildland Fire and Aviation Division, and the U.S. Forest Service (USFS) for prescribed burning in the Los Padres National Forest.

ARB's managed burn emission factor table was used for all agricultural burn and prescribed burn crop categories, except for forest management crop categories “chaparral (piles)” and “pine”, for which the USFS Fire and Environmental Research Applications (FERA) Team Piled Fuels Biomass and Emissions Calculator and ARB's Emission Estimation System (EES) emission factors were used. The growth profile for agricultural burning and weed abatement is based on ARB's projection of agricultural harvest acres. A no-growth assumption was used for forest management and range improvement emissions based on analyses of District reported data that don't show a discernible trend.

Commercial Cooking

Commercial cooking emissions estimates were grown from 2002 estimates provided by the District. The original estimates were developed from the number of restaurants and types of cooking equipment data obtained from the County of Ventura, Resource Management Agency. Process rates were derived using the 1999 Pacific Environmental Services (PES) study, A Detailed Survey of Restaurant Operations in the South Coast Air Basin, Final Report. Emissions were calculated using emission factors from the 1997 South Coast Air Quality Management District Staff Report for the Proposed Rule 1138 'Control of Emissions From Restaurant Operations', and EPA Methods for Developing a National Emission Inventory for Commercial Cooking Processes (2003). The growth profile is based on the SCAG total population forecast.

Point and Areawide Source Emissions Forecasting and Control Rules

Emission forecasts for 2019 and subsequent years are based on growth profiles that in many cases incorporate historical trends up to the base year or beyond. The growth surrogates used to forecast the emissions from these categories were largely based on SCAG data growth factors shown in Table 4-1. The emissions inventory also reflects emission reductions from point and areawide sources subject to District rules and CARB regulations. The rules and regulations reflected in the inventory are listed below in Table A-1.

Table A-1: District and CARB Control Rules and Regulations Included in the Inventory

Agency	Rule/Reg No.	Rule Title	Source Categories Impacted
VEN_APCD	74.11.1	Large Water Heaters and Small Boilers	Fuel combustion / boilers, process heaters, and steam generators
VEN_APCD	74.15.1	Boilers, Steam Generators and Process Heaters (1 to 5 MMBTUs)	Fuel combustion / boilers, process heaters, and steam generators
VEN_APCD	74.22	Natural Gas-Fired, Fan-Type Central Furnaces	Fuel combustion / space heating
VEN_APCD	74.11	Natural Gas-Fired Water Heaters	Fuel combustion / water heaters
VEN_APCD	74.2	Architectural Coatings	Architectural Coatings
VEN_APCD	74.30	Wood Products Coatings	Coatings and related process solvents, Degreasing
VEN_APCD	74.18	Motor Vehicle and Mobile Equipment Coating Operations	Coatings and related process solvents
VEN_APCD	74.20	Adhesives and Sealants	Adhesives and Sealants
VEN_APCD	74.19	Graphic Arts	Printing operations
VEN_APCD	74.24	Marine Coating Operations	Coatings and related process solvents
VEN_APCD	74.6	Surface Cleaning and Degreasing	Surface cleaning and degreasing
VEN_APCD	74.12	Surface Coating of Metal Parts and Products	Coatings and related process solvents, Degreasing
VEN_APCD	74.13	Aerospace Assembly and Component Manufacturing Operations	Coatings and related process solvents, Degreasing

Agency	Rule/Reg No.	Rule Title	Source Categories Impacted
VEN_APCD	74.31	Metalworking Fluids and Direct-Contact Lubricants	Other processes / multi-purpose lubricants
VEN_APCD	74.33	Liquefied Petroleum Gas Transfer or Dispensing	Petroleum marketing
VEN_APCD	74.14	Polyester Resin Material Operations	Chemical / fiberglass manufacturing
VEN_APCD	74.25	Restaurant Cooking Operations	Cooking
VEN_APCD	74.29	Soil Decontamination Operations	Industrial processes / other
ARB	ARCH_SCM	2000 Suggested Control Measures (SCM) for Architectural Coatings	Architectural coatings
ARB	AC_SCM2007	2007 Suggested Control Measures (SCM) for Architectural Coatings	Architectural coatings
ARB	AC_SCM2019	2019 Suggested Control Measure (SCM) for Architectural Coatings	Architectural Coatings
ARB	ARB_R003 & ARB_R003_A	Consumer Product Regulations & Amendments	Consumer products
ARB	ARB_R007	Aerosol Coating Regulations	Consumer products / Aerosol coatings
ARB	GDF_HOSREG	Gasoline Dispensing Facility (GDF) Hose Emission Regulation	Petroleum marketing
ARB	ORVR	Fueling emissions from ORVR vehicles	Petroleum marketing

Agency	Rule/Reg No.	Rule Title	Source Categories Impacted
ARB	AG_IC_ENG	Ag IC Engine Emission Scalers	Agricultural irrigation internal combustion engines
ARB	NONAGICENG	Non-Ag IC Engine Scalers	Non-agricultural internal combustion reciprocating engines

External Adjustments

External adjustments were made in CEPAM to account for additional recent regulatory actions. The external adjustments reflected in the CEPAM2022v1.01 Ventura County SIP inventory are listed below in Table 2.

Table 2: External Adjustment IDs and Descriptions

Adjustment ID	Adjustment Description
HD_I/M	HD I/M Regulation adopted by CARB Dec 2021
NonAg_ICE	Update non-ag internal comb. engines to reflect 2003 ATCM and 2010 rule amend
TRUCK_REGS	Advanced clean trucks Omnibus Low NO _x Opacity ICT_UBUS adjustments