

2020 Annual Report to the Governor and
Legislature on the California Air Resources
Board's Expenditure of Fees of Nonvehicular
Sources, Consumer Products, and Architectural
Coatings for Fiscal Year 2019-2020

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Introduction

The California Clean Air Act, Assembly Bill (AB) 2595 (Sher, Chapter 1568, Statutes of 1988), requires attainment of State ambient air quality standards by the earliest practicable date (Health and Safety Code Section 41503.5). As part of that mandate, the California Air Resources Board (CARB or the Board) and the local air quality management and air pollution control districts (air districts) are directed to reduce air pollution from motor vehicles, industrial facilities, and other sources of emissions. CARB has primary responsibility for control of air pollution from vehicular sources and consumer products, while air districts generally have primary responsibility for control of nonvehicular sources of pollution, such as stationary sources (Health and Safety Code Section 39002).

One type of pollution subject to ambient air quality standards is volatile organic compounds (VOCs), which contribute to the formation of ground-level ozone and are precursors to the formation of fine particulate matter (PM), both of which can result in adverse health impacts. The California Clean Air Act requires CARB to adopt regulations to achieve the "maximum feasible reduction in VOCs emitted by consumer products" (Health and Safety Code Section 41712(b)) and authorizes CARB to recommend "control measures" to air districts to achieve feasible reductions in VOC emissions related to architectural paints or coatings (Health and Safety Code Section 40916(d)(1)).

Health and Safety Code Sections 39612 and 39613 further authorize CARB to assess fees on stationary sources and manufacturers of consumer products and architectural coatings (collectively, "nonvehicular sources") in order to recover the costs of CARB programs related to these sources¹. These fees are collectively described by the name of the legislation that established them, AB 10X (Oropeza, Chapter 1, Statutes of 2003), as "AB 10X fees". The facilities subject to the nonvehicular fees are those that emit 250 tons or more annually of any nonattainment pollutant or precursor, as provided in Health and Safety Code Section 39612(d). The fees for consumer products and architectural coatings apply to manufacturers with total California sales that result in 250 tons per year or more of VOC emissions in the State (Health and Safety Code Section 39613).

Section 39612(g) of the Health and Safety Code also requires CARB to report to the Governor and the Legislature annually on the expenditure of the fees collected, which is the

¹ Health and Safety Code Section 39612 authorizes CARB to impose permit fees on nonvehicular sources, which "shall be expended only for the purposes of recovering costs of additional state programs related to nonvehicular sources." Health and Safety Code Section 39613 requires CARB to impose a fee for consumer products and architectural coatings sold in California, which "shall be used to mitigate or reduce air pollution in the state created by consumer products and architectural coatings, as determined by the state board, and shall be expended solely for those programs."

topic of this report. For fiscal year 2019-2020, CARB staff collected approximately \$23 million in consumer product, architectural coatings, and stationary source fees to partially fund program expenditures. This report provides information on program activities that were funded by fiscal year 2019-2020 fees authorized by Health and Safety Code Sections 39612 and 39613.

History of the Fee Program

As originally enacted in 1988, Health and Safety Code Section 39612 authorized CARB to assess fees on nonvehicular sources that were allowed by air district permits to emit 500 tons or more per year of any air pollutant that forms ozone or PM. In 1989, the Board approved the California Clean Air Act Nonvehicular Source Fee Regulation (California Code of Regulations, title 17, sec. 90800 et seq.). The original regulation included the fee rate and amounts to be remitted to CARB by the air districts for the first year of the program, fiscal year 1989-1990. In subsequent years, the Board approved amendments to the Fee Regulation identifying the amount of fees to be collected by each air district for the following fiscal year. To streamline the process, in 1998 the Board approved amendments that established a process whereby CARB's Executive Officer assesses the fees administratively.

In 2003, the Legislature enacted AB 10X, which amended Health and Safety Code Section 39612 and added Health and Safety Code Section 39613. The changes to Health and Safety Code Section 39612, included: (1) increasing the cap on facilities fees from \$3 million to \$13 million, and allowing the fees to be adjusted annually thereafter for inflation; (2) expanding the universe of facilities subject to the fees by specifying that the fees are to be collected from facilities authorized by air district permits to emit 250 tons (instead of the previous 500 tons) or more per year of any air pollutant that forms ozone or PM; and (3) authorizing CARB to collect the fees directly from all sources subject to the fees. In addition, Health and Safety Code Section 39613 required CARB to assess fees on manufacturers of consumer products and architectural coatings sold in California. The fees are assessed on manufacturers whose total California sales of consumer products or architectural coatings result in VOC emissions of 250 tons or more per year. CARB must use the fees collected pursuant to Health and Safety Code Section 39613 solely to mitigate or reduce air pollution in the State created by consumer products and architectural coatings. In July 2003, the Board approved amendments to the Nonvehicular Source Fee Regulation to collect the fees authorized by AB 10X.

In 2004, the Legislature authorized CARB to assess an additional \$2.6 million on facilities for a total of \$20 million. In November 2004, the Board approved amendments to the Fee Regulation, renamed Nonvehicular Source, Consumer Products, and Architectural Coatings Fee Regulation, to establish a procedure to collect the additional \$2.6 million for fiscal year 2004-2005 and onward from facilities. The amendments also provided for collection from facilities of any legislatively-approved fees in fiscal years beyond fiscal year 2004-2005 that are in excess of \$17.4 million. The full text version of the Nonvehicular Source Fee Regulation can be found on CARB's website at:

http://www.arb.ca.gov/ei/nscpac_fees/comprehensive_fee_reg.pdf

Fiscal Year 2019-2020 Fee Collections

Total fees collected in a given fiscal year reflect a base fee amount of \$17.4 million collected from architectural coating and consumer product manufacturers, and stationary sources, plus a \$2.6 million supplemental fee assessed on stationary sources only, pursuant to the Nonvehicular Source, Consumer Products, and Architectural Coatings Fee Regulations (California Code of Regulations, title 17, Sections 90800.8-90806) (hereinafter “Fee Regulation”).

Fees collected incorporate two additional adjustments. The first is a three percent increase of the base and supplemental fee amount to allow for recovery of unforeseen reductions in funds collected due to business closures and bankruptcies (Fee Regulation, Section 90800.8(c)(2)). CARB staff has determined from experience that this three percent upward adjustment is needed to account for this potential collection shortfall. Secondly, a carry-over balance from the previous fiscal year typically occurs, due to business closures and bankruptcies, loss of fee payers when emissions fall below applicable thresholds, addition of newly identified fee payers, or other factors. Any excess funds collected are carried over to reduce the total fee determinations for the next fiscal year. Similarly, any amount of funds under-collected will be added to increase the total fee determinations for the next fiscal year (Fee Regulation, Section 90800.8(d)).

Fiscal Year 2019-2020 Fee Determinations. Each manufacturer of consumer products or architectural coatings with more than 250 tons per year of VOC emissions in 2017 was subject to an AB 10X fee on each ton of VOC emissions. The \$17.4 million base fee for consumer products, architectural coatings, and stationary sources, adjusted as described above, was divided by the total VOC emissions (and, for stationary sources, other nonattainment pollutant and their precursor emissions) subject to the fee to determine the dollar per ton fee rate for the fiscal year. This is an iterative process in which CARB provides each fee payer with its preliminary fee amount and calculation methodology, with an opportunity for fee payer input before the fee is finalized (as described below). The final base fee rate for fiscal year 2019-2020 was \$199.47/ton of emissions for all fee payers. An additional supplemental fee of approximately \$117.18 per ton of emissions was assessed on stationary sources. Table 1 below identifies the total fees paid by stationary sources and consumer product and architectural coatings manufacturers in fiscal year 2019-2020.

Table 1: Fees Collected for Fiscal Year 2019-2020

Activities	Fees Collected
Stationary Sources	\$12,294,355
Consumer Product and Architectural Coatings	\$10,715,728
Total	\$23,010,083

CARB determined each individual fee payer’s fiscal year 2019-2020 preliminary fee amount, and provided an opportunity for fee payer and air district feedback. CARB’s protocol for soliciting feedback and finalizing each party’s fiscal year 2019-2020 AB 10X fees, as required by Section 90800.8(c) of the Fee Regulation, is described below:

1. Preliminary Fee Determination. By May 1, 2019, CARB sent stationary source and consumer product or architectural coatings manufacturers a letter indicating their preliminary fee and fee calculation methodology pursuant to Section 90800.8(c)(6) of the Fee Regulation. Each air district that has a stationary source subject to the fee reviewed the identified facility or facilities and their emissions prior to the preliminary fee determination. After the preliminary fee is determined, air districts also receive a copy of the letter sent to their stationary source facilities indicating each of its source’s preliminary fees and fee calculation methodology.
2. Stakeholder Feedback. Each letter recipient had sixty days to provide written comments to CARB regarding their preliminary fees and fee calculation methodology. Stakeholder comments typically involve refining of estimated emissions subject to fees.
3. Final Fee Determination. By August 1, 2019, CARB provided each stationary facility and consumer product or architectural coatings manufacturer with its final fee determination letter. Each air district with a stationary facility subject to the fee also received a final fee determination letter.

Additional information and details regarding fiscal year 2019-2020 fee payers, and emission and fee determination methodologies for can be found at: <https://ww2.arb.ca.gov/our-work/programs/consumer-products-program/fee-regulation-activity> and www.arb.ca.gov/ei/nscpac_fees/nscpac_fees.htm.

Major Activities Supported by the Fees

The federal Clean Air Act (42 U.S.C. sec. 7401 et seq.), administered by the United States Environmental Protection Agency (U.S. EPA), sets national ambient air quality standards (NAAQS). In order to demonstrate attainment of federal air quality standards, CARB must develop, maintain and update emission inventories; evaluate air quality trends and indicators; conduct sophisticated air quality modeling; and work with air districts to develop Air Quality Management Plans and State Implementation Plans (SIPs), that commit to achievement of

emission reductions needed to demonstrate attainment. The planning effort culminates with adoption of State and local measures.

AB 10X fees help implement these and other requirements related to attainment of State and federal air quality standards for the nonattainment pollutants emitted by the fee payers. The success of these and other efforts is evident in the air quality progress seen across the State. Today, more than 20 million people live in communities with air quality that meet current federal standards. This improved air quality provides significant health and economic benefits, including fewer premature deaths for people with preexisting heart and lung disease; reduced hospital admissions; and reduced emergency room visits.

AB 10X fees also support implementation of CARB's stationary source, consumer product and architectural coatings programs. This report provides an overview of these and other key CARB programs supported by AB 10X funding in fiscal year 2019-2020.

Program Implementation

Nonvehicular Sources.

The California Health and Safety Code (H&SC) establishes local air district authority over stationary source permitting and air quality planning commitments. Air district responsibilities include regional air quality planning, air monitoring, stationary source and facility permitting, and enforcement. Districts vary by attainment status, population, population density, demographics, area, topography, meteorology, and industry. Therefore, each air district establishes programs that are designed to best address the unique conditions of its jurisdiction.

State law also defines CARB's important oversight role in reviewing district attainment plans, rules, regulations, and enforcement practices. CARB's role includes programmatic reviews as well as and day-to-day review of individual district actions, such as permits for major sources and major modifications, issuance of emission reduction credits (ERCs), adoption of rules, and granting of variances. Below are examples of extensive stationary source reviews undertaken by CARB's Enforcement Division staff.

Reasonably Available Control Technology (RACT) SIPs. The federal Clean Air Act requires implementation of RACT for stationary sources in all PM nonattainment areas and all ozone nonattainment areas classified as Moderate nonattainment or higher. Additional levels of review and control, including Best Available Control Technology and Most Stringent Measures, are required for areas classified as Serious for PM nonattainment. Evaluations of RACT in the applicable nonattainment areas are due to U.S. EPA within 2 years after U.S. EPA finalizes designations for a given standard for ozone areas. Final designations for the federal 8-hour ozone standard of 70 parts per billion (ppb) were effective on August 3, 2018. Districts classified as moderate or above then had to adopt or revise rules to strengthen controls for sources within their jurisdictions in order meet RACT levels and to reduce emissions to attain federal standards and meet other SIP needs. Local air districts revised their rules through independent public processes, and following submittal of the rules to CARB, CARB reviewed them and submitted the rules to U.S. EPA as revisions to the

California SIP. In addition to reviewing individual rules, CARB staff worked with local air districts across the State to support and review their RACT SIP analyses of stationary sources within their nonattainment areas and jurisdictions. Once adopted as SIP revisions by local air districts and reviewed by CARB staff, the District's RACT SIPs were submitted by CARB to U.S. EPA as revisions to the California SIP to meet requirements under the 70 ppb 8-hour ozone standard. RACT SIPs for the 70 ppb standard were due to U.S. EPA on August 3, 2020. In FY 2019-20, Districts revised rules and CARB reviewed and submitted to U.S. EPA many rules to support SIP actions related to the 70 ppb and 75 ppb ozone standards, as well as multiple PM2.5 standards.

RECLAIM Unwind. The South Coast Air Quality Management District (SCAQMD) Board adopted the Regional Clean Air Incentives Market (RECLAIM) program in October 1993. The purpose of the RECLAIM program is to reduce oxides of nitrogen (NOx) and oxides of sulfur (SOx) emissions through a market-based program. The program replaced a series of existing and future command-and-control rules. RECLAIM was designed to provide facilities with the flexibility to seek the most cost-effective solution to reduce their emissions. It also was designed to provide equivalent emission reductions, in the aggregate, for the facilities in the program compared to what would occur under a command-and-control approach.

To address a need for further emission reductions from stationary sources, Control Measure CMB-05 of the SCAQMD [2016 Final Air Quality Management Plan](#) addressed changes to RECLAIM. The Measure identified a series of approaches, assessments, and analyses that could be explored to make the RECLAIM program more effective in ensuring equivalency with command-and-control regulations implementing Best Available Retrofit Control Technology (BARCT), and to generate further NOx emission reductions at RECLAIM facilities. This would be achieved in two ways: a discrete NOx emission reduction commitment by 2025; and a transition to a command-and-control regulatory structure requiring BARCT level controls as soon as practicable. As many of the program's original advantages appear to be diminishing, Measure CMB-05 identified an orderly sunset of the RECLAIM program as a way to maximize emissions reductions, create more regulatory certainty, and potentially reduce compliance burdens for RECLAIM facilities. A working group of stakeholders and experts began convening in 2017 to examine the future of the RECLAIM program and develop options and timing for the transition to a command-and-control regulatory structure.

Under the provisions of SB 288 (Sher, Chapter 476, Statutes of 2003), CARB is responsible for ensuring that New Source Review (NSR) changes will not result in backsliding of control program stringency. CARB Enforcement Division staff participates in working groups for key rules, providing review of the NSR and ERC rules changes, as well as prohibitory rules associated with RECLAIM transition changes. CARB Enforcement Division staff meet with District and U.S. EPA counterparts before each monthly RECLAIM Working Group meeting, providing review and input on any new proposals or concepts. Staff also attends the working group meetings as panelists. Staff have also been working closely with the SCAQMD to review and support the rule development process for prohibitory rules.

San Joaquin Valley Air Pollution Control District Permitting. In January 2019, CARB staff were directed by the Board to conduct a review of the San Joaquin Valley Air Pollution Control District (SJVAPCD) ERC program. The goal of this project was to review the SJVAPCD ERC system, including the equivalency determination, and explain it in the context of the broader SJVAPCD program for reducing emissions from stationary sources including NSR, permitting, and regulatory requirements.

CARB staff worked extensively with SJVAPCD staff and executive management to conduct the review. Through data and information requests from CARB, SJVAPCD provided electronic copies of hundreds of documents related to over 50 ERC projects, 30 Authority to Construct permits, and the federal offset equivalency tracking system. In addition, SJVAPCD provided CARB staff with electronic access to the SJVAPCD Permits Administration System, a comprehensive database for all permitting and ERC-related actions. The SJVAPCD also provided CARB staff with access to the federal offset equivalency tracking system, and shared information about the tracking system, access to database files, and tracking system output.

CARB staff took steps to ensure the review was an open, public process. Staff held workshops in April and September 2019, and in June 2020, staff presented material and solicited comments. These workshops were hosted at the SJVAPCD regional office in Bakersfield, which was linked to the Fresno office and regional Modesto office by the SJVAPCD's video teleconference system. The workshops were also webcast through CARB's web site, and translation services were made available at all three SJVAPCD office locations.

CARB staff has shared the findings of its review with SJVAPCD management and discussed the need to update the ERC program, as well as processes to address overarching findings in three areas. First, many of the SJVAPCD engineering evaluations of ERC and permit applications, and the SJVAPCD equivalency database system, could both be more transparent and rigorous. Second, CARB staff found that the SJVAPCD should make adjustments to how it implements its rule for the timeliness of ERC application submittals, and that the SJVAPCD could be more rigorous in its determination of surplus reductions in individual ERCs. In the third set of findings, staff identified issues in the SJVAPCD equivalency demonstration.

In response to these overarching findings, the SJVAPCD committed to take specific steps, beginning immediately. CARB staff plans to work with the SJVAPCD as it implements commitments. Staff will also update the Board periodically on progress.

Consumer Products

Chemically formulated consumer products such as personal care products, household care products, and automotive care products are a significant source of VOC emissions and have been regulated as a source of VOC in numerous rulemakings since 1989. Consumer products are one of the largest source categories of VOC emissions in the South Coast and

Statewide². The magnitude of emissions from this sector indicates that additional approaches to reduce emissions from this sector remain important.

In fiscal year 2019-2020, CARB staff continued implementation of flexibility provisions within the consumer product regulations geared to drive development of innovative, lower-emitting consumer products³. CARB's Alternative Control Plan (ACP) Regulation for Consumer Products and Aerosol Coating Products (California Code of Regulations, title 17, Sections 94540 – 94555) provides participating manufacturers with regulatory flexibility by allowing a product with VOC content above the VOC standard to be offset by a product with emissions below the standard. There are currently four companies with active ACPs, four inactive ACPs, and one cancelled ACP for a total of nine companies who have participated in the program.

CARB's Innovative Product Exemption (IPE) provisions, on the other hand, allow for a product that exceeds the applicable VOC limit, yet results in fewer VOC emissions compared to a "representative consumer product" of the same product category (California Code of Regulations, title 17, Section 94511). Such a product may result in lower emissions than a representative product due to special features such as a more efficient application technique, a greater percentage of active ingredients, or more effective active ingredients. There are currently 52 IPEs, primarily for air freshener products. Both the ACP and IPE programs provide manufacturer flexibility, while encouraging innovation to develop products that emit significantly lower VOC than currently required.

CARB continued to respond to manufacturer requests for product determinations and charcoal lighter material certification applications. Manufacturers often request an official CARB product determination for products with multiple, vague, or unclear potential uses in order to clarify how the product is defined for regulatory purposes, and the applicable VOC limit. CARB consumer product implementation, enforcement, legal, and laboratory personnel evaluate the product label, formulation, and applicable regulatory definitions in making these determinations. CARB also annually certifies dozens of charcoal lighter materials, including lighter fluids and charcoal briquettes, to ensure these products meet the applicable VOC emissions per start standard pursuant to California Code of Regulations, title 17, Section 94509(h).

In fiscal year 2019-2020, CARB staff continued to work closely with manufacturers, consultants, research institutions, and other regulatory agencies, such as the U.S. EPA, the California Department of Toxic Substances Control (DTSC), regulatory entities from abroad, and California air districts to drive development and implementation of effective, health-protective consumer products regulations. For example, CARB provided consultation for

² California Air Resources Board; *Revised Proposed 2016 State Strategy for the State Implementation Plan*; March 7, 2017; <https://www.arb.ca.gov/planning/sip/2016sip/rev2016statesip.pdf>.

³ California's consumer product regulations are comprised of: California Code of Regulations, title 17, Sections 94500-94506.5, 94507-94517, 94540-94555 and 94700-94701.

Environment and Climate Change Canada (ECCC) on a consumer products regulation, sharing staff expertise on regulatory definitions and text. ECCC administers acts and regulations, and implements government-wide regulatory initiatives for the purpose of conserving Canada's natural heritage, and ensuring a clean, safe and sustainable environment for present and future Canadians.

The 2016 State Strategy for the SIP requires CARB to develop measures to reduce consumer product VOC emissions by 1-2 tons per day (tpd) by 2023 and 4-5 tpd by 2031, respectively, in the South Coast Air Basin, and 8-10 tpd by 2031 statewide. Following the April 2019 public workshop, where staff identified and proposed further evaluation for 47 product categories (each of which were responsible for greater than one-half ton per day or more of VOC emissions), staff conducted 12 topic specific work group meetings and two additional workshops to continue discussion with interested stakeholders regarding potential emission reduction strategies. At the second public workshop, staff made initial proposals for VOC standards from seven product categories refined during these first 12 public work group meetings. These work group meetings and workshops also evaluated the potential for updates to some category definitions as well as exemptions and provisions in order to improve program implementation.

The consumer products regulatory proposals were scheduled for Board consideration in early 2021.

Architectural Coatings

Architectural coatings are products, such as house paints stains, industrial maintenance coatings, and traffic coatings, which are applied to stationary structures and their accessories. VOCs are emitted from the coatings and from solvents that are used for thinning and clean-up. Control of VOC emissions from architectural coatings is primarily the responsibility of the air districts, with CARB serving as an oversight agency and providing assistance to the air districts, such as conducting surveys of architectural coating product sales and formulations to estimate emissions and air quality impacts from this source category; and developing architectural coatings suggested control measures (SCM), which serve as model rules for the air districts and provide for consistent requirements across district lines. CARB provided regulatory and policy guidance to air districts through the development and implementation of SCMs for Architectural Coatings in 1977, 1985, 1989, 2000, 2007, 2019, and 2020.

During fiscal year 2019-2020, CARB staff updated the SCM for Architectural Coatings in May 2020 to reflect current coatings technology. The 2020 SCM added a new coating category for Photovoltaic Coatings with a 600 grams per liter (g/l) VOC limit. Photovoltaic Coatings are coatings labeled and formulated for application to solar photovoltaic modules and are applied as a single layer to solar photovoltaic modules already installed. CARB staff also established a sunset date for Photovoltaic Coatings of January 1, 2028 along with provisions that include notification and reporting requirements to aid implementing Photovoltaic Coating requirements. To minimize emission increases from Photovoltaic Coatings, the 2020 SCM set a volume limit in gallons per day to prevent emissions from the application of Photovoltaic Coatings exceeding the California Environmental Quality Act thresholds for each air district. The 2020 SCM sets up a framework for nine air districts that

have been identified as having solar installations with uncoated modules to revise their rules with provisions that would allow the application of Photovoltaic Coatings on uncoated modules at solar facilities in California. If all identified uncoated modules in California are coated, the 2020 SCM will help California gain 113 megawatts of electricity capacity and avoid potential power plant emissions from more efficient electricity production. For more information on the Architectural Coatings, visit: <https://ww2.arb.ca.gov/our-work/programs/coatings/architectural-coatings/suggested-control-measure>.

Research

CARB conducts research to improve understanding of the causes and effects of air pollution, enabling staff to identify emerging air quality challenges and develop cost-effective, science-based strategies for reducing air pollution and protecting public health. This research supports intelligent and efficient implementation of CARB's stationary source, consumer products and architectural coatings programs by identifying potential health and atmospheric impacts of common air pollutants. In addition, CARB research evaluating the interaction between criteria pollutants, greenhouse gases, and air toxics enables CARB to maximize co-benefits of regulations that target a diversity of pollutants.

Below are some examples of VOC-related research projects conducted or funded by CARB in fiscal year 2019-2020:

- CARB staff conducted an in-house study to measure formaldehyde concentrations in 97 occupied mobile (a.k.a. manufactured) homes in California. This study started in August 2014, and was concluded in the fall of 2018. The study results show that while formaldehyde levels in California mobile homes are much lower than they were several decades ago, levels are still higher than in other indoor environments and largely exceed California health-based guideline levels. A manuscript has been drafted and is currently undergoing review and editing for a future submission to the journal "Indoor Air" for publication.
- CARB conducted the California Baseline Ozone Transport Study (CABOTS) field measurement campaign between May and August 2016 to better understand the spatial and temporal variations in baseline ozone entering California and its effect on surface air quality. The data will also help to refine our understanding of the contribution of global background ozone relative to California emissions on air quality in downwind states. More information on CABOTS can be found at CARB website at <https://ww2.arb.ca.gov/news/carb-noaa-nasa-and-san-jose-state-university-scientists-team-study-ozone-transported-across/printable/print>. The last related contract ended in spring 2020.
- CARB staff is currently conducting an in-house study to estimate operators' exposures to air pollutants and noise from lawn and garden equipment and possible associated health risks, which began spring 2018. As part of the study, operator's exposures to VOC emissions are being measured for a small set of devices including chainsaws, leaf blowers, string trimmers, and push mowers. For each device tested, the operators wear a backpack with a 6-L canister to collect a 45-minute air sample at their breathing

zone while they are performing typical gardening activities. Concurrently, another canister is used to collect the air at a background site. VOC speciation and concentrations are determined at CARB's chemical analysis laboratory. Cancer and non-cancer risks are estimated for five substances (benzene, toluene, ethylbenzene, xylene, and 1,3-butadiene) using CARB's HARP2 Risk Assessment Standalone Tool. Preliminary results indicate that chainsaws produced the highest risks of the devices tested. This study is being expanded to include additional testing of gasoline and electric devices in 2022 with the results to be summarized later in the year or in 2023.

- CARB initiated a research project with FluxSense Inc. entitled "Characterization of Air Toxics and Greenhouse Gas Emission Sources and Their Impacts on Community-Scale Air Quality Levels in Disadvantaged Communities" in June 2018. The project utilizes state-of-the-art research grade mobile monitoring laboratory equipped with advanced monitoring instruments to characterize and quantify VOCs and benzene, toluene, ethylbenzene, and xylenes (BTEX) emission behavior from complex air pollution sources as well as their impact on community-level air quality. The project conducted four comprehensive field campaigns in four regions in California, including Bay Area (October 2018), San Joaquin Valley (October 2018), South Coast Air Basin (October 2019), and San Diego Air Basin (October 2019). The project measured emissions from various sources including refineries, petrochemical facilities, oil storage, port activities, landfills, oil and gas production and dairy farms, as well as the concentration level of air toxics in the nearby communities. The draft final report of the project is expected in March 2021. More information regarding this project can be found at https://ww3.arb.ca.gov/research/single-project.php?row_id=67028.
- CARB staff is utilizing satellite remote sensing capabilities to evaluate the ozone formation regimes in regions across California. This ongoing study started in early 2018, and is utilizing formaldehyde and nitrogen dioxide derivatives from two satellites to understand the spatiotemporal changes in the ozone regimes over the past decade. The effort is expected to develop an improved understanding of VOC and NO_x source impacts and the long-term effectiveness of various emission control strategies throughout all of California. First set of results were presented at American Geophysical Union Conference in late 2019. This project is expected to be completed by end of 2021.
- CARB initiated a research contract titled "Environmental Chamber Experiments to Improve Secondary Organic Aerosol Model Prediction" with University of California (UC), Riverside, California Institute of Technology, and UC Davis in fall 2018 to investigate a variety of VOCs in the atmosphere that contribute to the formation of ozone and secondary organic aerosol (SOA). SOA is a major contributor to PM of 2.5 microns diameter or less (PM_{2.5}). The primary effort of this research project is to optimize SOA chamber experiments that can be used to evaluate and improve SOA formation mechanisms in regulatory or scientific modeling applications. The research project will also characterize SOA precursors that are emitted from a variety of VOC sources, such as consumer products, and the chemicals to be tested will be selected based on their chemical composition and potential importance to both ozone and SOA formation. The resulting environmental chamber datasets will be used to evaluate

the predictive capabilities of the SOA formation mechanisms using selected SOA models. The results from this project will aid in the improvement of regulatory air quality models used to develop the State Implementation Plan, and enhance CARB's ability to develop regulatory strategies that reduce ambient ozone and PM_{2.5}. The project was kicked off in April 2019 and will last for three years.

- CARB staff has operated a formaldehyde analyzer at Fresno, CA since 2019 to study its diurnal, seasonal, and annual variabilities. The long-term monitoring of formaldehyde in our atmosphere will improve our understanding of the ozone sensitivities to ambient VOC and NO_x, thus informing the 2022 ozone SIP development process. In addition, the ground-level formaldehyde data will be used to evaluate the performance of TROPOspheric Monitory Instrument satellite formaldehyde product to improve its inference on tropospheric chemistry relevant for ambient air pollution management. The project began in 2019 and will continue into 2022, with evolving objectives of the general project, which includes evaluation of ozone climate penalties.
- CARB staff initiated a collaboration with the National Oceanic and Atmospheric Administration (NOAA), the South Coast Air Quality Management District, and the Coordinated Research Council's Atmospheric Impacts Committee to established multiple research contracts (#19RD012 - UCD, #20RD002 - NOAA, #20RD003 - UCB) that would concentrate advanced instrumentations to Pasadena and Redlands, CA in 2021. This ensemble project was initially named CalNexT following the successful CalNex campaign in 2010. This project was later re-named "Re-Evaluating the Chemistry of Air Pollution (RECAP) in California". This study will address questions related to the current role of anthropogenic and biogenic VOCs on urban air quality and will identify opportunities to support ozone reduction. The information from RECAP will inform the SIP, which describes how the State will attain and maintain NAAQS required under the federal Clean Air Act (CAA). The project planning started in 2018, and it will take place in the summer 2021, with contracts ending in 2022. Research partnership is expected to continue beyond 2022.

These and other projects funded in fiscal year 2019-2020 provide CARB with the technical foundation to identify potential air pollutant health risks and develop and implement cost-effective strategies to meet State and federal ambient air quality standards.

Air Quality Monitoring

In fiscal year 2019-2020, CARB's air monitoring field operations and laboratory continued to play key roles in measuring progress towards attainment of criteria pollutant air quality standards and assessing and addressing potential community health risk. Field operations include real-time ambient air quality measurements of gaseous pollutants and PM. Analytical services provided by the laboratory support PM mass analysis, PM chemical speciation, toxic air contaminant and greenhouse gas analyses, community air protection monitoring, and the

Study of Neighborhood Air near Petroleum Sources program, as well as special studies and air district requests.

California's Air Monitoring Network. Accurately measuring air quality is the foundation of California's efforts to reduce air pollution. For more than 50 years, California has maintained one of the most extensive air monitoring networks in the world, collecting data on a wide range of pollutants. The information gathered from this network makes it possible to track progress in cleaning the air and identify the most effective actions needed to meet health-based air quality standards. California's air monitoring program is a partnership between government agencies at the federal, state, and local level, along with universities and more recently with engaged community members and industry representatives.

California's air monitoring network is designed to meet a range of regulatory requirements, such as compliance with the federal Clean Air Act. The data provided by the air monitoring networks help address research and public health priorities and determine attainment status of State and Federal ambient air quality standards. The majority of California's air monitoring resources, reflected in the current statewide network of approximately 250 monitoring stations, have been dedicated to measuring ambient concentrations of criteria pollutants. In fiscal year 2019-2020, CARB staff engaged with air district staff to develop the 2020 Annual Monitoring Network Plan, which provides detailed information on California's regulatory monitoring network. The annual network plan also addresses changes that occurred to the regulatory monitoring network during the previous year and the changes that are expected to occur during the next year to 18 months. A public workshop was held June 15, 2020 to provide federal requirements and an overview of the CARB 2020 Annual Monitoring Network Plan.

In addition to continuous field measurements, twenty-four-hour daily samples are collected throughout the State's air quality monitoring network. Most air quality data generated by field and laboratory operations are submitted to U.S. EPA's Air Quality System database for public record. Combined, the field operation and laboratory annually generate over two million hourly measurements and 130,000 daily sample results, respectively, from 250 air monitoring stations located throughout California and Northern Mexico.

CARB's Aerometric Data Analysis and Management System (ADAM) and Air Quality and Meteorological Information System (AQMIS). ADAM and AQMIS provide air quality and meteorological data and statistics to the public via the Internet. The criteria pollutant and toxics information available through the iADAM website (<https://www.arb.ca.gov/adam>) consists of official air quality data, trends, and regulatory statistics for the entire State. ADAM also supports federal and State air quality designations and planning and is the foundation from which intelligent air quality strategies are developed. Upon request, CARB also provides extensive data and monitoring site information for download through various zip files.

AQMIS is a web-based data source (<https://www.arb.ca.gov/aqmis2/aqmis2.php>) which provides a hybrid of official and preliminary real-time data. AQMIS incorporates automated quality assurance and quality control routines to assess air quality and meteorological data in real-time to limit the display and use of potentially erroneous data. As official ADAM data

become available, they replace the preliminary data in AQMIS. AQMIS provides a range of statistics for the various pollutants available, and the air quality and meteorological data can be downloaded on-demand. AQMIS is also used for air pollution forecasting and evaluating the year-to-date status of air quality within several key geographical regions of California for planning purposes. In addition, near real-time monitoring data for ozone and PM_{2.5} are publicly available on Breathewell, CARB's web site for mobile devices: <http://mobile.arb.ca.gov/breathewell/>.

CARB's Incident Air Monitoring Section. CARB's data collection efforts also support air quality emergency response for events such as wildfires and industrial (including refinery) releases, which is a major source of VOC emissions. The Incident Air Monitoring Section also provides a wide selection of specialized equipment for use in emergency events. This equipment includes PM monitors, as well as gas analyzers, meteorological sensors, and plume modeling software. These are all utilized to aid both first responders and the surrounding community in the event of an air emergency.

Emissions Inventories

CARB compiles, maintains, and improves detailed and comprehensive inventories of air pollution sources and their emissions. This includes collecting and assuring the quality of emissions information, training CARB and air district staff on accessing the inventory, processing inventory requests, and developing improved inventory systems. CARB staff addresses data gaps in understanding air pollution, collects information, develops emission estimation methodologies, conducts pollutant emissions studies, develops research concepts, and coordinates with stakeholders on emission inventory methods and estimates and supports community-level health assessments. CARB staff also investigates appropriate surrogates and growth factors to forecast future emissions and evaluates emission trends. These inventories of criteria pollutants and their precursors provide the technical foundation for air quality modeling of future year emissions needed to demonstrate attainment of health-based air quality standards and form the basis for air quality planning and regulatory development processes. In fiscal year 2019-2020 CARB completed the emission inventory tasks identified below.

Annual Updates. CARB staff processes stationary source updates from air districts for approximately 30,000 individual facilities. This includes all criteria and toxic emissions data for the 2019 calendar year as well as any updates to stationary source data for previous years as requested by the air district. Staff load the data into the emission inventory system and perform quality assurance checks on the new data.

U.S. EPA National Emission Inventory (NEI) submittal. CARB staff submit criteria emissions to U.S. EPA annually. The NEI is on a three-year cycle. Every three years, staff must submit all stationary and area source criteria emission information to U.S. EPA. For the two years between these major submittals, CARB is required to submit such information only for major stationary sources. In fiscal year 2019-2020, staff submitted all stationary sources, area sources, and mobile sources to U.S. EPA and continued to work with U.S. EPA on quality assurance checks.

Forecasting. CARB staff, along with air districts and other stakeholders, refined the SIP base and future year emission estimates based upon the latest technical information. This included updating the air district rule-specific control profiles, evaluating and updating the growth factors to reflect the latest socioeconomic forecasts associated with specific source categories, and other emissions inventory improvements. In fiscal year 2019-2020, CARB staff developed emission inventory forecasts to support attainment planning efforts for ozone and PM.

Identifying, Assessing, and Mitigating the Transport of Air Pollutants

Understanding the nature and impact of air pollution transported within California (typically from coastal to inland regions) informs a broad spectrum of CARB activities, including updates to air district attainment designations, and development of attainment plans, control strategies, and mitigation requirements. The ability to address transport impacts has improved significantly in the last few years due to the use of new highly sophisticated photochemical models, new data analysis techniques, and state of the art air quality studies conducted by the National Aeronautics and Space Administration and other researchers. CARB now uses these photochemical models combined with the latest air quality studies to develop comprehensive federal air quality plans, which consider the role of transport in determining necessary emission controls.

Comprehensive photochemical modeling work conducted in fiscal year 2019-2020 has further refined the understanding of transport and underlies SIP attainment demonstrations for the federal ozone standard. A related CARB study helped to characterize the impacts of conditions aloft on surface air quality, further improving CARB's modeling of ozone concentrations in the San Joaquin Valley and expanding the technical ability to identify regional and international transport impacts from aloft conditions. As a part of the comprehensive SIPs for the federal ozone standard, CARB staff conducted an in-depth evaluation of transport impacts of ozone and ozone precursors.

CARB is responsible for assessing the relative transport contribution of ozone and ozone precursors between air districts and for establishing mitigation requirements. VOCs, which react with oxygen molecules, such as NO_x, to form ground-level ozone, are one of these ozone precursors. CARB first adopted transport mitigation requirements for air districts in 1990 based on an analysis of transport relationships between air districts. These relationships have subsequently been updated several times. CARB regulations identify transport couples consisting of an upwind area (source of transported emissions), the corresponding downwind area (receptor of transported emissions), and the required mitigation requirements. Identified upwind air districts have been implementing mitigation requirements, identified in their State triennial ozone plan update submittals to CARB, for over two decades.

The federal CAA contains provisions to protect downwind states from pollution that may originate in upwind states. These provisions are known as the "good neighbor" or "interstate transport" provisions. During fiscal year 2019-2020, as part of the California Infrastructure SIP development, staff carried out analysis on interstate transport of air pollutants based on modeling and ambient air quality and meteorological data analysis. States identified by U.S.

EPA national air quality models to potentially be impacted by the transport of California ozone and ozone precursors were evaluated. CARB demonstrated that California has sufficient pollution control programs in place to limit interstate transport and that high ozone days driving the 8-hour average ozone design values in other states were the result of local emissions, terrain, and wind flow patterns within those states and not linked to transport from California.

The CAA also includes a provision under section 179B that allows consideration of the impacts of transport of pollutants across international borders. Section 179B waives certain planning requirements if an area shows that it would attain the standard but for emissions emanating from outside of the United States. The Imperial County Air Pollution Control District (APCD) prepared an ozone plan in September 2017 to fulfill the requirements of this subsection by demonstrating that emissions in Imperial County are at a level sufficient to attain the 75 ppb 8-hour ozone standard absent the impact of emissions from Mexico.

Despite air quality progress in the region due to wide ranging control programs that have reduced ozone forming emissions, Imperial County did not meet the July 20, 2018 attainment deadline. Although the monitors in the more northern cities in Imperial County consistently record values well below the standard, the monitors located near the international border of Mexico remain above the standard. Once the attainment date passed and monitors recorded values above the standard, the CAA waives the requirement of reclassification to the next higher classification if an area shows it would have attained the standard but for emissions emanating from outside of the United States.

To make this demonstration in 2018, CARB staff prepared the *Imperial County Clean Air Act Section 179B(b) Retrospective Analysis for the 75 ppb Ozone Standard* and assessed the impact of Mexico emissions to provide the needed for U.S. EPA to waive the requirement to reclassify Imperial County to Serious. This effort included an analysis of wind data on all days that exceeded the ozone standard for a three-year period prior to the attainment date.

State Implementation Plans

8-hour Ozone SIPs. Ozone forms in the atmosphere through complex reactions between VOCs and NOx directly emitted from vehicles, industrial/stationary sources, consumer products and many other sources. For the federal ozone standards, CARB must work with local air districts to develop SIPs to identify control measures and demonstrate attainment by the required deadlines, as well as meet other requirements. Ozone SIPs must describe the control measures being pursued by CARB to reduce VOC and NOx emissions from mobile and non-mobile sources under our authority, and also include measures from the Districts where applicable to reduce emissions from the stationary and area sources under their jurisdictions.

CARB staff collaborated with air districts and worked to finalize development of SIP elements needed for plans to demonstrate attainment of the 75 ppb 8-hour ozone standard adopted by U.S. EPA in 2008. During fiscal year 2019-2020, staff also submitted district rules adopted as part of implementation of SIPs for many areas, and collaborated with U.S. EPA, Region 9 staff to minimize the U.S. EPA backlog of SIPs.

Further, staff began regular, collaborative work with all nonattainment area districts on the next round of SIPs required to meet the requirements of the 70 ppb 8-hour ozone standard adopted by U.S. EPA in 2015. Staff supported the air districts in development of their Reasonably Available Control Technology SIPs, and worked closely with the San Diego County Air Pollution Control District on development of an attainment SIP for two standards, the 75 ppb and the 70 ppb 8-hour ozone standards. Staff developed and refined emission inventories that were adopted by the Board in June 2020 and which, along with air quality monitoring and air quality modeling, provide the technical foundation for the new SIP attainment demonstrations due to U.S. EPA in 2022.

PM2.5 and PM10 SIPs. CARB staff developed and refined emission inventories that, along with air quality monitoring and air quality modeling, provided the technical foundation for the SIP attainment and maintenance demonstrations for the federal PM standards. The most common primary constituents of PM include sulfate, nitrate, ammonium, elemental carbon and organic mass. Secondary PM particles are formed from chemical reactions between PM precursors, including VOCs. For the federal PM standards, CARB must work with local air districts to develop SIPs to identify control measures and demonstrate attainment by the required deadlines, as well as meet other requirements. PM SIPs must describe the control measures being pursued by CARB to reduce PM and precursor emissions from mobile and non-mobile sources under our authority, and also include measures from the Districts where applicable to reduce emissions from the stationary and area sources under their jurisdictions.

During fiscal year 2019-2020, staff worked with the districts and stakeholders to implement a comprehensive PM2.5 SIP for the San Joaquin Valley APCD addressing four PM2.5 standards. Staff also worked with the Imperial County APCD on developing a PM10 maintenance plan and re-designation request for Imperial County, which was approved by U.S. EPA effective October 2020. CARB also worked with staff of the Eastern Kern APCD in developing their second PM10 maintenance plan for the Indian Wells Valley planning area.

Infrastructure SIP. Each time the U.S. EPA adopts a new or revises an existing standard, the federal CAA requires states to develop and submit an Infrastructure SIP. An Infrastructure SIP describes the authorities, resources, and programs a state has in place to implement, maintain, and enforce the federal standards, including California SIP-approved emission control measures for VOCs from vehicular, nonvehicular sources, consumer products, and architectural coatings. These revisions build on previous Infrastructure SIP submittals. When U.S. EPA approves an Infrastructure SIP revision⁴, it becomes part of the overall statewide SIP. During fiscal year 2018-2019, CARB staff completed the California Infrastructure SIP Revision, in response to the revised federal ozone standard. The Infrastructure SIP revision also provides in-depth analysis addressing interstate transport, also called the Good Neighbor SIP. The focus of the Good Neighbor SIP is to demonstrate that the State has adequate provisions prohibiting any emissions source or other type of emissions activity from

⁴ 2018 California Infrastructure SIP Revision

emitting any air pollution in amounts which will contribute significantly to nonattainment in, or interfere with maintenance by, any other state with respect to any national primary or secondary ambient air quality standard. During fiscal year 2019-2020, CARB worked with multiple air districts in the State to prepare and submit the ozone emergency episode plans that are necessary to meet the requirements of the Infrastructure SIP provision for the CAA.

Identifying Indicators to Assess Air Quality Progress

In fiscal year 2019-2020, ADAM continued to be reprogrammed for enhanced usability and to provide access to an expanded range of air quality indicators. The major revisions to ADAM entailed a system re-design and database platform migration to increase flexibility and gain significant operational cost savings. The ADAM air quality data can be viewed at <https://www.arb.ca.gov/adam/>. The AQMIS real-time air quality database is also available online at <https://www.arb.ca.gov/aqmis2/aqmis2.php>, allowing the public, air districts, and any other users to continually track and assess air quality progress. Additionally, AQMIS uses special quality control procedures to review the preliminary data during wildfire and high-wind dust events. AQMIS continues to display the 1997, 2008, and 2015 federal 8-hour ozone standard exceedance days for easy comparison, as well as a year-to-date design value for certain geographic regions for evaluating the current attainment status. CARB staff has also continued to develop a new community air quality data portal – Community Air Quality Viewer (AQ-VIEW) as part of the Community Air Protection Program (<https://aqview.arb.ca.gov/>).

State law directs CARB to develop air quality indicators that can be used to measure progress towards the attainment of State ozone air quality standards (Health and Safety Code Section 39607). CARB develops indicators for assessing peak ozone concentration and exposure. These indicators are used for assessing progress in State triennial ozone plans proposed by air districts. Because 8-hour ozone concentrations drive the State attainment status, CARB developed a calculation procedure and continues to provide 8-hour ozone, population-weighted and area-weighted exposure indicators for State triennial ozone plan updates.

Enforcement

Nonvehicular Sources. CARB's stationary source enforcement team provides compliance training to regulated entities, assists local air districts with inspections of stationary sources, investigates complaints, issues notices of violations, evaluates district variances for compliance with statutory requirements, obtains and analyzes evidence to determine the date of onset, cause, and extent of violation of air pollution regulations, and reviews air district rules for enforceability. In fiscal year 2019-2020, CARB stationary source enforcement personnel:

- provided enforcement assistance to air districts and other local and regional environmental agencies;
- responded to air pollution complaints at stationary facilities;

- conducted investigations, and referred them to other agencies when appropriate;
- reviewed all air district hearing board orders for compliance with Health and Safety Code requirements;
- gathered and analyzed data from emission monitoring devices required by air districts at stationary sources;
- reviewed air district rules for enforceability, compliance with State laws, clarity, and accuracy; and
- developed a variety of practical, rule-specific publications that describe source processes and emission control equipment, clarify rule requirements, identify compliance issues, and promote self-regulation.

Consumer Products. CARB consumer product program investigators purchase samples of regulated consumer products from outlets all over California. They inspect product containers for compliance with registration and dating requirements and send selected products to the laboratory for testing. CARB laboratory staff conducts laboratory analyses of products selected and submitted by CARB's enforcement team to determine compliance with the applicable VOC and aromatic compound limits, and chlorinated solvent prohibitions.

During fiscal year 2019-2020, CARB enforcement staff collected over 250 samples of household and institutional consumer products to be analyzed by Special Analysis Section laboratory staff. Sample selections focused on personal fragrances, hair care products, general purpose cleaners, and air fresheners. The laboratory results for approximately 26 samples indicated that the products may have exceeded the VOC limits.

As a result of continuing investigations, CARB issued 32 notices of violation during the fiscal year. After conducting office conferences, CARB staff worked to resolve the enforcement cases through administrative or civil actions. During the fiscal year, staff settled 33 cases involving a variety of products including general purpose cleaners and hair styling products. The \$1,503,575 in penalties collected helped to mitigate nearly 70 tons of excess VOC emissions and over 1 ton of gases with high global warming potential resulting from these violations. Some significant settlements involved substantial sales of noncompliant hairspray, automotive windshield wiper fluid, and aerosol coatings. CARB attorneys provided assistance to the Enforcement Division staff as needed. The annual enforcement report can be found at: <https://ww2.arb.ca.gov/resources/documents/enforcement-reports>.

Special Analysis Section laboratory staff conducted several workshops and individual meetings per an extensive revision to Laboratory Method 310 - Determination of Volatile Organic Compounds in Consumer Products and Reactive Organic Compounds in Aerosol Coating Products (Method 310) with interested stakeholders. The Method 310 amendments were scheduled for Board consideration in early 2021, along with proposed regulatory amendments. In addition, the laboratory also drafted and implemented the new Standard Operating Procedures (SOPs):

- SAS13 - Standard Operating Procedure for Consumer Product Sample Batch Management and Reporting

- SAS14 - Standard Operating Procedure for Consumer Product Sample Preparation

Finally, laboratory staff also continued work on the evaluation of test method applicability for analysis of several new and proposed types and categories of consumer products. These and other ongoing studies help ensure the most up-to-date science and analytical processes are used to evaluate continuously evolving consumer product formulations and maximize consumer product regulatory compliance.