ANNUAL REPORT ON VOLATILE ORGANIC COMPOUND EMISSIONS FROM PESTICIDES FOR 1990-2019

October 2021

California Environmental Protection Agency
Department of Pesticide Regulation
Environmental Monitoring Branch
P.O. Box 4015
Sacramento, California 95812-4015

Air 21-01

Preface

Scope of Data

This report fulfills the requirements of Title 3 California Code of Regulations (3 CCR), section 6881, requiring the Director of the Department of Pesticide Regulation (DPR) to issue an annual emissions inventory report for the Sacramento Metro, San Joaquin Valley, South Coast, Southeast Desert, and Ventura ozone nonattainment areas (NAAs). This report presents data reported to or produced by DPR from May 1 to October 31, 2019 (the most recent year data are available). These months are the peak ozone season in California. In addition, data from the same months in 1990 are included for baseline comparisons, and from 2016, 2017, and 2018 for trend analysis.

The term “emissions” herein refers to volatile organic compound (VOC) emissions from pesticide applications. Unless otherwise stated, all emissions from fumigants are reported as adjusted emissions. Nonfumigant emissions are always unadjusted. See section on “Procedure for Calculating Unadjusted and Adjusted Volatile Organic Compound Emissions.”

Background

Under the federal Clean Air Act, California must meet national standards for airborne pollutants and must specify how it plans to achieve these goals in a federally approved State Implementation Plan (SIP). SIPs require the control of emissions of nitrogen oxides and VOCs because they are precursors to ozone. Under California’s SIP, approved by the U.S. Environmental Protection Agency (U.S. EPA), DPR must track and control VOC emissions from pesticide products used in agriculture and by commercial structural applicators in five regions that do not attain the federal air quality standard for ozone (i.e., ozone NAAs). The SIP requires DPR to reduce emissions by 20% from the 1990 base year in four ozone NAAs—Sacramento Metro, South Coast, Southeast Desert, and Ventura—and by 12% in the San Joaquin Valley NAA.

DPR’s emissions inventory database includes only pesticide applications that are made between May 1 and October 31, the peak ozone season in California. DPR updates its emissions inventory when annual pesticide use report (PUR) data from the previous year becomes available. DPR’s PUR database contains data for every year from 1990 to 2018. Each year contains about 3.6 million pesticide use records and emission potential (EP) values for approximately 7,500 products. The EP is the fraction of a product that is assumed to contribute to atmospheric VOCs.

Beginning in 2008, DPR adopted regulations to reduce emissions from fumigant pesticides by requiring low-emission fumigation methods in certain NAAs. 3 CCR section 6452.2 sets emissions “benchmarks” equivalent to the SIP reduction goals for each of the five NAAs. If, in spite of application method restrictions, emissions equal or exceed trigger level of 95% of the SIP goal for an NAA, DPR will ensure that the SIP goal is achieved by establishing a fumigant limit. The fumigant limit is determined by subtracting the estimated nonfumigant emissions from the SIP goal.

The San Joaquin Valley NAA exceeded its trigger level in 2013. A majority of emissions in the San Joaquin Valley NAA historically stemmed from nonfumigant use. Therefore, in May 2013 (and effective November 1, 2013) DPR replaced the San Joaquin Valley NAA’s fumigant limit with prohibitions on the use of certain nonfumigant products designated as high-VOC.

Summary of Results

In 2019, all five ozone NAAs were in compliance with the SIP goals.

- Sacramento Metro NAA: 2019 emissions decreased by 2% (-0.020 tons/day [tpd]), from 1.249 tpd in 2018 to 1.229 tpd. Emissions in 2019 were 56% lower than the 1990 base year and remain in compliance with the SIP goal.
- San Joaquin Valley NAA: 2019 emissions increased by 1% (0.153 tpd), from 16.234 tpd in 2018 to 16.387 tpd. Emissions in 2019 were 20% lower than the 1990 base year and remain in compliance with the SIP goal. Prohibitions on the use of certain nonfumigant products went into effect in 2015 (3 CCR section 6884) and pesticide applications subject to these restrictions accounted for 30% of the total nonfumigant emissions for the year prior to restrictions (2014), compared to 10% in 2019. VOC regulations require DPR to calculate hypothetical emissions for 2019. The calculated hypothetical emissions exceed the trigger level of 95% of the SIP goal, or 17.2 tpd. Therefore, VOC regulations require that the nonfumigant prohibitions that went into effect in 2015 remain in effect during the May 1 through October 31 period for 2021 and 2022 in this NAA, as per 3 CCR section 6452.2(f).
- Southeast Desert NAA: 2019 emissions increased by 7% (0.019 tpd), from 0.264 tpd in 2018 to 0.283 tpd. Emissions in 2019 were 75% lower than the 1990 base year and remain in compliance with the SIP goal.
- Ventura NAA: 2019 emissions decreased by 5% (-0.060 tpd), from 1.138 tpd in 2018 to 1.078 tpd. Emissions in 2019 were 72% lower than the 1990 base year and remain in compliance with the SIP goal.
- South Coast NAA: 2019 emissions decreased by 14% (-0.149 tpd), from 1.070 tpd in 2018 to 0.922 tpd. Emissions in 2019 were 91% lower than the 1990 base year and remain in compliance with the SIP goal.

3 CCR section 6881(b) requires a 45-day public comment period of the draft report. No comments were received during the comment period ending on August 27.

Abbreviations

AI	Active Ingredient
AMAF	Application Method Adjustment Factor
APCD	Air Pollution Control District
CARB	California Air Resources Board
EC	Emulsifiable Concentrate
EP	Emission Potential
ER	Emission Rating
DPR	Department of Pesticide Regulation
FFM	Field Fumigation Methods
GIS	Geographic Information System
MUF	Method Use Fraction
NAA	Nonattainment Area
PUR	Pesticide Use Report
SIP	State Implementation Plan
TGA	Thermogravimetric Analysis
TIF	Totally Impermeable Film
tpd	Tons Per Day
VOC	Volatile Organic Compounds

Personnel

DPR personnel assigned to this project include:

Project lead: Justin Kroes

Project Supervisor: Maziar Kandelous

This project is under the overall management of Minh Pham, Environmental Program Manager II, (916) 445-0979, Minh.Pham@cdpr.ca.gov.

Acknowledgements

The authors wish to thank the reviewers whose unique perspectives and experiences helped ensure the accuracy and readability of this report. We gratefully acknowledge the staff of DPR and cooperating federal, state, local, and private agencies for contributing to the database.

Disclaimer

The mention of commercial products, their source, or their use in this report is not to be construed as either an actual or an implied endorsement of such product.

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Overview

Introduction

The State Implementation Plan (SIP) for pesticides requires the California Department of Pesticide Regulation (DPR) to develop and maintain an emissions inventory to track volatile organic compound (VOC) emissions and to reduce emissions by 20% from a base year in four out of five California ozone nonattainment areas (NAAs), and by 12% in the fifth ozone NAA. These five NAAs are defined as areas that do not meet the National Ambient Air Quality Standards for ozone as designated in the Clean Air Act. The scope of the VOC emissions inventory allows DPR to estimate emissions from agricultural and commercial structural pesticide applications within the state. To do this, DPR calculates emissions for each year beginning with 1990, and updates these calculations annually based on most recent data. The inventory focuses on the peak ozone period between May 1 and October 31 for each year.

The emissions inventory is estimated based on pesticide use reports (PURs) that are collected by DPR. The inventory includes applications that are made for agricultural and structural use as defined by law. Included are all applications with the exception of home use, industrial use, institutional use, applications made for vector control purposes, and veterinary uses. Production agricultural use covers applications to approximately 400 commodities/crops. Non-production agricultural use includes applications to approximately 20 sites such as cemeteries, golf courses, parks, and rights-of-way. Structural use includes all applications by structural pest control businesses, regardless of site treated.

The key Pesticide Use Report (PUR) data fields used to calculate emissions are shown in Table 1.

Table 1: Key information included in PURs that form the basis of DPR's volatile organic compound emissions inventory.

Information	Production Agriculture Reports	Non-production Agriculture and Non-agricultural Reports
Product Applied	Yes	Yes
Crop/Site Treated	Yes	Yes
Amount Applied	Yes - each application	Monthly Total
Date Applied	Date and Time	Month
Application Method	Yes	No
Acres/Units Treated	Yes	Monthly Total
Location of Application	Township/Range/Section	County
Fumigant Method Code	Yes	No

California's five ozone NAAs included in the emissions inventory are Sacramento Metro, San Joaquin Valley, Southeast Desert, Ventura, and South Coast. The boundaries of these NAAs, as defined by Title 40 of the Code of Federal Regulations (CFR) Part 81, and a listing of counties that fall within the boundaries is shown in Figure 1 and Table 2, respectively.

In January 2008, DPR adopted Title 3, California Code of Regulations (3 CCR), section 6452.4 requiring an annual emissions inventory report that includes the following information:

- Total agricultural and structural emissions for the previous years;
- Evaluation of whether emissions are in compliance with regulatory benchmarks specified in 3 CCR section 6452.2 (and equivalent to the SIP goals);
- Fumigant emission limits for the upcoming year, if necessary, according to 3 CCR section 6452.2;
- Emission ratings (or application method adjustment factors, the percentage of fumigant applied) for each fumigation method.

In May 2013 (and effective November 1, 2013), DPR amended the VOC regulations, moving the requirements for the annual report from 3 CCR section 6452.4 to 3 CCR section 6881, and adding the following report elements:

- Prohibitions on high-VOC nonfumigant products pursuant to 3 CCR section 6452.2(f), and if applicable, determination of whether prohibitions remain in effect pursuant to 3 CCR section 6884(c);
- List of nonfumigant products that are designated as low-VOC pursuant to 3 CCR section 6880; and
- List of actively registered nonfumigant products that are designated as high-VOC pursuant to 3 CCR section 6880.

Section 6881 also requires a 45-day public comment period of the draft report. This report contains all of the information specified above, including emission estimates for 1990-2019 and whether the 2019 emissions exceed levels that trigger additional VOC restrictions.

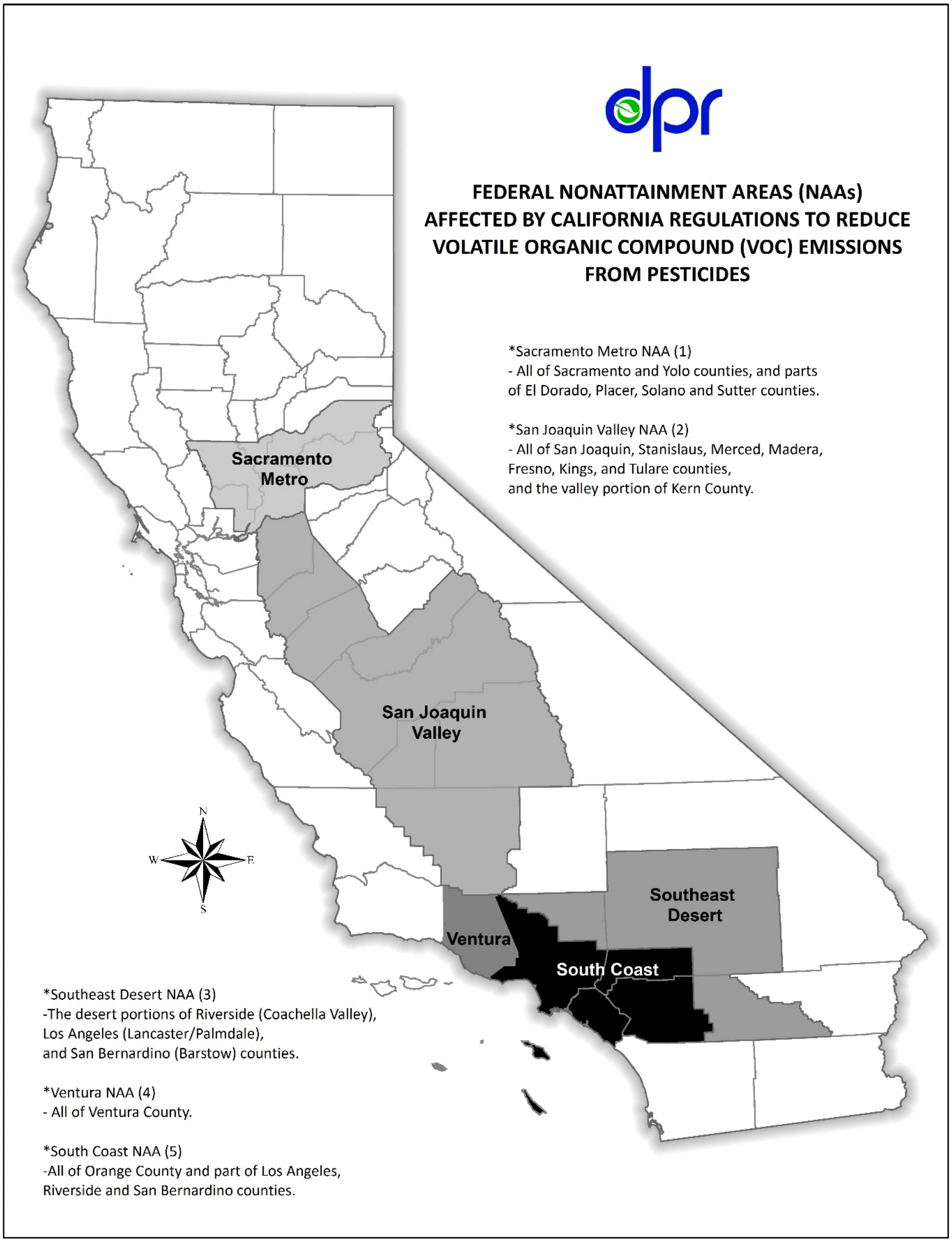

Figure 1: Federal ozone NAAs affected by California regulations to reduce volatile organic compound (VOC) emissions from pesticides.

Table 2: A listing of counties wholly or partially within the five ozone NAAs in California.

NAA	Counties within the NAA
Sacramento Metro	All of Sacramento, Yolo. Parts of Sutter, Solano, Placer, El Dorado.
San Joaquin Valley	All of Fresno, Kings, Madera, Merced, San Joaquin, Stanislaus, Tulare. Western Part of Kern.
Southeast Desert	Parts of Los Angeles, San Bernardino, Riverside.
Ventura	All of Ventura.
South Coast	All of Orange. Western Parts of Los Angeles, San Bernardino, Riverside.

Nonattainment Area Goals

The emissions in DPR's VOC inventory are compared to the SIP goals listed in Table 5, which are described in California's original 1994 SIP (62 Fed. Reg. at 1170, 1997) and Appendix H to the 2007 SIP (73 Fed. Reg. 41277, 2008). These SIP goals are a 20% reduction from 1990 levels for the Sacramento Metro, Southeast Desert, Ventura and South Coast NAAs, and a 12% reduction from the 1990 baseline for the San Joaquin Valley NAA. In August 2012, U.S. Environmental Protection Agency (EPA) approved DPR's SIP amendment for the San Joaquin Valley. This amendment includes a SIP goal of 18.1 tons per day (tpd), equivalent to a 12% reduction relative to the 1990 baseline. Prior to the amendment, the SIP described the reduction commitment only as 12% less than the 1990 baseline. Because the 18.1 tpd represents the 12% reduction from the 1990 baseline calculated using a specific methodology, the same methodology must be used to calculate future emissions to assure a legitimate comparison to measure SIP compliance. Therefore, emission estimates for application methods that were used in 1990 cannot be modified, absent a SIP revision. Similarly, nonfumigant pesticide emission potentials of formulations that were used in the base year cannot be changed, absent a SIP revision.

The annual report includes DPR's determination if emissions exceed levels that trigger additional VOC restrictions. As specified in 3 CCR section 6452.2, additional restrictions are triggered if emissions in an NAA exceed 95% of its SIP goal (Table 5). For the Sacramento Metro, Southeast Desert, South Coast, and Ventura NAAs the additional restrictions are a fumigant emissions limit, enforced by DPR and County Agricultural Commissioners (CACs) through grower allowances or other methods. The 2013 regulations revised the additional restrictions for the San Joaquin Valley because nonfumigant products contribute more emissions than fumigant products in this NAA; therefore, additional restrictions on nonfumigant products are a more efficient method to ensure that the SIP goal is achieved. If emissions exceed the trigger level for the San Joaquin Valley NAA, certain uses of high-VOC products are prohibited (3 CCR section 6884). For all five NAAs, the additional restrictions are triggered for the upcoming May-October period based on the most recent emissions inventory. For example, the 2019 emissions inventory is used to determine if additional VOC restrictions will go into effect for May-October 2021. Additional information on the 2013 regulations and changes to the additional restrictions is available at http://www.cdpr.ca.gov/docs/emon/vocs/vocproj/reduce_nonfumigant.htm.

Procedure for Calculating Unadjusted and Adjusted Emissions

Prior to 2008, DPR reported an unadjusted emissions inventory that assumed the entire volatile portion of a fumigant product eventually volatilizes, contributing to atmospheric VOC loadings. However, several dozen field studies have shown that actual emissions from soil-applied fumigants such as methyl bromide vary by application method and are generally less than 100% (Majewski et al., 1995; Wang et al., 1997; Williams et al., 1999; Yagi et al., 1993). DPR has developed an adjustment procedure to account for the effect of application method on reducing fumigant emissions.

The unadjusted inventory is based on the premise that the VOC emission from a single application of fumigant or nonfumigant product is equal to the amount used times the Emission Potential (EP) (Spurlock, 2002; 2006).

$$\text{emission} = \text{lbs of product used} \cdot \text{EP}$$

In the adjusted inventory, the emission from a single application of a fumigant active ingredient (AI) is reduced by an additional factor called the Application Method Adjustment Factor (AMAF), also referred to as the emission rating. AMAFs have been determined from field study data and are AI and application method specific (Barry et al., 2007). Since the AMAFs are based on field measured data for specific application methods and fumigants, they yield more refined estimates of fumigant emissions than the previous unadjusted emission estimates.

$$\text{emission} = \text{lbs of product used} \cdot \text{EP} \cdot \text{AMAF}$$

Nonfumigant product emissions are not currently adjusted for application method or other field factors due to a lack of data to support such adjustments. Consequently, their emissions are calculated using the same procedure as the unadjusted inventory.

Usually there are several different types of application methods used for a particular fumigant in any particular NAA. Each method of use (e.g., drip, sprinkler, shank, or tarp) represents a fraction of the total number of methods used and is referred to as the Method Use Fraction (MUF). Prior to 2008, field fumigations did not report application method; instead MUFs were derived from surrogate data and used in addition to AMAFs to adjust emissions in these years. The sum of all MUFs for any particular (NAA/fumigant AI) combination is one. Use practices change over time so that different MUFs are used for the baseline year (1990) and later years. MUFs for 2007 and earlier years were determined in a number of different ways. For 1,3-dichloropropene, the MUFs were determined from use data collected by the registrant in support of DPR's township application caps; for metam sodium and metam potassium, grower/applicator surveys were conducted to determine types of applications for different crops and areas. Methyl bromide and chloropicrin MUFs were based on expert opinion and regulatory history. Finally, MUFs for dazomet and sodium tetrathiocarbonate equal one because the AMAFs for each of these two fumigants are constant, independent of application method. Barry et al. (2007) discuss in detail MUFs and AMAFs were determined. Appendix 1A contains summaries of the AMAFs and MUFs used for emissions inventory data prior to 2009.

Additionally, regulations that went into effect in 2008 facilitated calculation of adjusted inventories by requiring reporting of field fumigation method (FFM) for each application, thereby providing an AMAF value specific to each combination of AI and application method. In 2019, seven (<1%) of the 3,068 field fumigant applications had no or a non-existent fumigation method code reported. These missing records originated in the San Joaquin Valley NAA and Sacramento Metro NAA. For any such records, DPR uses a conservative approach by assuming that the application method with the highest AMAF allowed by the regulations for that fumigant was used (Table 3), creating a complete dataset from which adjusted emissions can be calculated. Appendix 1B contains current FFMs, FFM codes for pesticide use reporting, and corresponding AMAFs.

Table 3: Default AMAFs (highest allowed by the regulations) assigned to fumigant applications with missing or invalid FFM codes.

Active Ingredient	Default AMAF
Methyl Bromide with or without Chloropicrin	48%
1,3-Dichloropropene with or without Chloropicrin	44%
Chloropicrin Only	44%
Metam-Sodium or Potassium N-Methyldithiocarbamate	28%
Dazomet	17%
Sodium Tetrathiocarbonate	10%

In addition to the emissions derived from fumigant active ingredients (AIs), inert ingredients for products that contain chloropicrin, methyl bromide, and 1,3-dichloropropene are assumed to be volatile and are included in the inventory calculations. For the highest use products containing metam sodium, metam potassium, sodium tetrathiocarbonate, and dazomet, analysis of their confidential statements of formula determined that the composition of inerts is non-volatile and so does not contribute to the EP of these products.

Non-production agriculture and non-agricultural pesticide applications are reported to DPR as "monthly summary data" with no geographic location information beyond the county of application (Table 1). These applications include commercial structural, landscape maintenance, rights-of-way, and commodity fumigations. In cases where two or more air basins, one of which may be in an NAA, are present within a single county, these applications must be proportionally allocated. DPR allocates these monthly summary applications using surrogate data that are assumed to have similar geographic distributions. In 2012, the surrogate data were updated to provide the most accurate estimated geographic distribution of emissions, reflecting changes in California's population and transportation infrastructure. U.S. Census data for the 2010 decennial census together with TIGER/Line shapefiles for roads, rail roads, and linear hydrography were used as surrogates for commercial structural, landscape maintenance, and rights-of-way applications. Commodity fumigation data were provided by California CACs (Neal and Spurlock, 2012).

Emissions are calculated for each NAA and allocated by primary AI, commodity or application site, and emissions inventory category as defined by the California Air Resources Board (CARB). The primary AI is defined as the AI present at the highest percentage in a pesticide product. If a product contains 20% of AI "A" and 10% of AI "B", all estimated emissions from that product are assigned to the primary AI "A".

CARB Emissions Inventory Classification

CARB defines four emission categories: methyl bromide emissions from agricultural applications, non-methyl bromide emissions from agricultural applications, methyl bromide emissions from structural applications, and non-methyl bromide emissions from structural applications. Emissions are calculated according to these categories and are reported as U.S. tpd in the results section of this report.

Data Revisions

DPR continually evaluates PUR data, EPs, MUFs, and AMAFs to ensure the VOC inventory includes the most reliable data. DPR thoroughly evaluates registrant-submitted thermogravimetric analysis (TGA) data to determine EPs for new and existing products. Previous inventories have shown that changes in a widely used product's EP can significantly influence the emissions inventory. Table 4 contains products whose EP values changed significantly as a result of recent TGA submissions.

Changes to a product's EP value can occur when EP values determined by alternative methods are replaced by an EP value derived from TGA data. If DPR finds the TGA data contain errors, DPR may request additional TGA data from the registrant in order to verify or update the product's EP. Products lacking TGA data are assigned default EP values based on the type of product formulation. Updates to DPR's Product/Label database may reflect changes in the product formulation and thus alter its default EP. Changes to default EP values are not included in Table 4. Lastly, DPR staff continually evaluates the emissions inventory data for any past errors in assigned EP values (e.g., incorrect use of deficient TGA data or erroneous bridging of one product's EP data to another "substantially similar" product). If any such errors are discovered by DPR staff, registrants are requested by DPR to provide new TGA data for the product in question and a new EP determination is performed by DPR staff using the newly received TGA data. The VOC inventory report includes EP values that were updated in the year prior to its release.

Table 4: Nonfumigant products with substantially changed EP values between the 2018 and 2019 annual inventories, and the estimated change in emissions (tpd) in 2019 for the San Joaquin Valley NAA resulting from changes in EP for products. Products without a change in emissions due to a change in EP had no use in 2019.

<table>
<tr><th>Product</th><th>Registration Number</th><th>2018 Method</th><th>2018 EP</th><th>2019 Method</th><th>2019 EP</th><th>Change in Emissions (tpd)</th></tr>
<tr><td>TIDE HEXAZINONE 2SL</td><td>84229-35-ZA</td><td>Default median</td><td>5.71</td><td>Derived</td><td>35.6</td><td rowspan="4"><0.001</td></tr>
<tr><td>DOMARK 230 ME</td><td>80289-7-AA-10163</td><td>Default median</td><td>3.23</td><td>Derived</td><td>6.0</td></tr>
<tr><td>RYCAR INSECTICIDE</td><td>71711-37-AA-67690</td><td>Default median</td><td>5.71</td><td>Derived</td><td>5.8</td></tr>
<tr><td>GIBBMAX</td><td>69766-1-AA</td><td>TGA</td><td>92.4</td><td>TGA</td><td>16.6</td></tr>
</table>

Volatile Organic Compound Inventory Results

The main text of this report summarizes the emissions inventory data for 2019 only. Inventory data for prior years are in previous inventory reports and are made available by DPR upon request.

Figure 2 illustrates the changes in unadjusted emissions from 1990 to 2019. These values are unadjusted and do not consider MUFs and AMAFs that are only applied to emissions in 1990 and 2004 through 2018, due to data limitations. The figure is useful in that it compares emissions for the entire history of the inventory and shows trends in five NAAs. Figure 3 summarizes adjusted emissions for the same years and compares them to the SIP goals that are based on a percentage reduction from the 1990 baseline.

Tables in Appendix 2 report NAA-specific emissions metrics. There are five tables for each NAA that present fumigant, nonfumigant, AI, commodity, and CARB-category emissions. The fumigant and nonfumigant tables both report total emissions. These tables include data for the years 1990 and 2004 through 2019.

The following points summarize these tables and figures for the current and previous report years:

- Sacramento Metro NAA: 2019 emissions decreased by 2% (-0.020 tpd), from 1.249 tpd in 2018 to 1.229 tpd. Emissions in 2019 were 56% lower than the 1990 base year and remain in compliance with the SIP goal.
- San Joaquin Valley NAA: 2019 emissions increased by 1% (0.153 tpd), from 16.234 tpd in 2018 to 16.387 tpd. Emissions in 2019 were 20% lower than the 1990 base year and remain in compliance with the SIP goal.
- Southeast Desert NAA: 2019 emissions increased by 7% (0.019 tpd), from 0.264 tpd in 2018 to 0.283 tpd. Emissions in 2019 were 75% lower than the 1990 base year and remain in compliance with the SIP goal.
- Ventura NAA: 2019 emissions decreased by 5% (-0.060 tpd), from 1.138 tpd in 2018 to 1.078 tpd. Emissions in 2019 were 72% lower than the 1990 base year and remain in compliance with the SIP goal.
- South Coast NAA: 2019 emissions decreased by 14% (-0.149 tpd), from 1.070 tpd in 2018 to 0.922 tpd. Emissions in 2019 were 91% lower than the 1990 base year and remain in compliance with the SIP goal.

Pesticide use varies from year to year depending on factors such as weather, drought, pest problems, economics, and types of crops planted. Increases and decreases in pesticide use from one year to the next or in the span of a few years do not necessarily indicate a trend. Such variances are and will continue to be a normal occurrence. A more detailed explanation of pesticide use patterns is given in DPR's annual summary of PURs at http://www.cdpr.ca.gov/docs/pur/purmain.htm.

The 2013 and earlier VOC regulations include additional restrictions that are triggered if emissions in an NAA exceed 95% of its SIP goal. None of the five NAAs exceeded their trigger levels in 2019. However, the San Joaquin Valley NAA exceeded its trigger level in 2013, requiring certain uses of the designated high-VOC products to be prohibited during May-October for that NAA beginning in 2015 and remaining in effect for at least two years (3 CCR section 6452.2(f)). The prohibitions enacted in 2015 are active through 2022 as a result of 2019 hypothetical emissions calculations (see "Hypothetical Emissions" below).

The nonfumigant regulations designate certain products containing abamectin, chlorpyrifos, gibberellins, and oxyfluorfen as high-VOC products (3 CCR section 6880). San Joaquin Valley NAA growers must obtain a recommendation from a pest control adviser prior to certain uses of these high-VOC products, and pest control advisers are required to recommend low-VOC products when feasible (3 CCR sections 6883, 6884). DPR continues to register reformulated products with lower EPs, including products containing abamectin, chlorpyrifos, gibberellins, and oxyfluorfen that are major VOC contributors. The criteria and specific products designated as high-VOC and low-VOC are discussed in a later section.

DPR adopted additional fumigant regulations, which became effective on January 1, 2008, that required the use of specific "low-emission" fumigant application methods. Those regulations are also included in 3 CCR section 6452, which describes the interim and rulemaking process DPR uses to evaluate and approve new low-emission fumigant application methods. In April 2013, DPR granted interim approval that allowed the use of the U.S. EPA-approved totally impermeable film (TIF) tarp method for certain fumigants. The regulation that gave permanent approval for TIF tarp methods became effective on April 1, 2016. The continued increase in adoption of lower emission application methods and products by growers, registrants, and others significantly contributes to SIP compliance and reducing emissions.

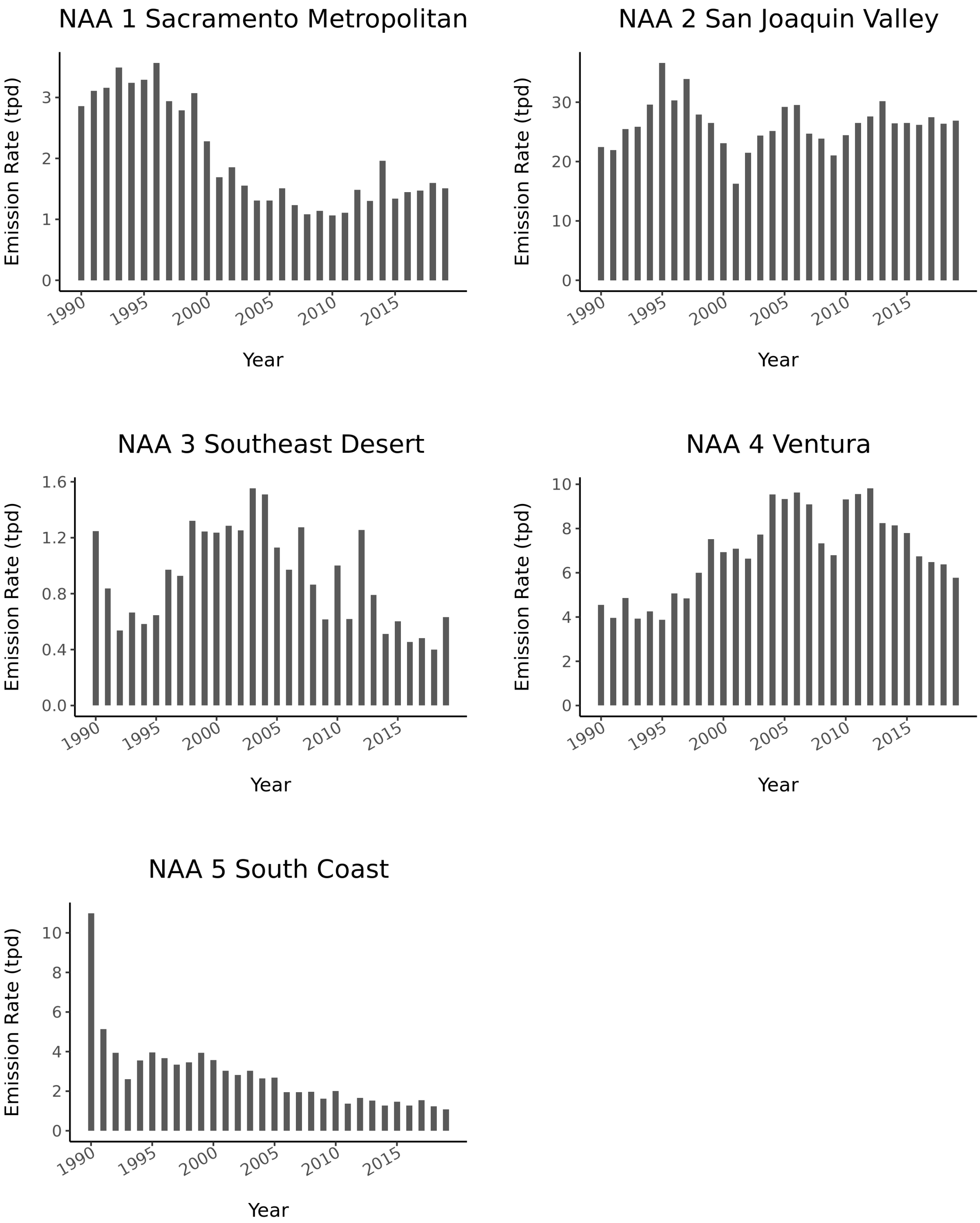

Figure 2: Unadjusted emissions in each NAA from 1990 to 2019.

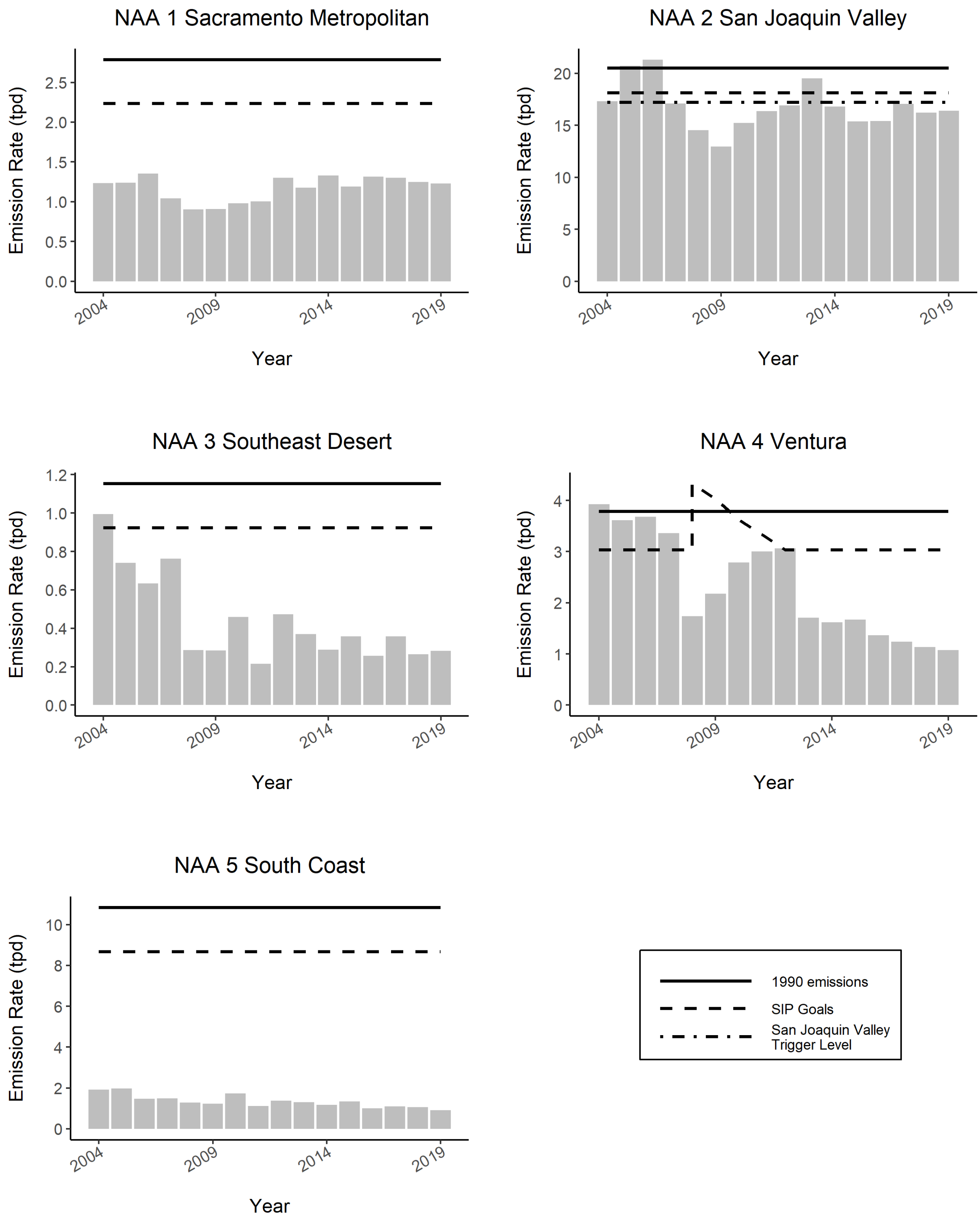

Figure 3: Emissions in each NAA during 1990 and 2004-2019 and SIP goals for emissions reductions relative to 1990 emissions. A 2007 SIP revision temporarily increased Ventura's SIP goal above 4 tpd in 2008, then gradually reduced the goal each year until 2012. Since 2012, the goal for Ventura remains 3 tpd.

Sacramento NAA

In the Sacramento Metro NAA, 2019 emissions decreased by 2% (-0.020 tpd) from 1.249 tpd in 2018 to 1.229 tpd. Emissions in 2019 were 41% (-0.861 tpd) below the regulatory trigger level (95% of the SIP goal) of 2.1 tpd (Figure 3).

Figure 4 and Tables A2-1-1 and A2-1-2 show emissions in 1990 and 2016-2019,[1] categorized as fumigants, nonfumigants with emulsifiable concentrate formulations, and all other nonfumigants. In 2019, nonfumigants contributed 88% of emissions; fumigants contributed 12%. Nonfumigant emissions increased by 2% (0.021 tpd), from 1.056 tpd in 2018 to 1.077 tpd. Fumigant emissions decreased by 21% (-0.041 tpd), from 0.193 tpd in 2018 to 0.152 tpd. Products with emulsifiable concentrate formulations accounted for 39% and 34%, respectively, of nonfumigant and total emissions. Emissions from these products decreased by 6% (-0.027 tpd), from 0.451 tpd in 2018 to 0.423 tpd.

Table A2-1-3 aggregates product emissions by primary AI. The top 10 AIs comprise 47% of total emissions. Figure 5 illustrates trends in emissions for the top five AIs between 2016 and 2019. Nine of the top 10 emitting AIs in 2019 were also among the top 10 in 2018. Of these, five AIs increased emissions: 1,3-dichloropropene; glufosinate-ammonium; methyl bromide; potassium n-methyldithiocarbamate; and mineral oil. Four of these AIs decreased emissions: glyphosate, isopropylamine salt; abamectin; bifenthrin; and hexythiazox. At 6% of total emissions, thiobencarb had the highest emissions (0.078 tpd) of any AI used in this NAA. Hexythiazox had the largest percent change in emissions: 44% (0.017 tpd).

Table A2-1-4 aggregates emissions by commodity. The top 10 commodities comprise 82% of total emissions. Figure 6 illustrates trends in emissions for the top five commodities between 2016 and 2019. Eight of the top 10 commodities in 2019 were also among the top 10 in 2018. Of these eight commodities, four increased emissions: almond, pistachio, soil application (preplant-outdoor), and carrots. Four of these eight commodities decreased emissions: cotton (general), walnut, orange, and grapes. At 20% of total emissions, rice (all or unspecified) had the highest emissions (0.243 tpd) of any commodity used in this NAA. Uncultivated agricultural areas had the largest percent change in emissions: 117% (0.019 tpd).

Table A2-1-5 shows this NAA's unadjusted 2019 emissions using the CARB California Emissions Inventory Development and Reporting System (CEIDARS) emissions inventory classifications. Unadjusted emissions from agricultural applications of methyl bromide decreased 18% (-0.008 tpd), from 0.043 tpd in 2018 to 0.036 tpd. Unadjusted emissions from agricultural applications of non-methyl bromide products decreased 7% (-0.102 tpd), from 1.488 tpd to 1.386 tpd. Emissions from structural applications of methyl bromide continued to be below a reportable level. Unadjusted emissions from structural applications of non-methyl bromide products increased 45% (0.024 tpd), from 0.054 tpd to 0.078 tpd.

[1] Table A2-1-1 is interpreted as Appendix 2, NAA 1, Table 1. Tables in Appendix 3 are similar, though they are not specific to an NAA; e.g., Table A3-1 is interpreted as Appendix 3, Table 1. These formats are standard throughout this report.

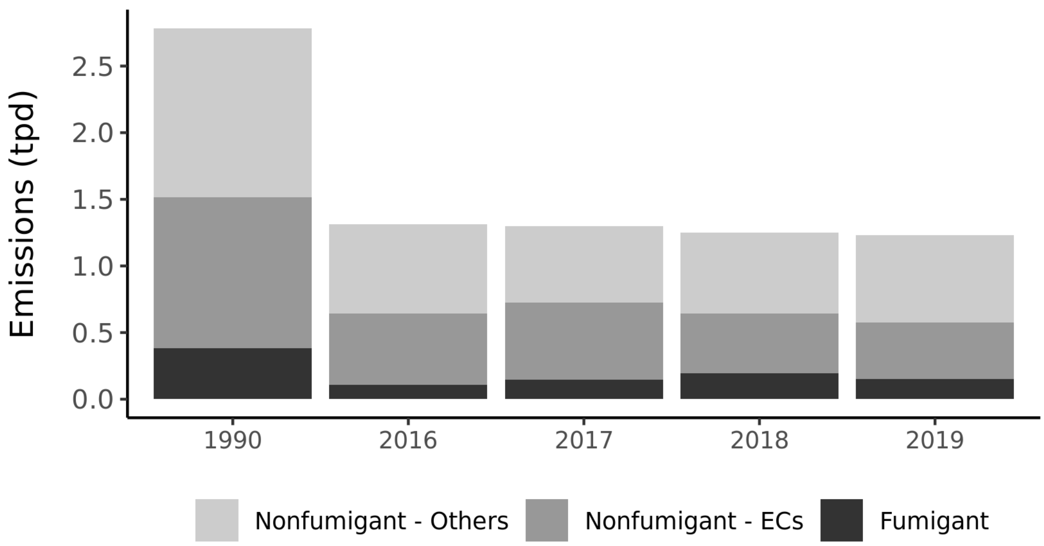

Figure 4: Emissions for the Sacramento Metro NAA during 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations (ECs), and other nonfumigants (Others). Fumigant emissions are adjusted to account for fumigation method. The adjusted and unadjusted emissions for nonfumigants are equivalent.

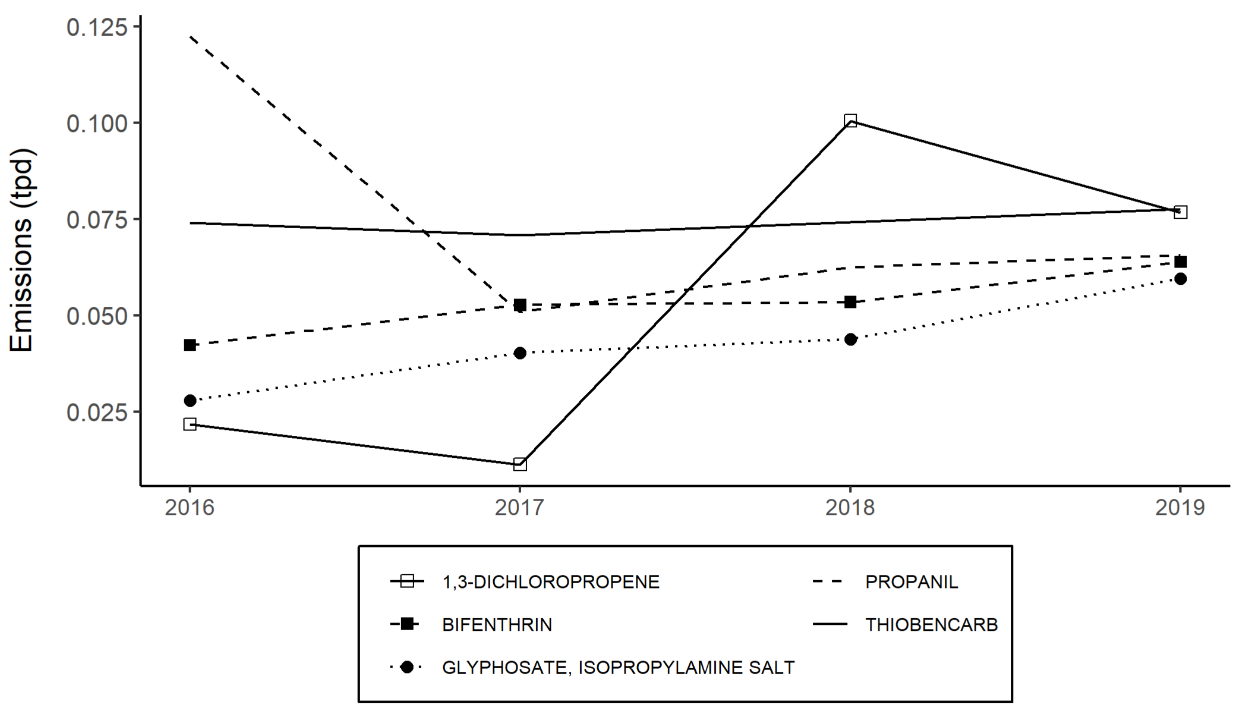

Figure 5: Emissions from products containing the top five active ingredients (AIs) by emissions in the Sacramento Metro NAA from 2016 to 2019.

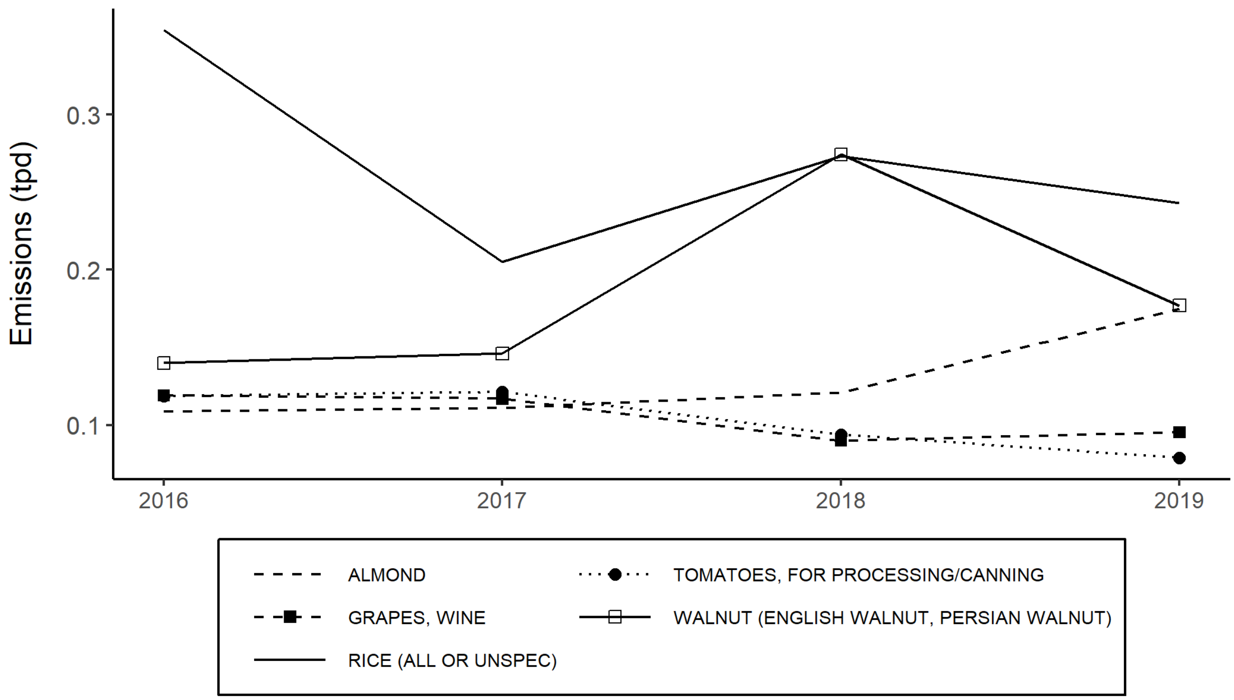

Figure 6: Emissions from the top five commodities by emissions in the Sacramento Metro NAA from 2016 to 2019.

San Joaquin Valley NAA

In the San Joaquin Valley NAA, 2019 emissions increased by 1% (0.153 tpd) from 16.234 tpd in 2018 to 16.387 tpd. Emissions in 2019 were 5% (-0.808 tpd) below the regulatory trigger level (95% of the SIP goal) of 17.2 tpd (Figure 3).

Figure 7 and Tables A2-2-1 and A2-2-2 show emissions in 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations, and all other nonfumigants. In 2019, nonfumigants contributed 73% of emissions; fumigants contributed 27%. Nonfumigant emissions decreased by 3% (-0.312 tpd), from 12.284 tpd in 2018 to 11.972 tpd. Fumigant emissions increased by 12% (0.465 tpd), from 3.951 tpd in 2018 to 4.415 tpd. Products with emulsifiable concentrate formulations accounted for 46% and 34%, respectively, of nonfumigant and total emissions. Emissions from these products decreased by 11% (-0.673 tpd), from 6.209 tpd in 2018 to 5.535 tpd.

Table A2-2-3 aggregates product emissions by primary AI. The top 10 AIs comprise 51% of total emissions. Figure 8 illustrates trends in emissions for the top five AIs between 2016 and 2019. Nine of the top 10 emitting AIs in 2019 were also among the top 10 in 2018. Of these, five AIs increased emissions: 1,3-dichloropropene; glufosinate-ammonium; methyl bromide; potassium n-methyldithiocarbamate; and mineral oil. Four of these AIs decreased emissions: glyphosate, isopropylamine salt; abamectin; bifenthrin; and hexythiazox. At 14% of total emissions, 1,3-dichloropropene had the highest emissions (2.208 tpd) of any AI used in this NAA. Chloropicrin had the largest percent change in emissions: 45% (0.165 tpd).

Table A2-2-4 aggregates emissions by commodity. The top 10 commodities comprise 75% of total emissions. Figure 9 illustrates trends in emissions for the top five commodities between 2016 and 2019. Eight of the top 10 commodities in 2019 were also among the top 10 in 2018. Of these eight commodities, four increased emissions: almond, pistachio, soil application (preplant-outdoor), and carrots. Four of these eight commodities decreased emissions: cotton (general), walnut, orange, and grapes. At 33% of total emissions, almond had the highest emissions (5.393 tpd) of any commodity used in this NAA. Tangerine had the largest percent change in emissions: 77% (0.189 tpd).

Table A2-2-5 shows this NAA's unadjusted 2019 emissions using the CARB CEIDARS emissions inventory classifications. Unadjusted emissions from agricultural applications of methyl bromide increased 1% (0.013 tpd), from 0.895 tpd in 2018 to 0.908 tpd. Unadjusted emissions from agricultural applications of non-methyl bromide products increased 2% (0.501 tpd), from 25.184 tpd to 25.686 tpd. Unadjusted emissions from structural applications of methyl bromide are usually below a reportable level, but in 2019 emissions were <0.001 tpd. Unadjusted emissions from structural applications of non-methyl bromide products decreased 4% (-0.009 tpd), from 0.213 tpd to 0.204 tpd.

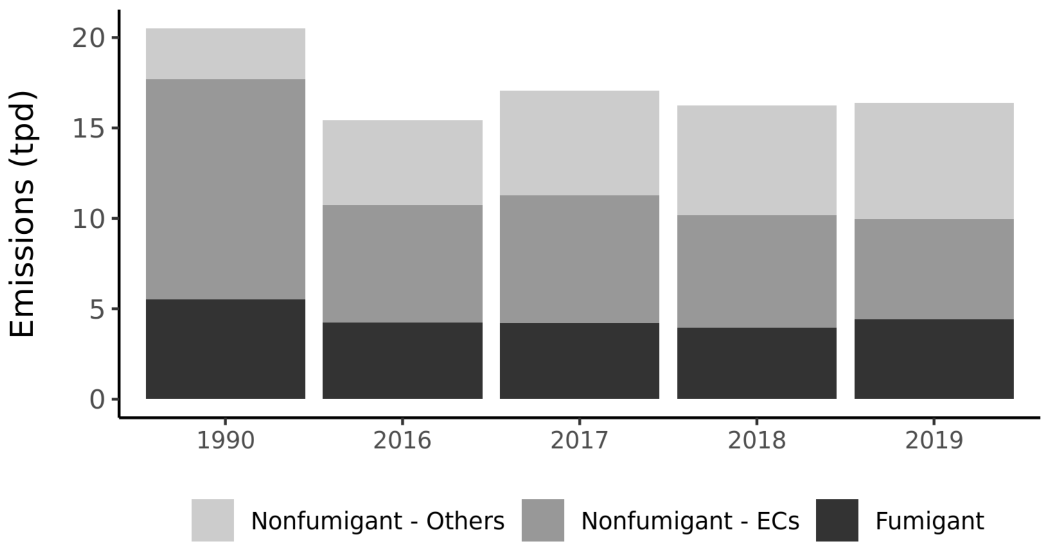

Figure 7: Emissions for the San Joaquin Valley NAA during 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations (ECs), and other nonfumigants (Others). Fumigant emissions are adjusted to account for fumigation method. The adjusted and unadjusted emissions for nonfumigants are equivalent.

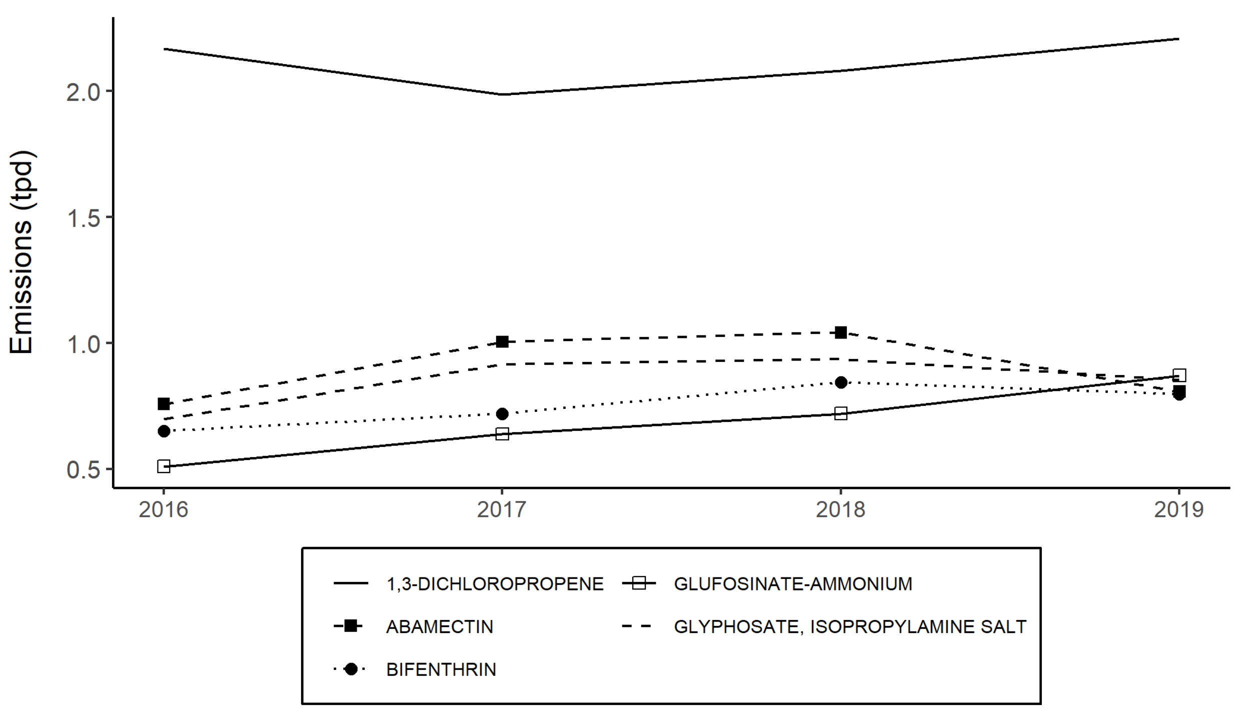

Figure 8: Emissions from products containing the top five active ingredients (AIs) by emissions in the San Joaquin Valley NAA from 2016 to 2019.

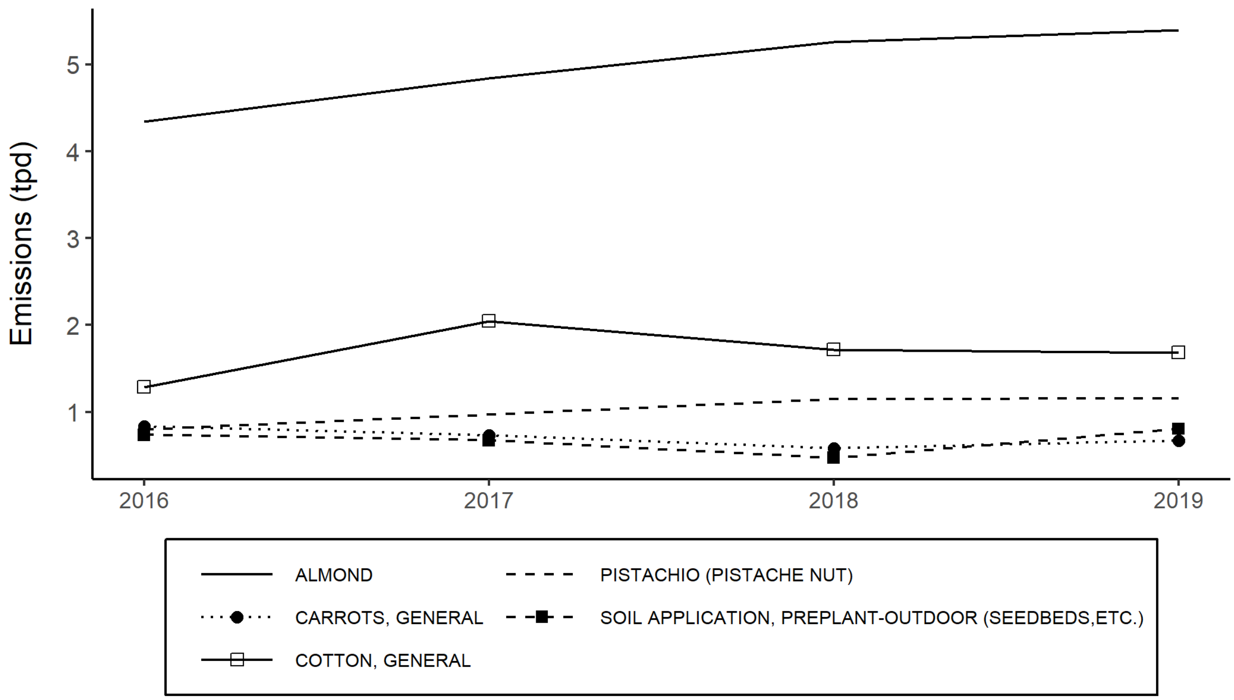

Figure 9: Emissions from the top five commodities by emissions in the San Joaquin Valley NAA from 2016 to 2019.

Southeast Desert NAA

In the Southeast Desert NAA, 2019 emissions increased by 7% (0.019 tpd) from 0.264 tpd in 2018 to 0.283 tpd. Emissions in 2019 were 68% (-0.591 tpd) below the regulatory trigger level (95% of the SIP goal) of 0.87 tpd (Figure 3).

Figure 10 and Tables A2-3-1 and A2-3-2 show emissions in 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations, and all other nonfumigants. In 2019, nonfumigants contributed 81% of emissions; fumigants contributed 19%. Nonfumigant emissions increased by 3% (0.007 tpd), from 0.223 tpd in 2018 to 0.230 tpd. Fumigant emissions increased by 29% (0.012 tpd), from 0.041 tpd in 2018 to 0.053 tpd. Products with emulsifiable concentrate formulations accounted for 49% and 40%, respectively, of nonfumigant and total emissions. Emissions from these products increased by 10% (0.010 tpd), from 0.102 tpd in 2018 to 0.112 tpd.

Table A2-3-3 aggregates product emissions by primary AI. The top 10 AIs comprise 59% of total emissions. Figure 11 illustrates trends in emissions for the top five AIs between 2016 and 2019. Nine of the top 10 emitting AIs in 2019 were also among the top 10 in 2018. Of these, five AIs increased emissions: 1,3-dichloropropene; glufosinate-ammonium; methyl bromide; potassium n-methyldithiocarbamate; and mineral oil. Four of these AIs decreased emissions: glyphosate, isopropylamine salt; abamectin; bifenthrin; and hexythiazox. At 17% of total emissions, metam-sodium had the highest emissions (0.048 tpd) of any AI used in this NAA. Triclopyr, triethylamine salt had the largest percent change in emissions: 381% (0.008 tpd).

Table A2-3-4 aggregates emissions by commodity. The top 10 commodities comprise 80% of total emissions. Figure 12 illustrates trends in emissions for the top five commodities between 2016 and 2019. Eight of the top 10 commodities in 2019 were also among the top 10 in 2018. Of these eight commodities, four increased emissions: almond, pistachio, soil application (preplant-outdoor), and carrots. Four of these eight commodities decreased emissions: cotton (general), walnut, orange, and grapes. At 15% of total emissions, structural pest control had the highest emissions (0.043 tpd) of any commodity used in this NAA. Grapes had the largest percent change in emissions: 248% (0.011 tpd).

Table A2-3-5 shows this NAA's unadjusted 2019 emissions using the CARB CEIDARS emissions inventory classifications. Unadjusted emissions from agricultural applications of methyl bromide increased 3,532% (0.005 tpd), from <0.001 tpd in 2018 to 0.005 tpd. Unadjusted emissions from agricultural applications of non-methyl bromide products increased 75% (0.251 tpd), from 0.333 tpd to 0.584 tpd. Emissions from structural applications of methyl bromide continued to be below a reportable level. Unadjusted emissions from structural applications of non-methyl bromide products decreased 35% (-0.024 tpd), from 0.067 tpd to 0.043 tpd.

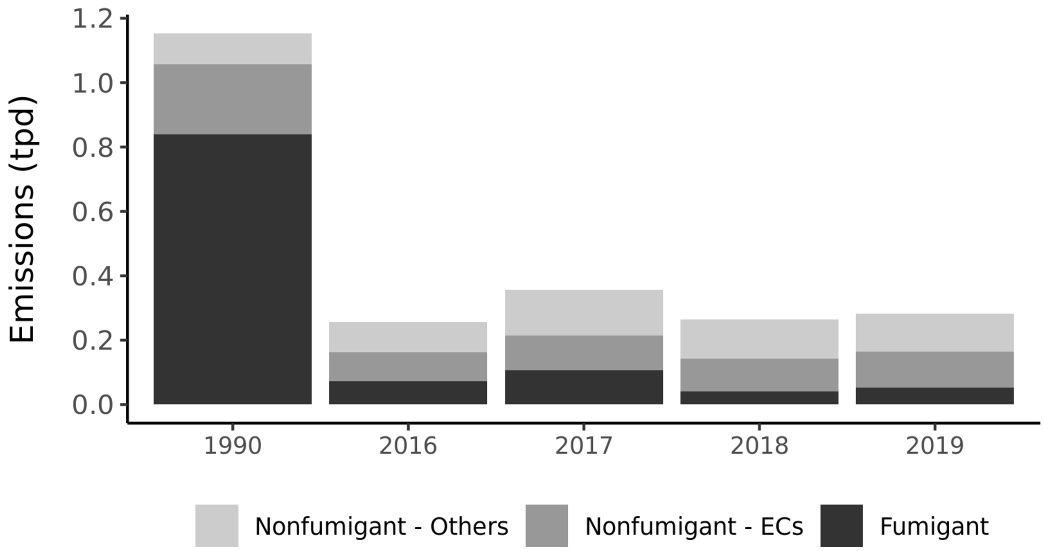

Figure 10: Emissions for the Southeast Desert NAA during 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations (ECs), and other nonfumigants (Others). Fumigant emissions are adjusted to account for fumigation method. The adjusted and unadjusted emissions for nonfumigants are equivalent.

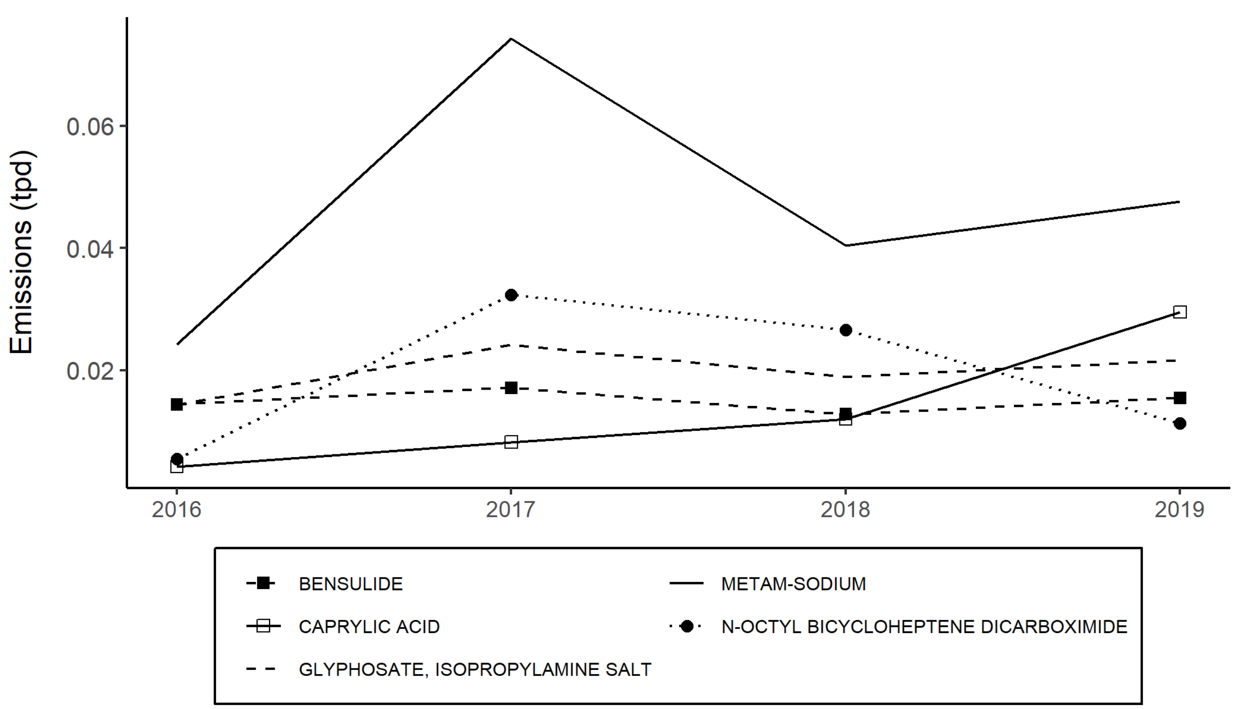

Figure 11: Emissions from products containing the top five active ingredients (AIs) by emissions in the Southeast Desert NAA from 2016 to 2019.

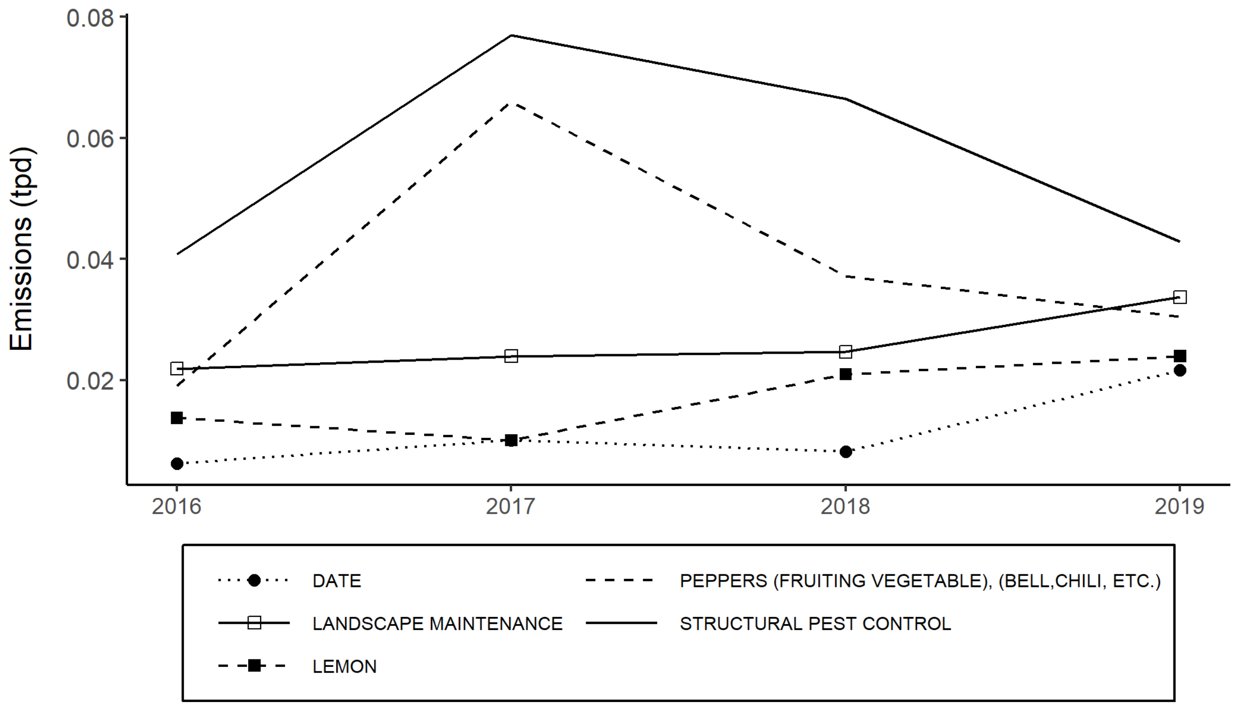

Figure 12: Emissions from the top five commodities by emissions in the Southeast Desert NAA from 2016 to 2019.

Ventura NAA

In the Ventura NAA, 2019 emissions decreased by 5% (-0.060 tpd) from 1.138 tpd in 2018 to 1.078 tpd. Emissions in 2019 were 62% (-1.772 tpd) below the regulatory trigger level (95% of the SIP goal) of 2.85 tpd (Figure 3).

Figure 13 and Tables A2-4-1 and A2-4-2 show emissions in 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations, and all other nonfumigants. In 2019, nonfumigants contributed 36% of emissions; fumigants contributed 64%. Nonfumigant emissions decreased by 4% (-0.018 tpd), from 0.405 tpd in 2018 to 0.387 tpd. Fumigant emissions decreased by 6% (-0.042 tpd), from 0.733 tpd in 2018 to 0.691 tpd. Products with emulsifiable concentrate formulations accounted for 43% and 15%, respectively, of nonfumigant and total emissions. Emissions from these products increased by 7% (0.010 tpd), from 0.155 tpd in 2018 to 0.165 tpd.

Table A2-4-3 aggregates product emissions by primary AI. The top 10 AIs comprise 72% of total emissions. Figure 14 illustrates trends in emissions for the top five AIs between 2016 and 2019. Nine of the top 10 emitting AIs in 2019 were also among the top 10 in 2018. Of these, five AIs increased emissions: 1,3-dichloropropene; glufosinate-ammonium; methyl bromide; potassium n-methyldithiocarbamate; and mineral oil. Four of these AIs decreased emissions: glyphosate, isopropylamine salt; abamectin; bifenthrin; and hexythiazox. At 33% of total emissions, chloropicrin had the highest emissions (0.286 tpd) of any AI used in this NAA. Caprylic acid had the largest percent change in emissions: 214% (0.011 tpd).

Table A2-4-4 aggregates emissions by commodity. The top 10 commodities comprise 89% of total emissions. Figure 15 illustrates trends in emissions for the top five commodities between 2016 and 2019. Eight of the top 10 commodities in 2019 were also among the top 10 in 2018. Of these eight commodities, four increased emissions: almond, pistachio, soil application (preplant-outdoor), and carrots. Four of these eight commodities decreased emissions: cotton (general), walnut, orange, and grapes. At 68% of total emissions, strawberry had the highest emissions (0.732 tpd) of any commodity used in this NAA. Landscape maintenance had the largest percent change in emissions: 27% (0.003 tpd).

Table A2-4-5 shows this NAA's unadjusted 2019 emissions using the CARB CEIDARS emissions inventory classifications. Unadjusted emissions from agricultural applications of methyl bromide increased 37% (0.002 tpd), from 0.004 tpd in 2018 to 0.006 tpd. Unadjusted emissions from agricultural applications of non-methyl bromide products decreased 9% (-0.593 tpd), from 6.340 tpd to 5.748 tpd. Emissions from structural applications of methyl bromide continued to be below a reportable level. Unadjusted emissions from structural applications of non-methyl bromide products decreased 15% (-0.004 tpd), from 0.028 tpd to 0.024 tpd.

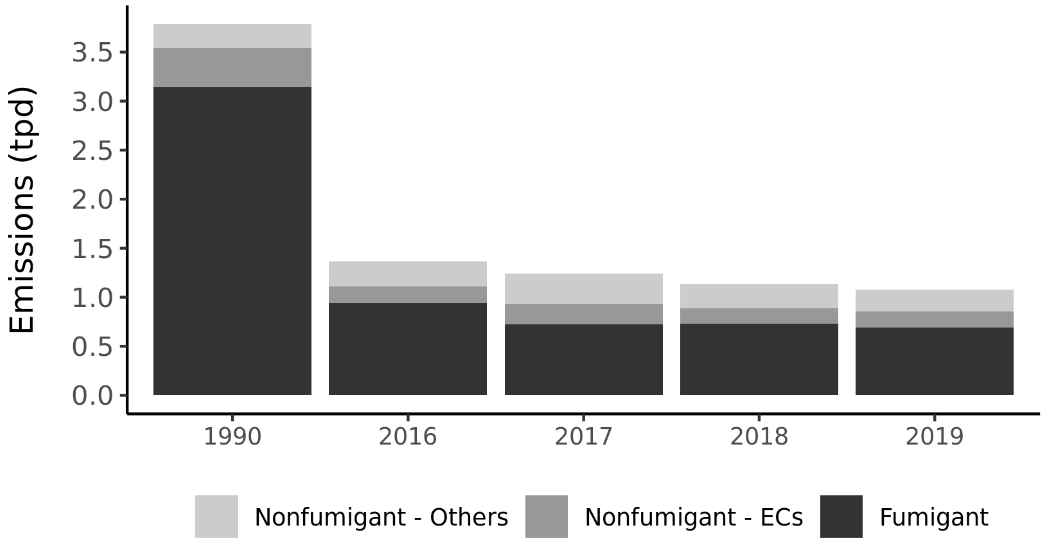

Figure 13: Emissions for the Ventura NAA during 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations (ECs), and other nonfumigants (Others). Fumigant emissions are adjusted to account for fumigation method. The adjusted and unadjusted emissions for nonfumigants are equivalent.

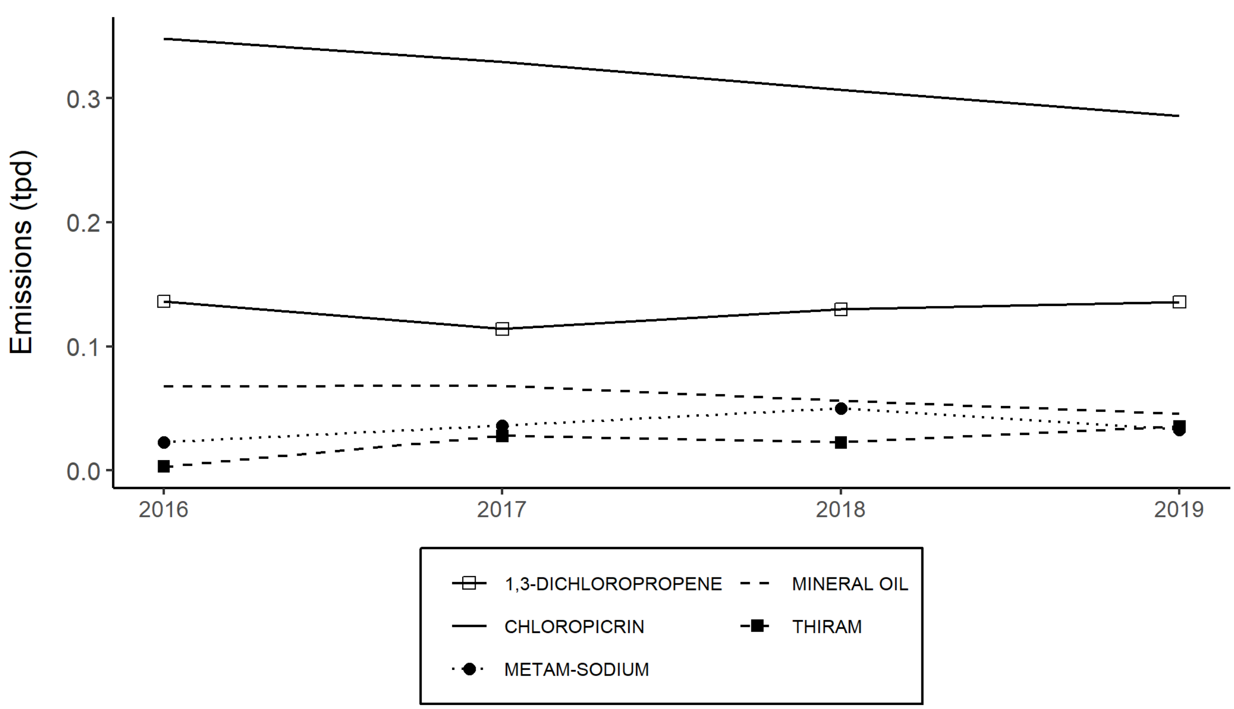

Figure 14: Emissions from products containing the top five active ingredients (AIs) by emissions in the Ventura NAA from 2016 to 2019.

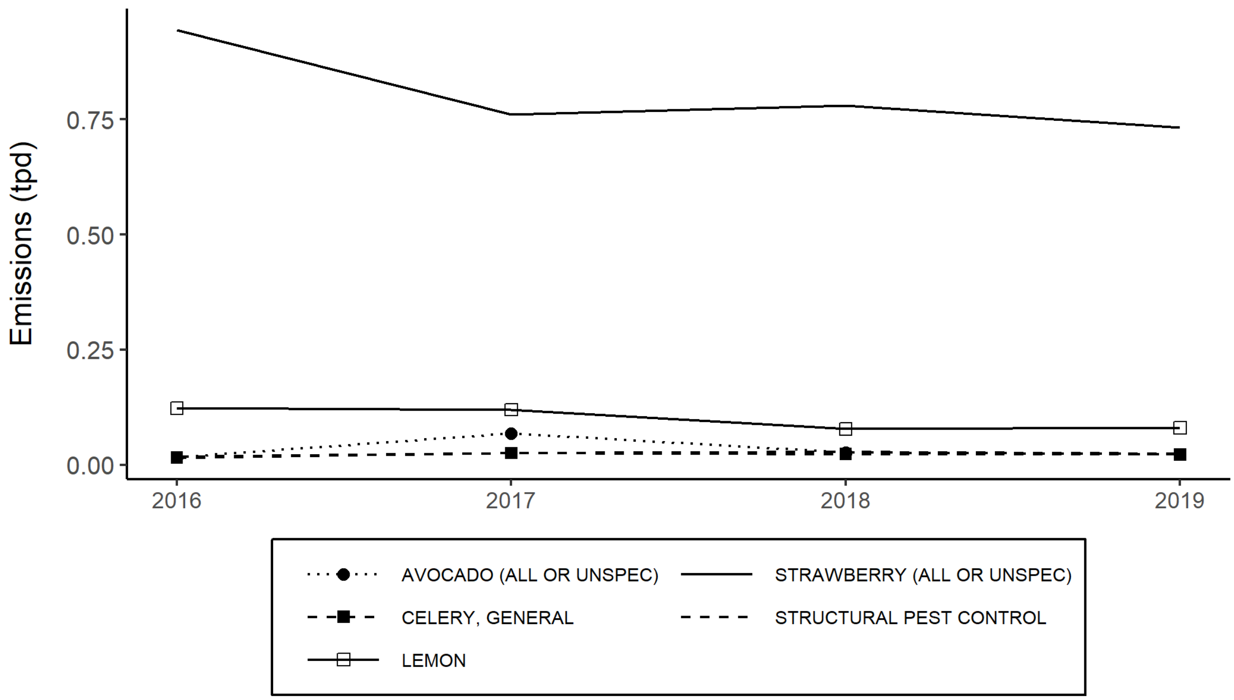

Figure 15: Emissions from the top five commodities by emissions in the Ventura NAA from 2016 to 2019.

South Coast NAA

In the South Coast NAA, 2019 emissions decreased by 14% (-0.149 tpd) from 1.070 tpd in 2018 to 0.922 tpd. Emissions in 2019 were 89% (-7.343 tpd) below the regulatory trigger level (95% of the SIP goal) of 8.3 tpd (Figure 3).

Figure 16 and Tables A2-5-1 and A2-5-2 show emissions in 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations, and all other nonfumigants. In 2019, nonfumigants contributed 88% of emissions; fumigants contributed 12%. Nonfumigant emissions decreased by 11% (-0.096 tpd), from 0.903 tpd in 2018 to 0.807 tpd. Fumigant emissions decreased by 32% (-0.053 tpd), from 0.168 tpd in 2018 to 0.115 tpd. Products with emulsifiable concentrate formulations accounted for 27% and 24%, respectively, of nonfumigant and total emissions. Emissions from these products increased by 10% (0.020 tpd), from 0.200 tpd in 2018 to 0.219 tpd.

Table A2-5-3 aggregates product emissions by primary AI. The top 10 AIs comprise 55% of total emissions. Figure 17 illustrates trends in emissions for the top five AIs between 2016 and 2019. Nine of the top 10 emitting AIs in 2019 were also among the top 10 in 2018. Of these, five AIs increased emissions: 1,3-dichloropropene; glufosinate-ammonium; methyl bromide; potassium n-methyldithiocarbamate; and mineral oil. Four of these AIs decreased emissions: glyphosate, isopropylamine salt; abamectin; bifenthrin; and hexythiazox. At 16% of total emissions, n-octyl bicycloheptene dicarboximide had the highest emissions (0.149 tpd) of any AI used in this NAA. Triclopyr, triethylamine salt had the largest percent change in emissions: 928% (0.023 tpd).

Table A2-5-4 aggregates emissions by commodity. The top 10 commodities comprise 94% of total emissions. Figure 18 illustrates trends in emissions for the top five commodities between 2016 and 2019. Eight of the top 10 commodities in 2019 were also among the top 10 in 2018. Of these eight commodities, four increased emissions: almond, pistachio, soil application (preplant-outdoor), and carrots. Four of these eight commodities decreased emissions: cotton (general), walnut, orange, and grapes. At 50% of total emissions, structural pest control had the highest emissions (0.465 tpd) of any commodity used in this NAA. Fumigation (other) had the largest percent change in emissions: 41% (-0.036 tpd).

Table A2-5-5 shows this NAA's unadjusted 2019 emissions using the CARB CEIDARS emissions inventory classifications. Unadjusted emissions from agricultural applications of methyl bromide decreased 38% (-0.043 tpd), from 0.113 tpd in 2018 to 0.070 tpd. Unadjusted emissions from agricultural applications of non-methyl bromide products increased 12% (0.060 tpd), from 0.492 tpd to 0.552 tpd. Emissions from structural applications of methyl bromide continued to be below a reportable level. Unadjusted emissions from structural applications of non-methyl bromide products decreased 25% (-0.157 tpd), from 0.622 tpd to 0.465 tpd.

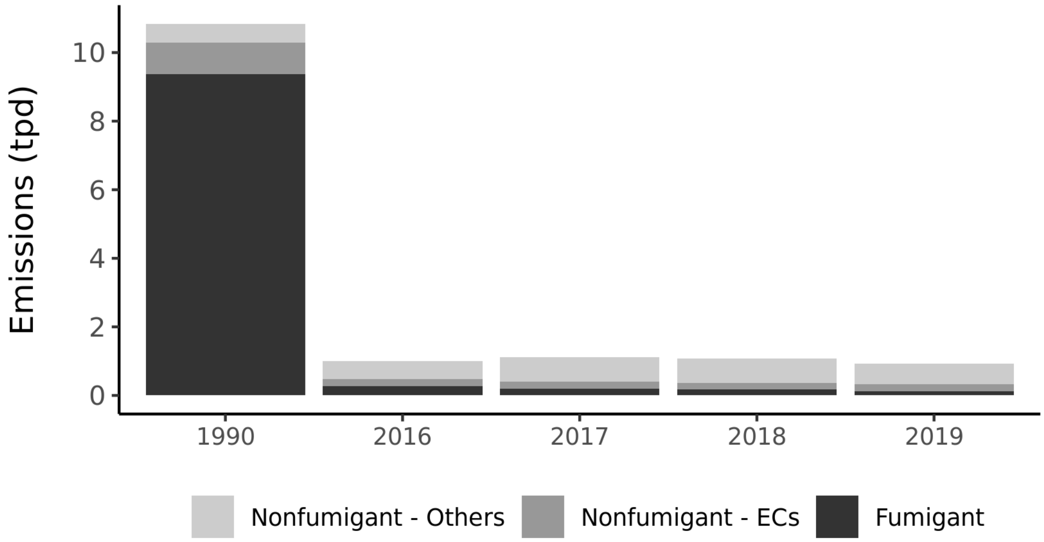

Figure 16: Emissions for the South Coast NAA during 1990 and 2016-2019, categorized as fumigants, nonfumigants with emulsifiable concentrate formulations (ECs), and other nonfumigants (Others). Fumigant emissions are adjusted to account for fumigation method. The adjusted and unadjusted emissions for nonfumigants are equivalent.

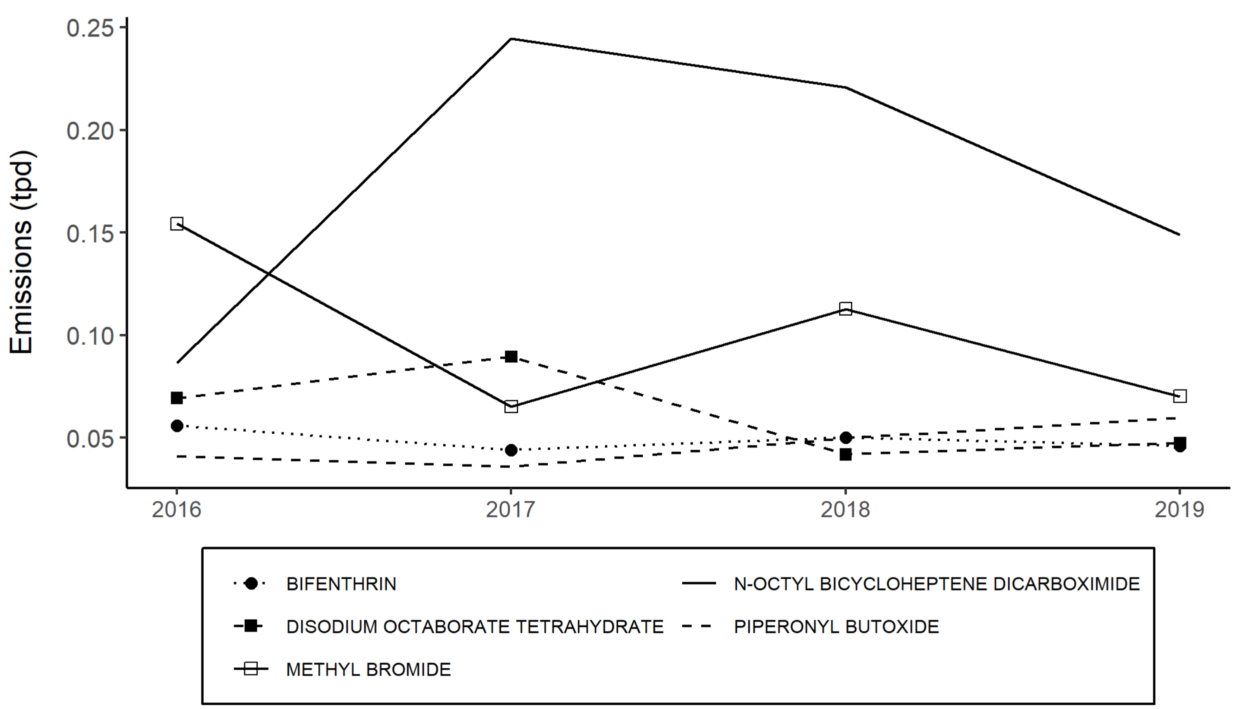

Figure 17: Emissions from products containing the top five active ingredients (AIs) by emissions in the South Coast NAA from 2016 to 2019.

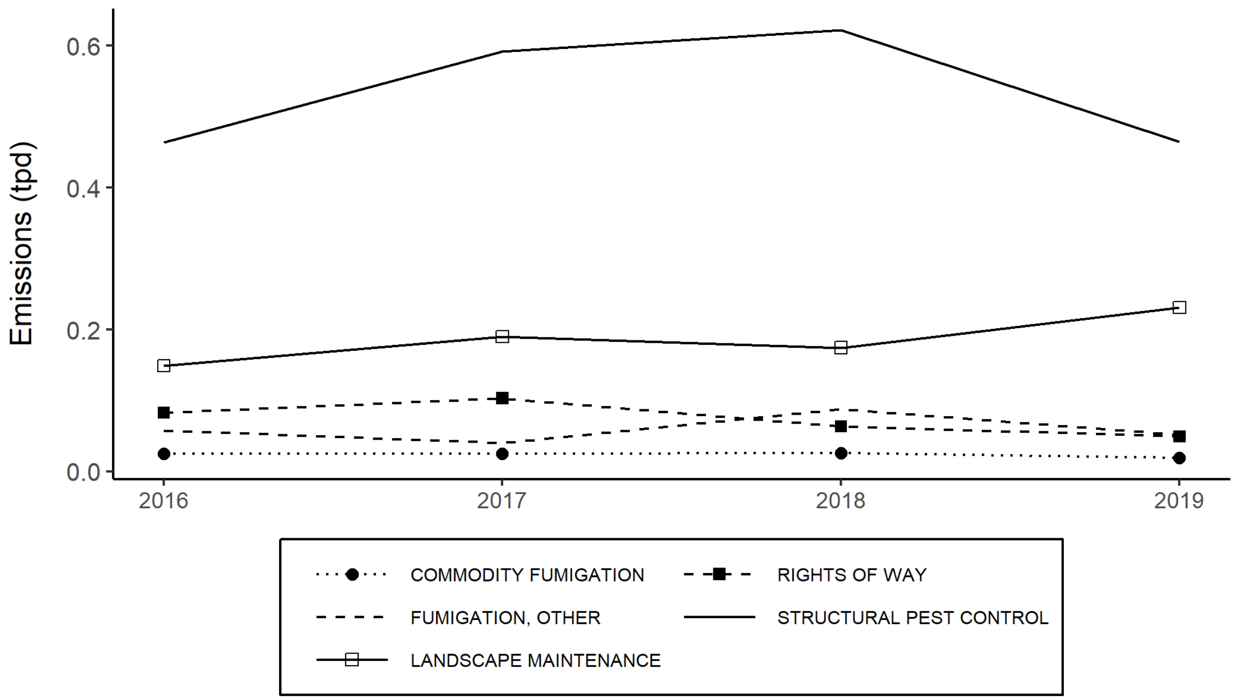

Figure 18: Emissions from the top five commodities by emissions in the South Coast NAA from 2016 to 2019.

Emissions Relative to Levels that Trigger Additional Restrictions

DPR is required to implement additional VOC restrictions if emissions exceed the trigger levels (95% of the SIP goals) specified in 3 CCR section 6452.2. As shown in Table 5, 2019 emissions in all five NAAs were less than the trigger levels.

Table 5: SIP goals, trigger levels and 2019 emissions.

NAA	SIP Goal (tpd)	Trigger Level (95% of SIP Goal) (tpd)	2019 Emissions (tpd)
Sacramento Metro	2.2	2.1	1.229
San Joaquin Valley	18.1	17.2	16.387
Southeast Desert	0.92	0.87	0.283
Ventura	3.0	2.85	1.078
South Coast	8.7	8.3	0.922

Emissions reported in the 2013 VOC Emissions Inventory Report for the San Joaquin Valley NAA exceeded the SIP goal by 0.183 tpd. In the 2014 Inventory, calculations for 2013 emissions in the San Joaquin Valley NAA were revised and resulted in emissions of 19.518 tpd (1.418 tpd above the SIP Goal). This increase was largely due to revised thermogravimetrically derived EP values for fenpyroximate and hexythiazox products with emulsifiable concentrate formulations. Exceedance of the trigger level required prohibition of certain uses of designated nonfumigant high-VOC products. High-VOC products and their restrictions are discussed in the next section.

Nonfumigant Restrictions for the San Joaquin Valley NAA

Designation of High-VOC Products

3 CCR section 6880 establishes EP thresholds for regulatory classification of nonfumigant products containing abamectin, chlorpyrifos, gibberellins, and/or oxyfluorfen as the primary AI(s):

Table 6: Emission Potential (EP) thresholds established in 3 CCR section 6880.

Primary AI	EP Threshold
ABAMECTIN	35%
CHLORPYRIFOS	25%
GIBBERELLINS	25%
OXYFLUORFEN	15%

DPR classifies products containing any of the four pesticides listed above into three groups:

- **High-VOC product**: (1) contains any of the four pesticides as a primary AI; (2) is labeled for agricultural use; and (3) the EP is greater than the threshold.
- **Low-VOC product**: (1) contains any of the four pesticides as a primary AI; (2) is labeled for agricultural use; and (3) the EP is equal to or less than the threshold.
- **Excluded product**: (1) contains any of the four pesticides, but not as a primary AI; or (2) is labeled for non-agricultural use only.

If a product contains multiple AIs, the primary AI(s) are those present at the highest percentage in a product. Products with a primary AI not listed in Table 6 (including products with multiple primary AIs) are excluded.

Products labeled only for non-agricultural uses are also excluded. Non-agricultural uses include: a) home use; b) use in structural pest control; c) industrial or institutional use; d) control of an animal pest under the written prescription of a veterinarian; or e) vector control. All other uses are considered agricultural.

Appendix 4 lists the currently registered products designated as high-VOC or low-VOC, pursuant to 3 CCR section 6881.

Restrictions on High-VOC Products

A number of regulations impose restrictions on the application of a high-VOC product to alfalfa, almonds, citrus, cotton, grapes, pistachios, or walnuts in the San Joaquin Valley NAA between May 1 and October 31. When emissions in the San Joaquin Valley NAA exceed its trigger level, 3 CCR section 6884 prohibits these applications for at least two years (see "Hypothetical Emissions" below), with the following exceptions:

- Use of chlorpyrifos products to control aphids on cotton.
- Use of gibberellins products when applied at an application rate of 16 grams of AI per acre or less.
- Use of oxyfluorfen products when applied at an application rate of 0.125 (1/8) pounds of AI per acre or less.

- Uses for which the U.S. EPA has issued an emergency exemption from registration under Section 18 of the Federal Insecticide, Fungicide, and Rodenticide Act.

- Uses registered as a Special Local Need under Section 24(c) of the Federal Insecticide, Fungicide, and Rodenticide Act.

- Applications made by or under the direction of the U.S. Department of Agriculture, the California Department of Food and Agriculture, or CACs to control, suppress, or eradicate pests.

- Applications using precision spray technology meeting the criteria of the California Office of the Natural Resources Conservation Service's Environmental Quality Incentives Program.

Applicants must obtain a written recommendation from a licensed pest control adviser before application (3 CCR section 6883). In turn, pest control advisers cannot make a recommendation that violates any active high-VOC prohibitions. If an exception to a prohibition applies, the exception must be identified in the written recommendation (3 CCR 6558).

Hypothetical Emissions

DPR's 2013 emissions inventory for the San Joaquin Valley NAA exceeded its trigger level. Therefore, in 2014, DPR enacted high-VOC restrictions from May 1 through October 31 of 2015 and 2016, as required by 3 CCR section 6452.2(f). If prohibitions for high-VOC nonfumigant products are in effect, 3 CCR 6884 specifies that those prohibitions must remain in effect until the hypothetical emissions detailed in the Annual VOC Emissions Inventory Report are less than the trigger level of 17.2 tpd for at least two consecutive years. Because this condition has not yet been met, the prohibitions enacted in 2015 were continued through at least 2021 as of the 2018 annual inventory report.

The hypothetical emissions during a year of prohibitions shall be calculated for each AI used on each crop specified in 3 CCR section 6884. The hypothetical emissions shall be calculated by assuming the relative mixture of high- and low-VOC products used in the current year of prohibitions would have been the same as in the most recent year without prohibitions. The emissions are then calculated using that product mixture for the amount of AI used in the current year.

The following formula is used to calculate the hypothetical emissions described above for each pesticide-crop combination:

$$\underset{\textbf{\textit{(Table A3-5 column D)}}}{\text{Hypothetical emissions for a pesticide-crop combination listed in section 6884 during May-Oct for the year of prohibitions}} = \frac{\underset{\textbf{\textit{(Table A3-5 column A)}}}{\text{Emissions for the pesticide-crop combination during May-Oct for the most current year without prohibitions}} \times \underset{\textbf{\textit{(Table A3-5 column B)}}}{\text{Pounds AI for the crop during May-Oct for the year of prohibitions}}}{\underset{\textbf{\textit{(Table A3-5 column C)}}}{\text{Pounds AI for the crop during May-Oct for the most current year without prohibitions}}}$$

Table A3-5 in Appendix 3 details the hypothetical emissions for 2019 calculated using the formula above. The total hypothetical emissions for the pesticides and crops listed in section 6880 are 2.886 tpd, which is 1.638 tpd more than the actual inventory emissions. Total hypothetical emissions equal the sum of the hypothetical emissions for each pesticide-crop combination, plus the actual emissions for the remaining pesticides and crops not listed in 3 CCR section 6880:

$$\text{Total hypothetical emissions} = 2.886 + 16.387 - 1.248 \text{ tpd}$$

Therefore, the total 2019 hypothetical emissions are equal to 18.026 tpd, which exceeds the trigger level of 17.2 tpd by 5% (0.831 tpd).

As specified in 3 CCR section 6452.2(f), the hypothetical emissions must be less than the trigger level for at least two consecutive years before DPR can lift the high-VOC prohibitions. Therefore, the prohibition on the use of high-VOC products for abamectin, chlorpyrifos, gibberellins, and oxyfluorfen on certain crops in the San Joaquin Valley NAA as specified in 3 CCR section 6884 that went into effect during 2015 remain in effect between the May 1 through October 31 period during 2021 and 2022.

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