Vosburg, Alia

From:	Courtney Taylor <me@courtneyetaylor.com>
Sent:	Friday, September 24, 2021 10:35 AM
To:	Vosburg, Alia
Cc:	ArlinGenetA@sbcapcd.org; HarrisD@sbcacpd.org; Kevin Poloncarz; Marshall Miller
Subject:	Supplemental Comments RE: Air Quality / Canna Rios LLC Cannabis Project (21APL-00000-00027)
Attachments:	Thornhill - Memo RE Inadequacy of Environmental Review - Final.pdf

Alia:

On behalf of my clients, Bien Nacido Vineyards, et al, attached please find supplemental comments from my co-counsel, Kevin Poloncarz at Covington & Burling LLP, regarding the air quality impacts of the Canna Rios LLC cannabis project.

Given the proposed project's proximity to a portion of San Luis Obispo County that has been designated by the EPA as nonattainment for the 2015 National Ambient Air Quality Standard ("NAAQS") for ozone under the Clean Air Act, and the California Air Resources Board's ("CARB") recent downgrade of Santa Barbara County's designation for the state ozone standard from "attainment" to "nonattainment,", site specific review of air quality impacts of this project is clearly required under CEQA prior to project approval.

Let me know if you have any questions about this or would like to discuss.

Thank you,
Courtney

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COVINGTON & BURLING LLP

September 23, 2021

Memorandum

To: Marshall Miller and Courtney E. Taylor

From: Kevin Poloncarz

Re: The Need for Further Environmental Review of the Proposed Canna Rios Project

I. Background

Applicant Canna Rios, LLC applied for a land use permit (19LUP-00000-00116) for a cannabis cultivation operation in Santa Maria, California (APN 129-040-010) (the "Project"). The Project will be located in northwest Santa Barbara County, adjacent to the San Luis Obispo County border.

Application materials suggest that the Project will involve growing, harvesting, and on-site freezing and packaging of cannabis. The Project has been described, in relevant part, as:

> [A] request for approval of a Land Use Permit to allow approximately 46.73 acres of outdoor cannabis cultivation and approximately 1.45 acres of cannabis nursery. . . The operation will involve 2 harvests per year for a duration of approximately 3 weeks per harvest, not to exceed 4 weeks per harvest. Approximately 1/3 of harvested cannabis will be immediately flash frozen and approximately 2/3 of harvested cannabis will be immediately packaged in the field; all harvested cannabis will be transferred offsite for processing the same day it is harvested.

Conditions of Approval, Case No. 19LUP-00000-00116, ¶1.

The County Planning Commission has explained that the Project is within the scope of the county's previously certified Programmatic Environmental Impact Report ("PEIR") pursuant to the California Environmental Quality Act ("CEQA"). *See* May 7, 2021 letter RE: Appeal of Canna Rios, LLC Cannabis Cultivation Land Use Permit; 21APL-00000-00007, 21APL-00000-0008, Attachment A: Findings, §1.1. The Commission found "the Project will not create any new significant effects or a substantial increase in the severity of previously identified significant effects on the environment, and there is no new information of substantial importance under State CEQA Guidelines Section 15162 warranting the preparation of a new environmental document for the Project." *Id.*

Appellants Bien Nacido Vineyards *et al.* respectfully disagree with this conclusion.

II. Additional Environmental Review is Necessary Under CEQA

Both the paucity of analysis in the PEIR relating to the Project's specific, foreseeable environmental impacts, and several changed circumstances since the PEIR's certification demand further environmental review under CEQA.

As a threshold matter, the drafters of the PEIR explicitly noted the PEIR's inherent inability to address site-specific impacts of future cannabis activities such as the Project. The PEIR provides, in relevant part: "[a]s a Program EIR, the level of detail included in the project description and methodology for impact analysis is relatively more general than a project-level EIR, as individual cannabis activity site-level details are not available for prospective license applications or would be considered too speculative for evaluation." PEIR at ES-1. Elsewhere, the PEIR explains that CEQA requires further environmental review for any of these site-specific effects that were not addressed in the PEIR: "In accordance with the State CEQA Guidelines Section 15168(c), if subsequent cannabis site development would have effects that were not examined in the EIR, further CEQA review would be required to determine site-specific impacts, determined on a case-by-case basis, and in accordance with the use permit or development plan process applicable to the subject site." PEIR at 1-5.

Here, consistent with the PEIR's summary of the CEQA process, further environmental review is necessary and the failure to conduct such analysis in association with the Project is inconsistent with CEQA and unlawful. While the county completed a "checklist" concerning the Project pursuant to Section 15168 of the CEQA Guidelines, that checklist fails to examine the Project's foreseeable environmental impacts, specifically its potential to contribute to significant air quality and climate change impacts. Instead, the checklist refers back to the PEIR as an adequate examination into the Project's potential impacts. This conclusion overlooks gaps in the PEIR itself, as well as new information and changed circumstances since the PEIR was certified.

Section 15168 of the CEQA Guidelines describes programmatic EIRs. It provides that a PEIR is only an acceptable stand-in for a project-specific EIR to the extent it addresses future impacts both specifically and comprehensively. *See* Cal. Code Regs. tit. 14, § 15168(c)(5). It further explains that, even when an agency has published a PEIR, the agency must consider whether projects or activities are adequately addressed by that PEIR, and, if they are not, then further project-specific environmental analysis is required. "If a later activity would have effects that were not examined in the program EIR, a new initial study would need to be prepared leading to either an EIR or a negative declaration." *Id.* at § 15168(c)(1).

Section 15168 also contains a cross-reference to Section 15162, which explains when additional environmental review is necessary. Under Section 15162 an agency is required to undertake additional environmental review when "[s]ubstantial changes occur with respect to the circumstances under which the project is undertaken which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;" or "[n]ew information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete" comes to light. In this instance, the Project involves both substantially changed circumstances and new information of substantial importance, both of which require supplemental environmental review. *Id.* at §§ 15162(a)(2)–(3). Further environmental review is therefore necessary to specifically address two potential types of emissions impacts that are not considered by the PEIR.

First, the PEIR fails to consider the impact that biogenic volatile organic compounds ("VOCs") emitted from commercial cultivation of cannabis plants have on nonattainment with state and federal standards for ground-level ozone. While scientific studies indicate that biogenic VOCs from cannabis may also contribute to particulate matter and toxic air pollution, ozone is a pollutant of increasing local concern: Since certification of the PEIR, the portion of San Luis Obispo County lying *literally at the northern boundary of the Project site* has been designated by the U.S. Environmental Protection Agency ("EPA") as nonattainment for the 2015 National Ambient Air Quality Standard ("NAAQS") for ozone under the Clean Air Act; and the California Air Resources Board ("CARB") recently downgraded Santa Barbara County's designation for the state ozone standard from "attainment" to "nonattainment."

New studies published since the time the PEIR was certified indicate that biogenic VOC emissions from commercial cannabis cultivation can contribute to ozone and other air pollution. Yet the PEIR's discussion of the impact that commercial cannabis operation might have on attainment of state and federal air quality standards focuses solely on emissions of VOCs and other pollutants *from combustion of fuels in mobile sources and agricultural equipment*; it fails to give any consideration to the role that biogenic VOCs from cannabis cultivation may have on ozone pollution levels in either Santa Barbara County or San Luis Obispo County. The Project-specific checklist also fails to include any such discussion.

While the PEIR and Project checklist assessed odor impacts attributable to commercial cannabis cultivation, they completely ignored the more significant public health impacts associated with how biogenic VOC emissions from commercial cannabis cultivation throughout the County and from this Project will contribute to ongoing violations of state and federal air quality standards and generate significant toxic air pollution. Moreover, neither document gave any consideration to the impacts that emissions from commercial cannabis cultivation have in San Luis Obispo County, which is literally at the Project's property line and has since been designated nonattainment for the more stringent 2015 ozone NAAQS.

In short, new information of substantial importance that was not available at the time of the PEIR's certification has become available that shows that the Project's air quality impacts will be significantly greater and more severe than considered by the PEIR. This includes: (i) new scientific studies indicating that biogenic VOCs from cannabis cultivation contribute to ozone pollution; (ii) the fact that the adjacent County, which is located literally at the property line, has since been designated as nonattainment for the more stringent federal ozone standard; and (iii) the fact that Santa Barbara County has since been downgraded back to nonattainment with the state ozone standard. Unless and until the County conducts additional review to consider how the Project's emissions of biogenic VOCs will contribute to violation of state and federal ozone standards in Santa Barbara County and the federal nonattainment area immediately adjacent to the Project site, the requirements of CEQA have not been met and the Project's approval is unlawful.

Second, the PEIR fails to adequately consider hydrofluorocarbon ("HFC") emissions associated with the Project's freezing operations. Other than defining what HFCs are and how they contribute to climate change, the PEIR fails to acknowledge that commercial cannabis cultivation could result in HFC emissions or to consider how HFCs from refrigeration and freezing operations associated with such cultivation contribute to global warming. The Project-specific checklist fails to provide any additional analysis beyond the PEIR, despite the fact that this Project will involve some type of freezer, albeit undefined or conditioned, and refrigerants are the leading source of HFC emissions.

Globally, HFCs are the fastest growing source of greenhouse gas ("GHG") emissions that contribute to climate change, with a global warming potential, on a pound for pound basis, thousands of times greater than carbon dioxide (CO_2). Accordingly, scientists, lawmakers, and government agencies have increasingly turned their focus to aggressively reducing HFC emissions. Because the PEIR failed to consider impacts associated with use of HFCs in refrigeration and in light of the increasing state and federal emphasis on reducing HFCs due to the available of new low global warming-potential substitutes, the County should have performed additional environmental review of the Project to assess the impacts associated with use of refrigerants in its freezing operations.

A. The Project's Contribution to Nonattainment with State and Federal Ozone Standards Has Not Been Assessed

1. Cannabis cultivation emits considerable quantities of biogenic ozone-precursor VOCs, which are now understood to impact ozone pollution

The Clean Air Act requires the EPA to set National Ambient Air Quality Standards ("NAAQS") for six key "criteria" pollutants.[1] These standards provide maximum acceptable levels for each of the pollutants. When a region's air quality fails to achieve the standards, that area is designated by EPA as a "nonattainment" area.[2] Likewise, in California, CARB has issued its own standards for criteria pollutants and designates areas as either attaining or not attaining CARB's standards, which often provide for different acceptable levels of pollution than the federal NAAQS.[3] Nonattainment areas must work toward attainment with either the federal or state ambient air quality standards (or both), and new or modified pollution sources within such areas are subject to greater scrutiny because of the need to minimize or completely offset further contributions to nonattainment.

Ozone is one of the federal criteria pollutants and is thus subject to a NAAQS.[4] Yet, unlike some other criteria pollutants, ozone is not emitted directly into the air, instead, it is produced when various precursor pollutants—VOCs and oxides of nitrogen ("NOx")—combine in the atmosphere

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[1] *See* 42 U.S.C.A. §§7408–7409.

[2] *See* US EPA. Air Quality Designations for Ozone. https://www.epa.gov/ozone-designations (last accessed Sept. 17, 2021).

[3] *See* California Air Resources Board. Air Quality Designations for Ozone. https://ww2.arb.ca.gov/resources/fact-sheets/air-quality-standards-ozone (last accessed Sept. 17, 2021).

[4] US EPA. Criteria Air Pollutants. https://www.epa.gov/criteria-air-pollutants (last accessed Sept. 17, 2021).

in the presence of sunlight. Consequently, these precursor pollutants are regulated and must be considered in any plan to monitor and mitigate ozone nonattainment.[5]

The cannabis industry is a significant source of VOCs. While many plants emit VOCs, cannabis plants are now known to emit enough VOCs to "negatively affect regional air quality."[6] Different strains of cannabis emit different levels and types of VOCs, and the amount of emissions varies depending on differences in strain, maturity, and cultivation and processing methods. The impact that cannabis-produced VOCs have on ozone pollution also depends on regionally variable factors, like the amount of NOx present in the atmosphere. Jurisdictions that have been early adopters of legal cannabis cultivation have also been actively involved in ensuring that the industry does not exacerbate air quality problems. Denver, for example, recognizes that biogenic VOCs from cannabis plants "contribute to ground level ozone" and that it is "important that the cannabis industry mitigate VOC emissions."[7]

2. The PEIR's analysis of ozone pollution fails to consider the impacts from biogenic VOC emissions

As a threshold matter, the PEIR acknowledges the inherent limits to sufficiently analyzing emissions impacts at a programmatic level. The PEIR explains that "[g]iven the programmatic nature of the Project and the inability to effectively predict or anticipate the location and extent to which cannabis activities would operate, it is difficult to assess the impacts that the Project would result with regard to operational long-term emissions." PEIR at 3.3-20.

Moreover, while the PEIR generally recognizes that VOCs contribute to ozone formation, the PEIR's consideration of ozone and VOCs focuses only on combustion-related emissions—*not* biogenic VOC emissions from the cultivation and processing of cannabis itself. And although the PEIR mentions potential *odor* issues caused by terpenes (which are a category of biogenic VOCs), it does not assess the role these powerful compounds play in ozone formation. *See* PEIR at 3.3-7. Indeed, the PEIR describes reactive organic gases ("ROGs") and VOCs as both "emitted from the incomplete combustion of hydrocarbon or other carbon-based fuels," and describes other types of sources of VOCs, including industry, "petroleum fuels, solvents, dry cleaning solutions and paint;" it *nowhere* mentions that VOCs are emitted by the cannabis plants themselves. *See id.*

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[5] National Ambient Air Quality Standards for Ozone, 80 Fed. Reg. 65292 (September 17, 2021) https://www.govinfo.gov/content/pkg/FR-2015-10-26/pdf/2015-26594.pdf.

[6] V. Samburova et al. Dominant Volatile Organic Compounds (Vocs) Measured at Four Cannabis Growing Facilities: Pilot Study Results. 69 (11) J. Air Waste Mgmt. Assoc. 1267 (Nov. 2019). https://pubmed.ncbi.nlm.nih.gov/31498732/.

[7] Denver Public Health & Environment. Cannabis Environmental Best Management Practices Guide 2 (October 2019).
https://www.denvergov.org/content/dam/denvergov/Portals/771/documents/EQ/MJ%20Sustainability/6_Cannabis_BestPracticesManagementGuide_AirQuality.pdf#:~:text=Cannabis%20plants%20naturally%20emit%20terpenes%2C%20which%20are%20volatile,when%20ground-level%20ozone%20levels%20often%20exceed%20health%20standards.

Continuing, the PEIR only discusses how commercial cannabis cultivation might contribute to air pollution "through the use of heavy equipment, tilling operations, waste burning, operation of gasoline- or diesel-fuel equipment such as generators and well pumps, vehicle trips to and from a licensed cannabis site by employees and customers, and truck trips to and from a site by vendors and transporters." PEIR at 3.3-17. Elsewhere, the PEIR discusses how operations from cannabis activities could potentially violate an ambient air quality standard, contribute to an air quality violation or result in a cumulatively considerable net increase of a criteria pollutant for which the County is in nonattainment; but, again, it only discusses *combustion-related emissions* from mobile sources – cars and trucks transporting people and products to and from the sites. PEIR at 3.3-20. It says *nothing* about the potential contributions to air quality violations associated with biogenic VOCs from the cultivation of cannabis itself.

In short, the PEIR's assessment of the air quality impacts resulting from cannabis cultivation on violations of air quality standards focuses solely on emissions of pollutants associated with combustion of fuels in vehicles used to transport people and products from the site, or in equipment associated with cultivation activities, e.g., well pumps and tilling. Emissions of biogenic VOCs from cannabis cultivation and processing are only discussed as a potential source of odors. PEIR at 3.3-22-23. Nowhere does the PEIR attempt to quantify or assess how or whether biogenic VOCs from cannabis cultivation cause or contribute to nonattainment with ozone standards or result in exposure to hazardous air pollutants and toxic air contaminants.

Because the effects of such emissions were not examined in the PEIR, they should have been considered through completion of a new initial study and either an EIR or mitigated negative declaration in association with this specific Project. CEQA Guidelines § 15168(c)(1). The failure to do so prior to the County's approval of the Project amounts to a violation of CEQA.

3. The PEIR failed to consider significant impacts attributable to biogenic VOC emissions from cannabis cultivation

a) The County failed to give any consideration to the impacts that emissions attributable to cannabis cultivation will have on nonattainment with the federal ozone standard in San Luis Obispo County

The PEIR reports that Santa Barbara County was designated as attainment for the 2008 federal ozone NAAQS and that CARB was recommending that the County be designated attainment for the more stringent 2015 federal ozone NAAQS as well. PEIR at 3.3-5. It therefore assesses impacts from commercial cannabis operations on attainment of federal air quality standards only within Santa Barbara County, which it reports is attaining the federal ozone NAAQS. But it fails to give *any* consideration to how emissions from cannabis cultivation might impact nonattainment with the ozone NAAQS outside of Santa Barbara County. This is of considerable concern in this case because the Project's property line constitutes the southern boundary of the portion of San Luis Obispo County, which the EPA has since designated as nonattainment for the 2015 ozone NAAQS.[8]

Even had the PEIR endeavored to consider the impact that biogenic VOC emissions from cannabis cultivation might have on attainment of air quality standards outside of Santa Barbara County (which it did not), at the time of the PEIR's certification, EPA had not yet designated the Eastern part of San Luis Obispo County as nonattainment with the 2015 ozone NAAQS. That designation was not made until April 30, 2018, and published in the Federal Register until June 4, 2018.[9] Rather, at the time when the PEIR was certified, EPA had recently finalized a determination that the Eastern portion of San Luis Obispo County had *attained* the 2008 ozone NAAQS by the applicable attainment date based upon three-years of quality assured data showing compliance with the less stringent 2008 standard of 0.075 parts per million (ppm) NAAQS.[10]

Since certification of the PEIR, EPA has now designated the Eastern portion of San Luis Obispo County as nonattainment for the more stringent 2015 ozone NAAQS of 0.070 ppm. The underlying technical analysis was based both on recorded violations of the NAAQS occurring in San Luis Obispo County and also on EPA's consideration of the area's adjacency to Kern County,[11] which is part of the San Joaquin Valley extreme ozone nonattainment area and where some of the worst air quality in the United States is observed.

Notably, that technical analysis includes "back trajectories" illustrating the source of emissions impacting locations within the San Joaquin Valley that violate the federal ozone NAAQS. Those trajectories demonstrate that emissions occurring *in the immediate vicinity of the Project site* could, in fact, impact downwind locations as far away as the San Joaquin Valley.[12] They also illustrate a fact that should have been self-evident to the County prior to approval of the Project: Air pollution does not observe jurisdictional boundaries. Here, where the Project's property line is literally the boundary for the San Luis Obispo County federal ozone nonattainment area, any

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[8] EPA Greenbook. California 8-hour Ozone Nonattainment Areas (2015 Standard) Area Map. https://www3.epa.gov/airquality/greenbook/ca8_2015.html (last accessed Sept. 17, 2021).

[9] 83 Fed. Reg. 25,776, 25,790 (Jun. 4, 2018) (amending 40 C.F.R. § 81.305 to designate the Eastern part of San Luis Obispo County, including the are immediately adjacent to the north of the Project site nonattainment with the 2015 ozone NAAQS).

[10] 81 Fed. Reg. 93,620 93,621 (Dec. 21, 2016) (adding 40 C.F.R. § 52.282(i) to the California State Implementation Plan, providing: "*Determination of attainment*. The EPA has determined that, as of January 20, 2017, the San Luis Obispo (Eastern San Luis Obispo) 2008 8-hour ozone nonattainment area in California has attained the 2008 ozone standard by the July 20, 2016 applicable attainment date, based upon complete, quality-assured and certified data for 2013-2015.").

[11] EPA, California Intended Area Designations for the 2015 Ozone National Ambient Air Quality Standards Technical Support Document. https://www.epa.gov/sites/default/files/2017-12/documents/ca_120d_tsd_combined_final.pdf (last accessed Sept. 18, 2021).

[12] *See id.* at Figures 16.6a, 16.6b, 16.6c, 16.6e and 16.6h (showing back trajectories for violating monitors in Clovis, Bakersfield, Corcoran, Merced and Sequoia with emissions originating from the immediate vicinity of the Project site in Santa Barbara County).

molecule of biogenic VOCs crossing the property line will cause or contribute to ozone pollution in an area that has been designated nonattainment with the federal ozone NAAQS.

Even where a source is not a "major stationary source," the federal Clean Air Act requires that every state plan for attainment of the NAAQS must include "legally enforceable procedures" for determining whether the construction of any new source "will result in … [i]nterference with attainment or maintenance of a national standard in the State in which the proposed source or modification is located *or in a neighboring State*." 40 C.F.R. § 51.160(a) (emphasis added). EPA's rules further require that "the State or local agency responsible for final decisionmaking on an application" for construction of any such "minor" source must prevent it from being constructed if "[i]t will interfere with the attainment or maintenance of a national standard. *Id.* at § 51.160(b). In sum, the Clean Air Act acknowledges that even "minor" sources can contribute to nonattainment in neighboring jurisdictions and requires permitting agencies to prevent such sources from being constructed if they would interfere with the attainment or maintenance of a NAAQS.

Yet in this case – where the County is approving commercial cultivation of sources of VOCs *literally over the fenceline* from a federal ozone nonattainment area – no consideration was given as to whether and how emissions of biogenic VOCs impact ozone pollution in that nonattainment area or will interfere with that area's attainment of the more stringent federal ozone standard.

Since the time when the County certified the PEIR, significant new information has come to light on the impacts of biogenic VOCs from commercial cannabis cultivation on ozone air pollution. One study originally published in November 2019 and available at the National Institute of Health's website concludes that "[h]igh concentrations of VOCs emitted from *Cannabis* grow facilities can lead to the formation of ozone, secondary VOCs (e.g., formaldehyde and acrolein), and particulate matter." [13] Observing that one adult cannabis plant "emits hundreds of micrograms of [biogenic] VOCs per day and thus can trigger formation of tropospheric ozone [ ] and other toxic air pollutants," the authors conclude that, "[o]ur results highlight that further assessment of VOC emissions from *Cannabis* facilities is needed, and this assessment is one of the key factors for developing policies for optimal air pollution control."[14]

This new scientific information on the impacts that VOC emissions from cannabis cultivation have on ozone pollution and the EPA's designation of the property immediately adjacent to the Project as a federal nonattainment area for the more stringent federal ozone NAAQS constitutes "[n]ew information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete;" and which demonstrates that the Project will have more significant effects than were examined by the PEIR; and that the significant effects examined by the PEIR will be substantially more severe than shown by the PEIR. Guidelines at § 15162(a)(3)(A)-(B). The failure of the County to consider such information and conduct an assessment of such effects constitutes a violation of CEQA and is unlawful.

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[13] *See supra* at note 6. It bears mentioning that formaldehyde and acrolein are federal hazardous air pollutants and California toxic air contaminants.

[14] *Id.*

b) The County failed to give any consideration to how emissions of biogenic VOCs from the Project will contribute to violations of the state ozone standard within Santa Barbara County

Santa Barbara County is a nonattainment area for the California ozone standard and yet, as discussed above, the PEIR does not address the ways in which biogenic VOCs from commercial-scale cultivation or processing of cannabis may contribute to that nonattainment. As described above, the PEIR only considered *combustion*-related sources of VOCs from cannabis cultivation and failed to even mention that cannabis cultivation produces biogenic VOC emissions that could contribute to ozone formation or other forms of air pollution.

Additionally, air quality conditions within Santa Barbara County have significantly changed since the PEIR was published. CARB, at time of the PEIR's certification, had designated Santa Barbara County as "nonattainment/transitional" with regard to ozone.[15] This transitional designation meant that the county was coming into attainment and, consequently, would not need to regulate potential ozone sources as stringently as counties located in nonattainment areas. Following the PEIR's certification, CARB took action to confirm that the County had, in fact, attained the state ozone standard and redesignated Santa Barbara County as attainment for that standard.[16]

However, that attainment status was short lived and, since the PEIR was issued, CARB has redesignated the county as nonattainment for the state ozone standard.[17] CARB's public hearing to approve that redesignation occurred on February 25, 2021. This redesignation constitutes a substantial change in circumstances under CEQA, which, coupled with the new scientific information on the impacts that biogenic VOCs from cannabis cultivation have on ozone pollution, requires the County to take a closer look at how the Project will contribute to and exacerbate nonattainment with the state ozone standard within Santa Barbara County and whether additional mitigation is warranted to reduce those impacts. Guidelines § 15162.

Indeed, when the County's Air Pollution Control Officer submitted comments to CARB on its redesignation of the County to nonattainment, the County committed to work with CARB to attain and maintain state and federal ambient air quality standards and "to help the community better understand *emission sources* and air quality issues."[18] Yet, with the County Board of Supervisor's

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[15] *See* Final Regulation Order (amending Cal. Code Reg. § 60201 to indicate Santa Barbara County as "Nonattainment-Transitional") submitted to the Office of Administrative Law February 27, 2017); https://ww3.arb.ca.gov/desig/changes/2016sec100.pdf (last accessed Sept. 18. 2021).

[16] *See* Final Regulation Order (amending Cal. Code Reg. § 60201 to indicate Santa Barbara County as "Attainment") submitted to the Office of Administrative Law March 23, 2020) https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2019/sad19/fro.pdf (last accessed Sept. 18. 2021).

[17] *See* Final Regulation Order (submitted to the Office of Administrative Law August 13, 2021) https://ww3.arb.ca.gov/board/15day/sad/fro.pdf (last accessed Sept. 16. 2021).

[18] Letter, from Aeron Arlin Genet, Air Pollution Control Officer, re: Proposed 2020 Amendments to Area Designations for State Ambient Air Quality Standards (Feb. 19, 2021) (emphasis added);

knowledge of the worsening ozone pollution in Santa Barbara County and after being provided with information concerning the impacts that biogenic VOCs from commercial cultivation have on ozone formation in this and other cannabis permit appeals, the County Planning Department has not performed, and the Planning Commission has not directed on appeal, *any* subsequent environmental assessment of whether and how such VOC emissions may impact nonattainment with the state ozone standard. Further, we understand that the County has not provided notice of the Project to the County's Air Pollution Control District, nor provided the District with the ability to review, comment on, or propose Project conditions. In so doing, the County has failed to satisfy the fundamental public informational requirements and purpose of CEQA and, accordingly, has acted unlawfully.

4. The County has failed to perform any subsequent environmental review that would meet the requirements of CEQA

Rather than conduct any additional analysis of the impact that biogenic VOC emissions would have on nonattainment with state or federal ozone standards in Santa Barbara or San Luis Obispo Counties, the County purported to address project-specific impacts through the completion of a checklist pursuant to Section 15168 of the Guidelines. However, that checklist did not mention VOCs or ozone at all, let alone discuss their impact on nonattainment.

When the issue of VOCs was raised in an appeal of the permitting of the Project at issue, the County Planning Commission's staff response mischaracterized both the science regarding biogenic VOCs and the PEIR's discussion of the issue. County staff's response to issue of VOCs reads, in its entirety:

> The Project was adequately evaluated under the PEIR and there is no new information of substantial importance showing that the Project will have substantially increased impacts to adjacent agriculture as a consequence of terpene contamination. There continues to be a lack of evidence that terpenes from cannabis cultivation result in impacts to the quality or marketability of surrounding agricultural crops. Terpenes are considered to be biogenic volatile organic compounds (VOCs). As explained by William Vizuete, professor of environmental sciences and engineering at the University of North Carolina during the Board of Supervisors hearing of August 20, 2019, and incorporated by reference, all living things emit biogenic VOCs. Therefore, biogenic VOCs are ubiquitous. Biogenic VOCs produced by plants are involved in plant growth development, reproduction, and defense. Cannabis plants primarily produce a kind of biogenic VOC called monoterpenes, which are aromatic oils that provide cannabis varieties with distinctive flavors like citrus, berry, mint, and pine. These are the same kind of terpenes that are found in other plants such as roses, orange trees, rosemary, and pine trees. Santa Barbara native oak and pine trees are also significant VOC emitters. VOCs and terpenes are discussed in the PEIR and were considered as part of the analysis of air

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https://www.arb.ca.gov/lists/com-attach/2-areadesignations2020-VmRWYAQ3WTtWfVVn.pdf (last accessed Sept. 18, 2021).

> quality impacts. Their existence and alleged impacts are not new information. Moreover, to require subsequent CEQA review, the new information must show that the project would have one or more significant effects not discussed in the PEIR or that significant effects would be substantially more severe than shown in the PEIR. The Appellant has not produced substantial evidence supporting that other crops, including vineyards, absorb cannabis terpenes and, if so, the affect it has on their quality.[19]

The County's response confirms that biogenic VOCs resulting from cannabis cultivation were considered by the County only as a potential cause of terpene taint (the worry that terpenes from cannabis will impact the flavor of wine grapes). But the response mischaracterizes the PEIR's analysis and paints with too broad of a brush in arguing that "VOCs and terpenes are discussed in the PEIR and were considered as part of the analysis of air quality impacts." As described above, the PEIR only analyzed the ozone impacts associated with VOC emissions from combustion of fuels in mobile sources and agricultural equipment; it completely failed to even describe the biogenic VOCs emitted by cannabis plants or to consider how those emissions could contribute to nonattainment with state or federal ozone standards in Santa Barbara County, San Luis Obispo County, or elsewhere.

As also described above, since the time when the County certified the PEIR, significant new information has come to light on the impact that biogenic VOCs from commercial cannabis cultivation have on air pollution. This information indicates that VOCs from cannabis can contribute to ozone, particulate matter and toxic air pollutants, including formaldehyde and acrolein.[20] Formaldehyde and acrolein are carcinogens, and there is absolutely no discussion of these emissions within the PEIR or otherwise.

The County brushed aside any concerns regarding biogenic VOC emissions from the Project, noting the biogenic VOCs are ubiquitous and considering only their contribution to potential "terpene taint;" i.e., product quality issues for wine producers. In the PEIR, the County considered only the potential *odor* impacts that might result from these biogenic VOCs or terpenes and it considered only how the combustion-related VOC emissions – and not the biogenic VOCs – from cannabis cultivation might contribute to nonattainment with state and federal ozone standards.

Under CEQA, "[i]f a later activity would have effects that were not examined in the program EIR, a new initial study would need to be prepared leading to either an EIR or a negative declaration." Guidelines § 15168(c)(1). Further review is especially relevant here where new large-scale cultivation is set to occur in and adjacent to nonattainment areas. Given that Santa Barbara County was subsequently designated nonattainment for the state ozone standard and the area of San Luis Obispo County lying literally over the northern property line has been subsequently

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[19] Santa Barbara County Planning Commission. Staff Report for the Appeal of the Canna Rios, LLC – Cannabis Cultivation Land Use Permit, §2.D. (April 27, 2021)

[20] *See supra* at note 6.

designated as nonattainment for the more stringent 2015 federal ozone standard, it is legally incorrect to conclude that "[t]he Project was adequately evaluated under the PEIR and there is no new information of substantial importance."[21]

B. The PEIR Fails to Adequately Address the Project's Potential Emission of Hydrofluorocarbons and Their Impact on Climate Change

The PEIR fails to adequately address the specific sources of hydrofluorocarbon ("HFC") emissions within the County's cannabis industry. The subsequent CEQA checklist also fails to address or even mention the Project's potential for HFC emissions. Additionally, as discussed below, since the PEIR was certified, scientists, regulators, and lawmakers have all called for an increased effort to curb HFC emissions, driven in part by the worsening impacts from climate change and the commercial availability of low global warming-potential substitutes for HFCs. This constitutes new information of substantial importance and substantially changed circumstances warranting further environmental review under CEQA.

As the PEIR summarizes, HFCs are a type of greenhouse gas ("GHG"), which "are typically used as refrigerants." PEIR at 3.3-9. Other than providing a definition for HFCs, however, the PEIR does little to analyze the environmental impact of HFCs, and specifically neglects to address foreseeable sources of HFCs in cannabis-related activities throughout the County. Instead, the PEIR provides the following brief discussion: "[HFCs] are typically used as refrigerants for both stationary refrigeration and mobile air conditioning. The use of HFCs for cooling and foam blowing is growing, as the continued phase out of chlorofluorocarbons (CFCs) and hydrochlorofluorocarbons (HCFCs) gains momentum. The USEPA adopted Global Warming Potentials of HFCs range from 140 for HFC-152a to 11,700 for HFC-23." PEIR 3.3-9.

The Project will include on-site freezing of cannabis.[22] As the PEIR reports, HFC emissions are typically associated with refrigeration. Although specifics of the Project's freezing process are still scarce, enough is known to conclude that this aspect of the proposed operation is not adequately addressed by the PEIR or the Commission's subsequent CEQA §15168 checklist. Indeed, the PEIR does not analyze the HFC emissions associated with freezers and refrigerators at all. Instead, the only impacts attributable to refrigeration that the PEIR analyzes are *electricity demand* and *noise* concerns associated with "non-cultivating commercial cannabis operations." *See* PEIR at 3.13-24. Similarly, the checklist does not discuss HFC emissions at all, or any of the environmental impacts associated with the planned on-site freezing operations.

CEQA requires more analysis. Section 15168(c)(1) of the Guidelines provides: "[i]f a later activity would have effects that were not examined in the program EIR, a new initial study would need to be prepared leading to either an EIR or a negative declaration." Guidelines § 15168(c)(1). Because

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[21] Santa Barbara County Planning Commission. Staff Report for the Appeal of the Canna Rios, LLC – Cannabis Cultivation Land Use Permit, §2.D. (April 27, 2021)

[22] *See* April 27, 2021 Staff Report, §5.2.

the PEIR included no consideration of potential HFC emissions from commercial cannabis cultivation, it should have been considered by the County prior to approval of the Project.

Additionally, since the certification of the PEIR, there is growing appreciation for the role HFC emissions play in climate change. The World Meteorological Organization's 2018 report devotes an entire chapter to HFC emissions, noting their increasing use and significance in global warming.[23] Relatedly, curtailing emissions of HFCs – which are the fastest growing source of GHGs globally[24] – has become an increasing area of focus in both federal and state efforts to address climate change, driven in part by the commercial availability of low global warming-potential substitutes for HFCs. The increasing focus on HFCs and availability of substitutes for their use in refrigeration warrant further environmental review of the impacts associated with the Project's on-site freezer. *See* Guidelines §§ 15162(a)(2)–(3).

1. California has increasingly focused on refrigerants as super-polluters

The PEIR refers generally to the county-wide cannabis program's consistency with GHG reductions prescribed in CARB's Scoping Plan. *See* PEIR at 3.3-16. But other than describing what HFCs are, it bears *no* acknowledgement that commercial cannabis cultivation might result in HFC emissions.

Since the PEIR's certification in February 2018, CARB has begun updating its Scoping Plan, and has made HFCs an area of specific focus. In 2018, the California Legislature passed and the Governor signed SB 1013, which imposes prohibitions on use of HFCs in many commercial and residential refrigeration applications, among other uses.[25] CARB also adopted corresponding regulations, establishing end-use dates for use of HFCs in various stationary refrigeration and foam end-uses.[26] These laws and regulations were passed with wide industry support due to the availability of commercial substitutes for HFCs that have a lower global-warming potential.

More recently, in August, CARB announced that it was working on a 2022 update to the Scoping Plan, and it has made clear that reducing HFC emissions and other short-lived climate pollutants

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[23] World Meteorological Organization, Scientific Assessment of Ozone Depletion: 2018, World Meteorological Organization, Global Ozone Research and Monitoring Project—Report No. 58, 67 pp., Geneva, Switzerland, 2018. https://ozone.unep.org/sites/default/files/2019-05/SAP-2018-Assessment-report.pdf.

[24] Center for Climate and Energy Solutions, "Controlling Industrial Greenhouse Gas Emissions" (2021). https://www.c2es.org/content/regulating-industrial-sector-carbon-emissions/.

[25] Senate Bill 1013 (2018) (known as the California Cooling Act, filed with the Secretary of State on September 13, 2018) (enacting, *inter alia,* Cal. Health & Saf. Code § 39734).

[26] Cal. Code Reg. tit. 17 §§ 95371-95377 (submitted to the Office of Administrative Law on November 13, 2018 and filed with the Secretary of State on and with an effective date of December 27, 2018, pursuant to CARB's request for an early effective date). https://ww2.arb.ca.gov/sites/default/files/barcu/regact/2018/casnap/reedcasnap.pdf?_ga=2.155921917.718169624.1632174496-994147807.1608159414.

("SLCP") will be a main focus going forward. On September 8, 2021, for example, CARB held a workshop to develop the scoping plan, and in the notice for the workshop, CARB explained that "[b]ecause SLCP impacts are especially strong over the short term, acting now to reduce their emissions can have an immediate beneficial impact on climate change and public health."

2. The United States is focusing on eliminating super-polluters associated with refrigeration

At the federal level, curtailing HFC emissions has been at the forefront of recent efforts to address global warming. For example, on January 27, 2021, President Biden signed the Executive Order on Tackling the Climate Crisis at Home and Abroad,[27] which, among other things, instructed the Secretary of State to "prepare, within 60 days of the date of this order, a transmittal package seeking the Senate's advice and consent to ratification of the Kigali Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, *regarding the phasedown of the production and consumption of hydrofluorocarbons*." *Id.* (emphasis added).

Additionally, in 2020, a bipartisan coalition of senators championed the American Innovation and Manufacturing ("AIM") Act of 2020. Briefly, the AIM Act of 2020 instructs the EPA Administrator to address HFCs in a number of ways, including by phasing down their production and consumption. Pursuant to that direction, the EPA Administrator today signed the agency's first rule to phase down the production and consumption of HFCs.[28] In that rule, the EPA notes that "HFCs are potent greenhouse gases (GHGs) with 100-year global warming potentials (GWPs) (a measure of the relative climatic impact of a GHG) that can be hundreds to thousands of times more potent than carbon dioxide (CO2)."[29] When it announced the proposed rule, the EPA explained that reducing "highly potent HFCs" is "an important step toward meeting [the United States' Paris Agreement pledge to reduce national greenhouse gas emissions by 50 to 52 percent below 2005 levels by 2030]."[30] Additionally, in the final rule signed today, the EPA noted that, in concert with other nations implementing the phasedown schedule required by the Kigali Amendment, the global phasedown "is expected to avoid up to 0.5 °C of warming by 2100."[31]

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[27] Exec. Order No. 14,008, Fed. Reg. Vol. 86, No. 19 (January 27, 2021).

[28] U.S. EPA, Phasedown of Hydrofluorocarbons: Establishing the Allowance Allocation Under the American Innovation and Manufacturing Act, pre-publication rule (September 23, 2021). Pre-publication rule available at https://www.epa.gov/system/files/documents/2021-09/san-8458-preamble-092221-prepub-with-header.pdf.

[29] Pre-publication rule at 24.

[30] U.S. EPA, EPA Moves Forward with Phase Down of Climate-Damaging Hydrofluorocarbons (May 3, 2021). https://www.epa.gov/newsreleases/epa-moves-forward-phase-down-climate-damaging-hydrofluorocarbons.

[31] Pre-publication rule, at 26.

3. Further environmental review is necessary to consider the climate change impacts associated with cannabis freezing under CEQA

As described above, the PEIR failed to give any consideration to HFC emissions associated with commercial cannabis cultivation; the only environmental impacts considered in association with refrigeration were electricity demand and noise. And, despite the fact that the County's approval for the Project includes some type of unspecified flash freezing operation, the County made no effort to assess the potential impacts from that operation. The Project's potential impacts associated with emissions of HFCs warranted further environmental review. *See* Guidelines § 15168(c)(1). Additionally, the increasing focus on curtailing HFC emissions at the state and federal level, including requirements to use newly available lower global warming-potential substitutes for HFCs as refrigerants, constitutes changes "to the circumstances under which the project is undertaken," which similarly must be accounted for via supplementary environmental review. *See id.* § 15162(a)(2).

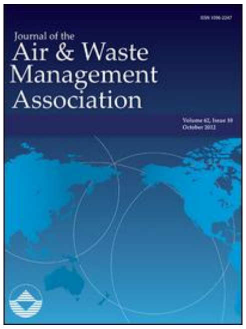
III. Conclusion

The County erred in relying upon the PEIR as the basis for the approval of the Project because the PEIR failed to include consideration of the impacts associated with biogenic VOC emissions or HFCs from the Project. Until these shortcomings are addressed, the environmental review of the Project is legally inadequate and violates CEQA.

As described above, the PEIR only considered the impact of combustion-related VOCs from mobile sources and agricultural equipment on nonattainment with state and federal ozone standards and only within Santa Barbara County; the only air quality impacts considered in relation to biogenic VOCs were odors and, during the subsequent appeal, "terpene taint." Yet since the time when the PEIR was certified, new scientific studies have been published indicating that biogenic VOC emissions from commercial cannabis cultivation contribute to ozone and other air pollution. Additionally, since the time when the PEIR was certified, the portion of San Luis Obispo County lying literally at the northern boundary of the Project site has been designated nonattainment for the more stringent 2015 ozone NAAQS, and Santa Barbara County has been redesignated as nonattainment for the state ozone standard. Technical analyses supporting EPA's ozone designations illustrate how emissions occurring within the vicinity of the Project site could have impacts on nonattainment as far downwind as Merced or Bakersfield, which are designated as extreme ozone nonattainment areas and experience some of the worst air pollution in the nation. This new information and the changes in ozone designations demand further environmental review to understand the role that biogenic VOCs from the Project will have on ozone pollution and on violations of state and federal ozone standards, both within Santa Barbara County and elsewhere. *See* Guidelines § 15162(a)(2)-(3).

Additionally, the PEIR and the CEQA checklist fail to address the Project's potential for HFC emissions and the associated impacts on global warming; this, despite the fact that the Project will feature some type of on-site freezer and HFCs used as refrigerants are the fastest growing global source of GHG emissions. The only consideration that the PEIR gave to the environmental impacts resulting from refrigeration used in association with commercial cannabis cultivation was with respect to noise and electricity consumption. Because the Project's potential HFC emissions and resulting impact on climate change were not considered, further environmental review is warranted at this time. *See id.* at §§ 15168(c)(1); 15162(a)(2)-(3).

Footnote 6



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NOTEBOOK PAPER

Dominant volatile organic compounds (VOCs) measured at four *Cannabis* growing facilities: pilot study results

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ABSTRACT

In recent years, sale of recreational marijuana products has been permitted in several states and countries resulting in rapid growth of the commercial cannabis cultivation and processing industry. As previous research has shown, biogenic volatile organic compounds (BVOCs) emitted from plants can react with other urban air constituents (e.g., NOx, HO radical) and thus negatively affect regional air quality. In this pilot study, BVOC emissions from *Cannabis* plants were analyzed at four grow facilities. The concentrations of measured BVOCs inside the facilities were between 110 and 5,500 μg m^{-3}. One adult *Cannabis* plant emits hundreds of micrograms of BVOCs per day and thus can trigger the formation of tropospheric ozone (approximately 2.6 g day^{-1} $plant^{-1}$) and other toxic air pollutants. In addition, high concentrations of butane (1,080– 43,000 μg m^{-3}), another reactive VOC, were observed at the facilities equipped with *Cannabis* oil extraction stations.

Implications: High concentrations of VOCs emitted from *Cannabis* grow facilities can lead to the formation of ozone, secondary VOCs (e.g., formaldehyde and acrolein), and particulate matter. Our results highlight that further assessment of VOC emissions from *Cannabis* facilities is needed, and this assessment is one of the key factors for developing policies for optimal air pollution control.

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Introduction

It is well-known that vegetation is the largest source of atmospheric biogenic volatile organic compounds (BVOCs) (Atkinson and Arey 2003), contributing a significant fraction (approximately 89%) of the total atmospheric VOCs (Goldstein and Galbally 2007). Trees and other types of vegetation emit BVOCs, such as isoprene, pinenes, and terpenoid compounds (Fuentes et al. 2000). Sindelarova et al. (2014) reported that the mean total global emission of BVOCs is 760 Tg (C) $year^{-1}$, with main constituents such as isoprene (70%), monoterpenes (11%), and sesquiterpenes (2.5%). The average global isoprene emission was found to be 594 Tg $year^{-1}$, while for North America, it was 34.5 Tg $year^{-1}$. The principle reactions of BVOCs are with the hydroxyl radical (HO), ozone (O_3) and the nitrate radical (NO_3) (Fuentes et al. 2000). Since the lifetimes of major BVOCs ranges from minutes to a few hours (Atkinson and Arey 2003), they play a major role in the chemistry of the lower troposphere. For example, the lifetime of the most abundant BVOC, isoprene, is 1.4 hours with respect to its reaction with HO radical (Atkinson and Arey 2003), assuming that HO radical concentration is 2×10^6 cm^{-3}. Emitted in the air BVOCs react with HO, NO_3 and O_3 to yield products that react with nitrogen oxides and form pollutants such as ozone, formaldehyde, acetaldehyde, and acrolein (Li et al. 2016; Papiez et al. 2009; Seinfeld and Pandis 2016). Some of these pollutants are potentially hazardous compounds. Tropospheric ozone, for example, is one of the criteria air pollutants (Atkinson 2000; Logan 1985), which, in high concentrations, has harmful effects on human health (Brunekreef and Holgate 2002; Gryparis et al. 2004; Yang et al. 2003) and the environment (Chuwah et al. 2015; Dickson et al. 2001; Mills et al. 2011). Papiez et al. (2009) found that BVOCs emitted by landscaped vegetation contribute significantly to ozone growth rates in the Las Vegas region and should be considered as one of the sources of ozone air pollution. The oxidation of higher molecular weight VOCs and BVOCs produces secondary organic aerosol particles (SOA) that may be even more harmful than ozone (Claeys et al. 2004; Hoffmann et al. 1997; Katsouyanni et al. 2001).

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Color versions of one or more of the figures in the paper can be found online at www.tandfonline.com/uawm.
Supplemental data for this paper can be accessed here.

Because of the importance of atmospheric photochemical reactions, the estimation of atmospheric VOC emissions, including BVOCs, is needed where NOx emissions are high. *Cannabis* facilities are typically built in urbanized areas near automobile roads, which are known areas of high NOx concentration. These facilities can be a source of large amounts of BVOC and VOC generated during the production of *Cannabis* products. The oxidation of highly reactive BVOCs from *Cannabis* plants can lead to the formation of ozone and secondary VOCs (e.g., formaldehyde and acrolein). In recent years, the *Cannabis* market has increased drastically since the sale of recreational marijuana has been permitted in several states. At the same time, not much information on BVOC emissions from *Cannabis* is currently available. Therefore, identification of the speciated VOCs at commercial *Cannabis* facilities is needed. The goal of this pilot study is to characterize and quantitatively analyze VOC emissions at commercial *Cannabis* grow facilities and identify what future steps should be taken to evaluate their contribution to photochemical processes and production of potentially harmful compounds. In this project, 80 individual VOCs, both biogenic and anthropogenic, were measured at four different *Cannabis* producers located in California and Nevada. To our knowledge, this study is the first attempt to obtain a detailed profile and concentrations of VOCs at commercial *Cannabis* grow facilities.

Experimental

Materials and methods

To accurately identify and quantify BVOCs, a standard mixture of VOCs (Table S1) was purchased from Apel-Reimer Environmental Inc. (Broomfield, CO, USA) and a standard mixture of *Cannabis* VOCs (Table S2) was obtained from Restek (Restek Corporation, Bellefonte, PA, USA).

VOC sampling and analysis

VOC sampling canisters were cleaned prior to sampling by repeated evacuation and pressurization with humidified zero air (Airgas, Inc., Radnor, PA, USA), as described in the EPA document "Technical Assistance Document for Sampling and Analysis of Ozone Precursors" (U.S.EPA 1998, 2009) (Supplementary Material).

Canister samples were analyzed for BVOC and non-BVOC species using gas chromatography instrument coupled with mass spectrometry and flame ionization detectors (GC-MS/FID) according to EPA Method TO-15 (U.S.EPA 1999). The GC-MS/FID system includes a Lotus Consulting Ultra-Trace Toxics sample pre-concentration system built into a Varian 3800 GC with FID coupled to a Varian Saturn 2000 ion trap MS. The detailed description is presented in the Supplementary Material.

Calibration of the GC-MS/FID system was conducted with a mixture that contained hydrocarbons commonly found in the air (Table S1) in the range of 0.2 to 10 ppbv. Calibration of *Cannabis* VOCs was performed using a standard mixture of terpenes (Table S2). Five point external calibrations were run prior to analysis, and one calibration check was run every 24 hours. If the response of an individual compound was more than 10% off, the system was recalibrated. Replicate analysis was conducted at least 24 hours after the initial analysis to allow re-equilibration of the compounds within the canister.

Sampling and calculation of emission rates

All the facilities where the VOC samples were collected are commercial indoor-growing *Cannabis* facilities. One facility was located in California, and another three were in the state of Nevada. Measurements in Nevada were conducted at three locations within an urban area of Reno and Sparks, while the area around the facility in California can be characterized as sub-urban/rural. At all facilities, the rooms had no access to natural light, and they were equipped with high-pressure sodium (HPS) lamps. The relative humidity inside the grow rooms was 50%–60%, and the temperature was 24–28°C. The air in the grow rooms was well mixed with fans during the sampling (Figure S1, Supplementary Material). At all tested facilities, the sampling was conducted when the plants were at their flowering grow stage and their buds had reached full maturation. The plants cultivated were a mixture of *Cannabis Sativa, Cannabis Indica*, and hybrid strains. To sample the VOCs, a Teflon sampling tube was positioned 30 cm above the *Cannabis* canopy and the other end attached to the canister medium-volume sampler. The samples were collected in different rooms: the grow room, where plants are grown under controlled conditions; the curing room, where drying and aging of the harvested buds is performed; and the purging room, where removal of any residual solvents (e.g., liquid butane) is performed from the *Cannabis* concentrate using a vacuum oven or hot water bath. The data on plant strains and other growing conditions (fertilization, soil type, etc.) were not released to us.

Table 1. Concentrations of BVOCs and non-BVOCs at four different *Cannabis* grow facilities; *facilities with extraction stations; the standard deviations were calculated based three (in some cases two) replicate canister samples collected simultaneously; grow room is a room where plants are grown under controlled conditions; curing room: where drying and aging of the harvested buds is performed in a controlled environment; purging room: where removal of any residual solvents (e.g., liquid butane) is performed from the *Cannabis* concentrate using a vacuum oven or hot water bath.

Facility name	*Total BVOCs, μg m^{-3}*	*% of the total VOCs*	*Total non-BVOCs, μg m^{-3}*	*% of the total VOCs*	*Ratio: non-BVOCs/ BVOCs*
**Facility 1.*					
Outside	0.12 ± 0.01	**1**	15 ± 1	**99**	125
Curing room	863 ± 95	**19**	3764 ± 226	**81**	4.4
Grow room	1563 ± 172	**53**	1374 ± 82	**47**	0.9
Facility 2.					
After C-scrubber	25 ± 1	**30**	59 ± 7	**70**	2.4
Grow room (light/fan: off)	5502 ± 55	**99**	51 ± 6	**1**	0.01
Grow room (light/fan: on)	634 ± 4	**90**	71 ± 9	**10**	0.11
**Facility 3.*					
Outside	N/A	-	N/A	-	-
Grow room	196 ± 4	**3**	6686 ± 152	**97**	34
Purge room	1005 ± 90	**2**	49431 ± 2482	**98**	49
Facility 4.					
Outside	N/A	-	N/A	-	-
Grow room	112 ± 55	**72**	44 ± 3	**28**	0.4
Cure room	1055 ± 517	**96**	42 ± 3	**4**	0.04

The emission rates (ERs) of target compounds produced by *Cannabis* plants were measured only at Facility 2 that had one grow room (Table 1). The ERs derived assuming the growing room has well mixed air and losses of compounds due to depositions on walls and other surfaces were not considered. In order to obtain the ERs, BVOC concentrations were measured during steady state, when exhaust fan was on, and 10 min after the exhaust fan was turned off. The increase in concentrations was used to calculate the ERs (in mg min^{-1} plant^{-1}) of each individual VOC per time unit per plant:

$$ER_i = \frac{(C_{fan\ off} - C_{fan\ on}) \times V_{room}}{t \times N_{plants}} \quad (1)$$

where: $C_{fan\ off}$ – concentration of individual BVOC (mg m^{-3}) after the exhaust fan was turned off, $C_{fan\ on}$ – concentration of individual BVOC (mg m^{-3}) before the exhaust fan was turned off, t – time while the fan was off (10 min); V_{room} – volume of the room (m^3); N_{plants} – number of plants in the room.

Calculation of relative ozone formation potential of emitted BVOCs

Ozone formation potentials (OFP) are widely used to estimate the potential of individual VOC to form ozone in the air. While there are different possible methods of estimating OFP, here we use the concept of maximum incremental reactivity (MIR) that is based on incremental reactivity (Carter 1994). Carter defines incremental reactivity (IR) as the change in the O_3 mass concentration ($\Delta[O_3]$) due to an incremental change in the mass concentration of a VOC ($\Delta[VOC]$) for standard conditions, Equation (2).

$$IR = \frac{\Delta[O_3]}{\Delta[VOC]} \quad (2)$$

To estimate maximum incremental reactivity, a standard VOC mixture is chosen and a series of simulations are made for varying concentrations of NO_x. There will be a NO_x level where the IR values reach a maximum, the MIR point (Carter 1994; Stockwell, Geiger, and Becker 2001). At the MIR point more simulations are made with incremental variations of individual VOCs to calculate MIR values from Equation (2). Note that the MIR point is at a NO_x level where O_3 production is very limited by the available VOC. Carter with the California Air Resources board performed these calculations (Carter 1994, 2009) and they provide tables of standard MIR values for individual VOC on the California Air Resources Board website (ARB 2012).

Here, the OFP of each measured emitted BVOC was estimated by multiplying its mass emission rate by its MIR value using the following equation:

$$OFP_i = ER_i \times MIR_i \quad (3)$$

where: ER_i – mass emission rate for individual VOC (mg plant^{-1} day^{-1});

MIR – maximum incremental reactivity in mg-O_3 mg-VOC^{-1}.

The relative OFP of the measured BVOC mixture was calculated by summing the OFPs for the mixture and dividing each OFP_i to determine the percent relative OFP (%OFP).

$$\%OFP = \frac{OFP_i \times 100\%}{\sum OFP_i} \tag{4}$$

Results and discussion

Concentrations of BVOCs and nonbiogenic VOCs measured at four *Cannabis* facilities are presented in Table 1. The variation of VOC levels between facilities and rooms depends on several factors, such as the number of plants and their growing stage, the performance of ventilation systems, the size of facility rooms, and the presence of other VOC sources. Overall, VOC levels are specific for each individual facility. The highest concentration of the total BVOCs was observed at Facility 2 (5502 ± 55 μg m^{-3}), when the fan was off and BVOCs accumulation was the largest. The lowest BVOC concentration was in the grow room of Facility 4 (112 ± 55 μg m^{-3}), even though in this room the number of plants per volume of the room was the highest among grow rooms at other facilities (Table S3). The total BVOCs were also measured outside the facilities (Facilities 1 and 2). In the case of Facility 1, the concentration of the total analyzed BVOCs was thousands of times lower outside than inside (Figure 1a). Facility 2 was equipped with C-scrubbers, and the samples were collected outside of the grow room as the area was not climate controlled. Even though Facility 2 was located in a forest area, the total concentration of BVOCs was significantly higher inside the facility than outside, being 220 times higher in the grow room with fan off and 25 times higher in the same room (with fan on) than outside (Figure 1b). Analysis of individual BVOCs showed that the most abundant compounds at all four facilities are β-myrcene, D-limonene, terpinolene, α-pinene, and β-pinene. For example, in the curing room at Facility 1 (Figure 1a), the top analyzed BVOCs were β-myrcene (54% of the BVOCs, 840 ± 96 μg m^{-3}), terpinolene (20%, 312 ± 23 μg m^{-3}), and

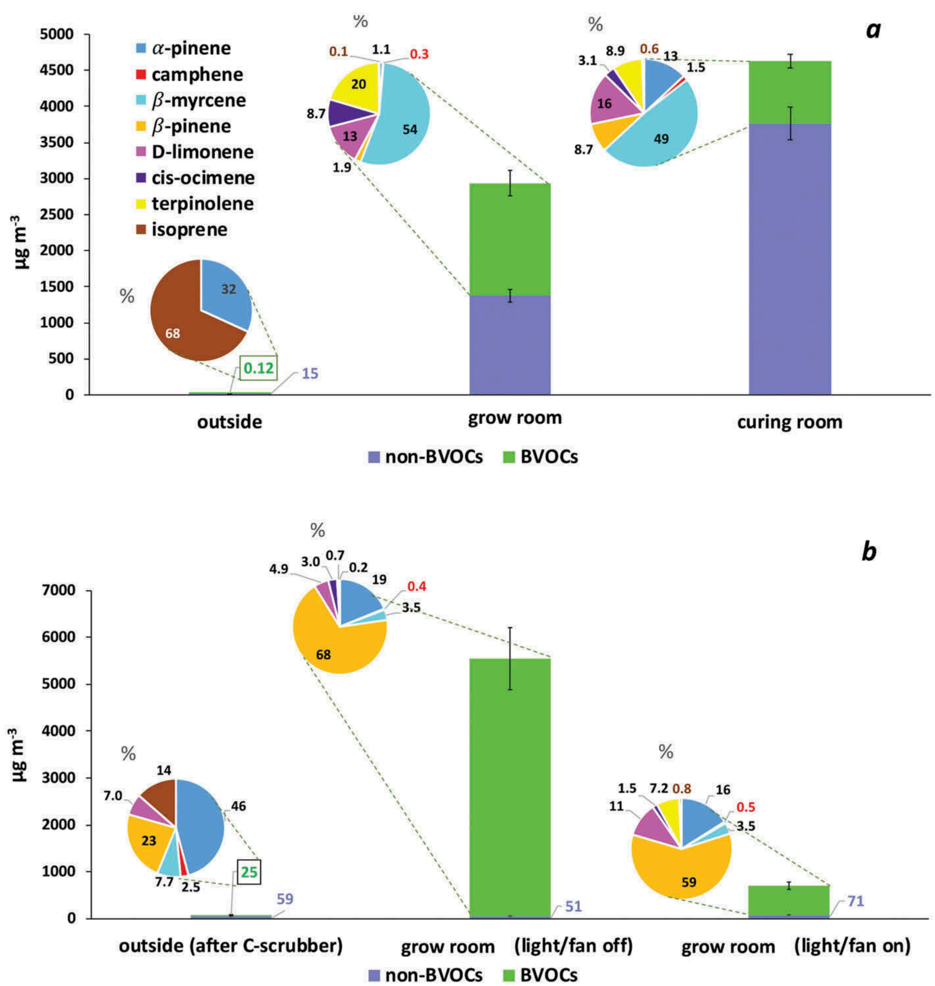

Figure 1. Biogenic (in μg m^{-3}) and non biogenic (in %) VOCs at four *Cannabis* facilities: (a) Facility 1, (b) Facility 2, (c) Facility 3, and (d) Facility 4. The standard deviations were calculated based on three (in some cases two) replicate canister samples collected simultaneously.

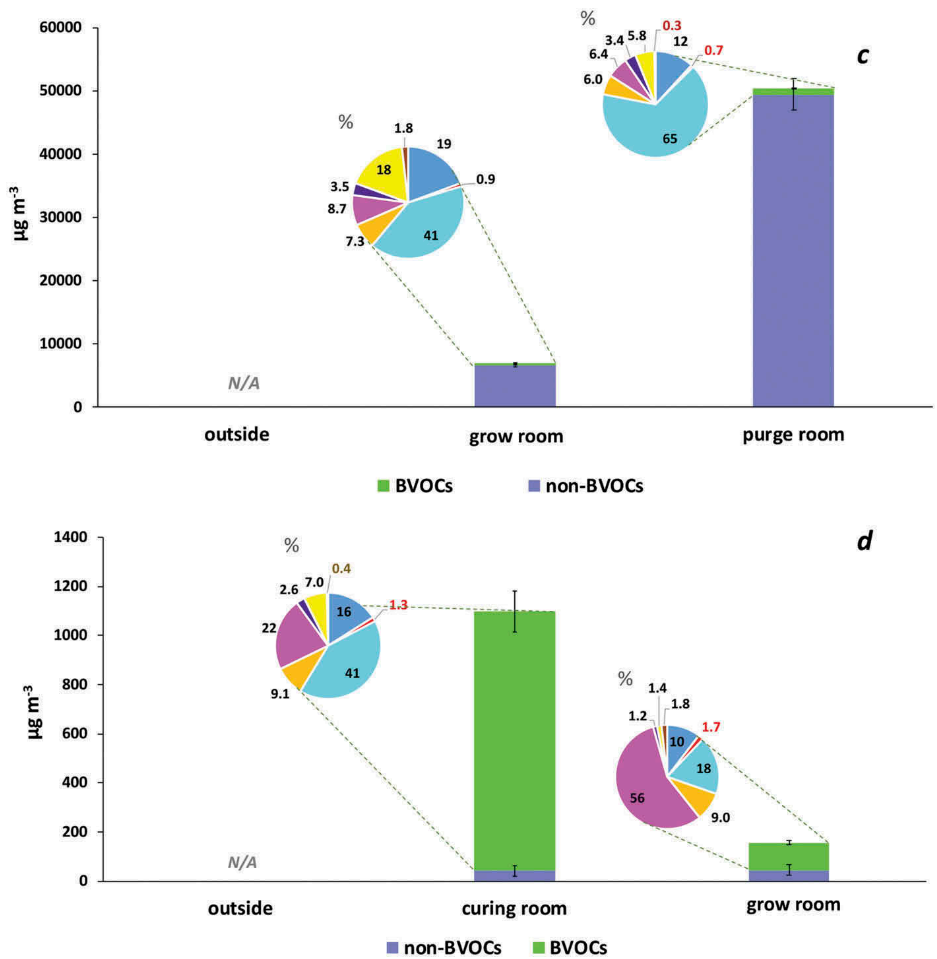

Figure 1. (Continued).

D-limonene (13%, 202 ± 12 μg m^{-3}). At the same time, the most abundant BVOCs outside of Facility 1 were isoprene (0.084 ± 0.009 μg m^{-3}) and α-pinene (0.039 ± 0.004 μg m^{-3}), being 68% and 32% of the total analyzed outside BVOCs, respectively. In comparison, the most abundant BVOCs at Facility 2 were β-pinene and α-pinene. When the fan and lights were off, the β-pinene and α-pinene concentrations were 3766 ± 452 μg m^{-3} and 1036 ± 124 μg m^{-3}, which are 68% and 19% of the total BVOCs, respectively (Figure 1b). Predictably, the BVOC levels were lower when the fan and lights were on, and the concentrations of β-pinene and α-pinene, the most abundant at Facility 2, were 377 ± 45 μg m^{-3} (59% of the total BVOCs) and 102 ± 12 μg m^{-3} (16% of the total BVOCs), respectively. For Facility 3 (Figure 1c), the most abundant BVOCs were β-myrcene (78–650 μg m^{-3}) and α-pinene (35–140 μg m^{-3}), while at Facility 4, the highest levels were observed for D-limonene (44–232 μg m^{-3}) and β-myrcene (10–432 μg m^{-3}). Isoprene is the major biogenic compound, being two-thirds of the total global BVOCs (Guenther et al. 1995; Sindelarova et al. 2014), and it is widely used as a tracer compound of biogenic emissions (Carlton, Wiedinmyer, and Kroll 2009; Kleindienst et al. 2007; Wang et al. 2013), while for *Cannabis* emissions, it is not in the top five of the analyzed BVOCs (Figure 1). Similar to our results, Wang et al. (2019) found that β-myrcene is one of the most abundant BVOCs emitted from four strains of *Cannabis* plants. However, in contrast to Wang's study, in our results, eucalyptol was not a dominating terpene at any of the tested commercial facilities.

The total concentrations of the non-BVOCs (Table 1) widely varied between the facilities with and without additional plant-processing stations. Facilities 1 and 3 were equipped with extraction stations, where low molecular weight alkanes, such as liquid butane, are used as an extraction solvent of the oil from the *Cannabis* plants. At these facilities, the total concentration of non-BVOCs in different rooms ranged from 1,290 to 52,000 μg m^{-3}. These levels of non-BVOCs were 0.9–49 times higher than BVOCs concentrations for the same rooms (Table 1). At Facilities 2 and 4, the non-BVOC concentrations ranged from 30 to 80 μg m^{-3} . BVOCs were 2.5–107 times higher than the non-BVOCs inside these facilities. Therefore, to control VOC emissions from *Cannabis* facilities, non-BVOCs must also be monitored, especially at the

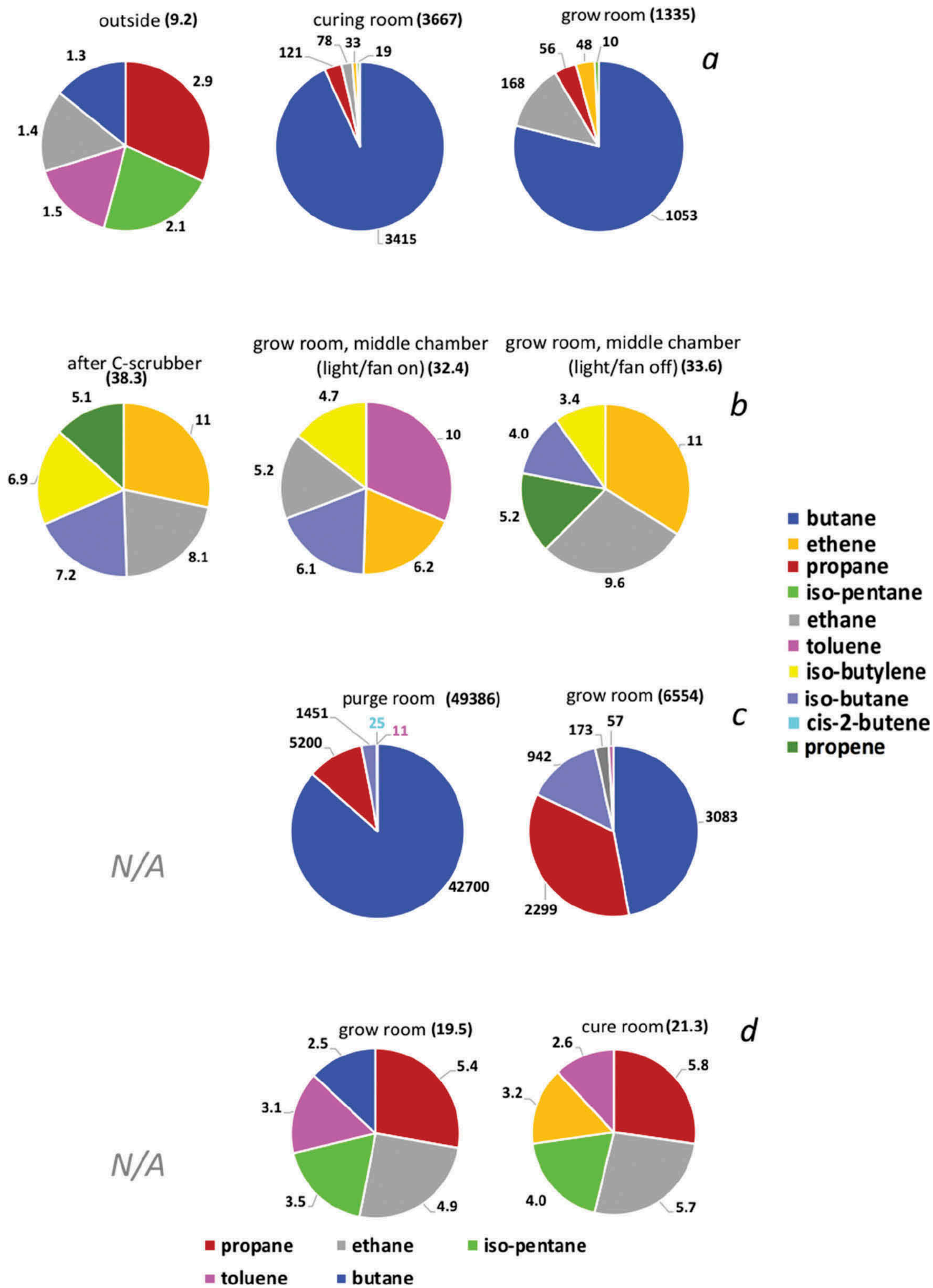

Figure 2. Top five non-BVOCs at four commercial *Cannabis* facilities: (a) Facility 1, (b) Facility 2, (c) Facility 3, (d) Facility 4; (in μg m^{-3}); total of the top five non-BVOCs are presented in brackets in bold font (units: μg m^{-3}).

facilities with additional processing of the *Cannabis* product.

Figure 2 presents the top five individual non-BVOCs that were detected at facilities with (Facility 1 and 3) and without (Facility 2 and 4) extraction stations. As was expected, butane was the dominant non-BVOC at the facilities where butane extraction was performed. For Facility 1, butane concentrations inside the curing and

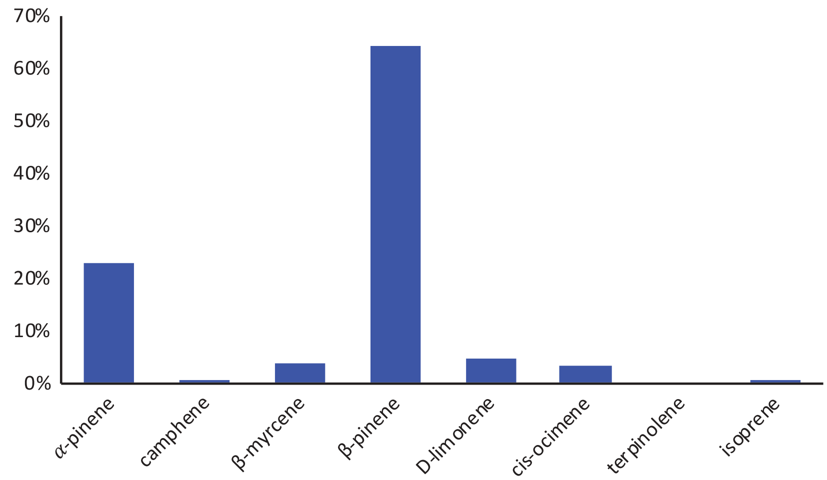

Figure 3. Relative contribution to ozone forming potential of the most abundant BVOCs at Facility 2.

grow rooms were 3,415 ± 205 (90.7% of total non-BVOCs) and 1,083 ± 43 μg m^{-3} (75.8% of total non-BVOCs), respectively, which are approximately 2,600 and 800 times more than the butane level measured outside of this facility (1.3 ± 0.4 μg m^{-3}). In the case of Facility 3, which was also equipped with an extraction station, the butane levels in its grow (3,083 ± 302 μg m^{-3}) and purge (42,723 ± 4,300 μg m^{-3}) rooms were 1.7–36 times higher than in the rooms of Facility 1, and butane was responsible for 46% and 86% of the total non-BVOCs, respectively (Figure 2). In Facilities 2 and 4, butane concentrations were low (2.5–4.3 μg m^{-3}) compared with Facilities 1 and 3, since there were no butane extraction stations there. Butane is one of the most reactive VOCs with a lifetime of 2.5 days under typical HO level atmospheric conditions (2×10^6 of HO radicals per m^{-3}) (Finlayson-Pitts and Pitts 2000). It is well-known that ozone is produced via photochemical reactions of n-butane with oxidants in the atmosphere (Andersson-Sköld, Grennfelt, and Pleijel 1992; Bowman, Pilinis, and Seinfeld 1995; Finlayson-Pitts and Pitts 1997). High concentrations of n-butane in the air can lead to high levels of harmful tropospheric ozone (Bell, Peng, and Dominici 2006; Fann et al. 2012; Kampa and Castanas 2008). Therefore, n-butane emissions from the facilities with butane extraction stations should not be ignored.

Emission rates and ozone-forming potential

To predict the potential of analyzed BVOCs for ozone formation, the ERs of target BVOCs were measured. We were able to obtain the ERs only for the BVOCs at Facility 2, and they are summarized in Table S4 (Supplementary Material). The highest ERs were observed for β-pinene (518 mg day^{-1} $plant^{-1}$), α-pinene (143 mg day^{-1} $plant^{-1}$), and D-limonene (31 mg day^{-1} $plant^{-1}$), which are 70%, 19%, and 4% of the total measured BVOCs (744 mg day^{-1} $plant^{-1}$), respectively.

Figure 3 shows the relative OFP contributions of the most abundant BVOCs collected at Facility 2. It is clear that α- and β-pinenes contributed the most to the OFP, being 87% of the total OFP for all analyzed *Cannabis* BVOCs. The OFP can significantly vary (more than two orders of magnitude) for the species with the same ER (Benjamin and Winer 1998). For example, MIR for isoprene (10.61, Supplementary Material) is three times higher than for β-pinene (3.52), but because ER for isoprene is more than 400 times lower than for β-pinene, β-pinene's contribution to ozone formation is significantly higher (146 times) than for isoprene's. However, as our results showed, BVOCs can vary among the facilities; therefore, different terpenes can be responsible for the formation of harmful compounds. Assuming that terpenes are released from Facility 2 into typical ambient conditions, α- and β-pinenes will be responsible for the formation of a maximum of approximately 2.6 g day^{-1} $plant^{-1}$ of ozone (Table S3), and plants that produce 1–10 g day^{-1} $plant^{-1}$ of ozone are considered as "medium" OFP species (Benjamin and Winer 1998).

Conclusion

The analysis of volatile terpenes at four commercial *Cannabis* facilities showed that the most abundant BVOCs at all facilities are β-myrcene, D-limonene, terpinolene, α-pinene, and β-pinene. The calculated terpenes' OFP at one of the facilities where ERs were measured demonstrated a significant contribution of α- and β-pinenes to the total OFP. These results suggest that isoprene, which is a widely used tracer for studying chemistry and modeling of biogenic emissions, is not suitable for estimating BVOC emissions from *Cannabis* facilities and for understanding the chemical processes of *Cannabis* BVOCs in the lower troposphere. We also found that butane concentration at the facilities with cannabis oil extraction stations can be very high; thus, butane emissions from these facilities may significantly contribute to the chemistry of emitted-in-the-air VOCs, and it may lead to the formation of harmful compounds.

Since this research is a pilot study, there are several questions that need to be addressed in the future. Measuring at what rate BVOCs and other VOCs are emitted outside by *Cannabis* facilities and estimating the effect of these emissions on air quality will be important. The ERs should be measured for more than one *Cannabis* facility, and significantly more data points should be collected during these experiments. In this study, we have focused on volatile BVOCs collected with canisters, but our preliminary research showed that semivolatile biogenic organic compounds (e.g., linalool, β-caryophylene, and α-bisabolol) that can be sampled with Tenax sorbent tubes are also emitted by *Cannabis* plants in high quantities. The effects of these species on the formation of ozone, formaldehyde, and other harmful compounds have to be evaluated. Moreover, different types of plants (mainly *Cannabis sativa* and *Cannabis indica*) at different growing stages and conditions (soil type, light, fertilization, watering, ventilation, size of pots, concentration of CO_2 in grow rooms, relative humidity, temperature, etc.) may release BVOCs in various ratios (Niinemets, Loreto, and Reichstein 2004; Riedlmeier et al. 2017; Wiß et al. 2017). Knowing the ERs of BVOCs per plant, the non-BVOC concentrations in the facilities, the release of these emissions into the air, and the concentrations of NOx around the facilities can help estimate the impact of *Cannabis* grow facilities on air quality and develop optimal air pollution control strategies in the future.

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CANNABIS ENVIRONMENTAL BEST MANAGEMENT PRACTICES GUIDE

AIR QUALITY

DENVER
PUBLIC HEALTH &
ENVIRONMENT

OCTOBER 2019

Cannabis plants naturally emit terpenes, which are volatile organic compounds (VOCs), as they grow. Marijuana Infused Product (MIP) facilities also emit VOCs from solvent evaporation during extraction processes. VOCs react with oxides of nitrogen in the presence of sunlight to create ground-level ozone, a pollutant that is dangerous to human health and the environment. Controlling emissions of VOCs from cultivation and MIP facilities helps improve air quality, which is especially important in urban areas and from May to September, when ground-level ozone levels often exceed health standards.

This guide provides recommended best management practices to improve air quality impacts and reduce VOC emissions from cannabis industry operations.

CARBON FILTRATION

Installing control technologies can reduce the amount of VOC emissions released from cultivation and MIP processes while simultaneously controlling odors. Carbon filtration is currently the best control technology for reducing VOC emissions from cannabis cultivation and MIP facilities. Best management practices for carbon filtration include:

- Design and invest in a carbon filtration system appropriate to your facility and don't exceed the maximum rated cubic feet-per-minute rating for air circulation through the filter.
- Choose a filter with a high VOC removal efficiency.
- Inspect and conduct regular maintenance of HVAC systems and carbon filters.
- Make sure that all operations are conducted within sealed infrastructure, and check regularly to ensure there are no leaks.
- Have a documented system in place to respond to odor complaints.
- Develop training for staff members to ensure best practices are being implemented as a part of the routine facility operating procedure.

In Denver, an odor ordinance requires that cultivation facilities control the odor impacts of their growing operations. Denver Revised Municipal Code, Chapter 4 – Air Pollution Control, Section 4-10.

SOLVENT EXTRACTION

Only certain solvents are permitted for use in Colorado MIP facilities: butane, propane, CO_2, ethanol, isopropanol, acetone, heptane and pentane. All but CO_2 release VOCs when they evaporate. The disposal of solvents by evaporation or spillage is prohibited. Best management practices for solvent extraction include:

- Regularly inspect all solvent storage devices and extraction system to prevent leaks.
- Be careful to prevent leaks during the transfer of solvents between containers and systems at all stages of the production processes.
- Ensure that solvent is always kept in a closed-loop extraction system or sealed container.
- Maintain an inventory of all solvents and their use over time.

Air quality regulations may apply to MIP facilities, depending on the annual amount of solvent lost to evaporation: www.colorado.gov/pacific/cdphe/greencannabis/air-quality

BENEFITS OF VOC/ODOR CONTROL

- Reduces community odor complaints and improves neighborhood relations.
- Improves public and environmental health by helping to reduce local ozone concentrations.
- Enhances your brand image with environmental stewardship.
- Helps to shift the cannabis industry at large toward sustainable and environmentally conscious business practices.

AIR QUALITY

INTRODUCTION

The cannabis industry directly impacts air quality in two predominant operations:

1. Plant growth cultivation
2. Marijuana Infused Product (MIP) facilities

At cultivation facilities, the natural growth of cannabis plants and other processes emit terpenes, which are Volatile Organic Compounds (VOCs) known for their strong odors. At MIP facilities, the evaporation of solvents and other processes in the production cycle results in Volatile Organic Compound (VOC) emissions. VOCs alone do not typically pose a direct threat to human health or the environment.

However, they do contribute to ground-level ozone by chemically reacting with other types of pollution, specifically, nitrogen oxides (NOx) in the presence of sunlight. Ozone is an air pollutant that is harmful to human health and negatively impacts the environment; therefore, it is important that the cannabis industry mitigate VOC emissions in their processes. This chapter provides recommended best management practices to improve air quality impacts and reduce VOC emissions from cannabis industry operations.

In Colorado's Front Range, cultivation and MIP facilities are generally in dense urban areas near heavily trafficked highways and other industrial sources of NOx pollution. Because VOCs require the presence of NOx and sunlight to form harmful ozone, VOCs from these facilities have a greater impact on ozone formation than facilities in rural areas. This makes mitigating VOC emissions from the cannabis industry especially important in these regions. Fortunately, most odor control practices at cultivation and MIP facilities also substantially reduce VOC emissions. The correct operation and maintenance of odor control systems at cultivation and MIP facilities is a best management practice for reducing air quality impacts from the cannabis industry.

SUSTAINABILITY

ASPECTS AND IMPACTS

- Odor control
- Regulatory compliance
- Indoor air quality
- Community relations
- Employee well-being
- Regional stakeholder alignment
- Operational and compliance budgets

CULTIVATION FACILITIES

As cannabis plants grow, they release a distinctive range of odors which are made up of different types of VOCs called terpenes.

Activities during the cultivation or production cycle that release significant odors also release elevated VOCs during that time. Installing control technologies can reduce the amount of VOC emissions released from the cultivation process and control odors in compliance with the Denver city and county odor ordinance. Highly reactive, ozone-forming terpenes commonly emitted from cannabis cultivation include: pinene, limonene, myrcene, and terpinolene.

CARBON FILTRATION - BEST OPTION FOR CONTROLLING ODORS AND VOCS

Carbon filtration is currently the best control technology for reducing VOC emissions from cannabis cultivation facilities. Carbon filters are simple to install, inexpensive, effective, and reliable when properly maintained and replaced. These filters work by using an absorption process where porous carbon surfaces chemically attract and trap VOCs along with other gas phase contaminants. As the filter ages, less carbon surface area is available to trap VOCs; at this point the filter will need to be replaced. Depending on the filter load, most carbon filters will last 6-12 months in a commercial cultivation environment and should be replaced according to the manufacturer's recommendations.

Carbon filters can operate as stand-alone units that clean and recirculate the air, or can be integrated into the HVAC system. Typically, carbon filters are at their peak performance when positioned at the highest point in your grow space where heat accumulates. High humidity levels hinder filter performance, so this control technology is better suited for facilities with environmental controls. An effective filtration system must be properly sized according to the space needed for volume and air-flow requirements. Maintaining an optimal environment can require multiple filters. Carbon filters can be used in combination with other odor control technologies.

Benefits:

- Improve indoor air quality by capturing airborne gas phase contaminants and odors.
- Control the odor impacts of the facility: A properly installed and maintained carbon filtration system is highly effective at controlling odors. This satisfies the requirements of the odor ordinance in Denver and improves community relations as well as business reputation.
- Control VOC emissions: a carbon filtration system will control odors and can remove VOC emissions. This improves public health and the environmental impacts of the facility.

Recommended best practices:

- Design and invest in a carbon filtration system that meets the specific needs of your facility. It is recommended that you work with an HVAC consultant with cannabis industry experience.
- Get information from the manufacturer about the effectiveness of the filter at removing VOCs and choose a filter with a high efficiency rate.
- Do not exceed the maximum rated cubic feet-per-minute rating for air circulation through the filter. If you exceed this max flow rate, the passing air will not have enough "contact time" with the carbon, and the filter will not be effective at removing VOCs.
- Regularly inspect your filter and replace the filter if it is releasing a smell near the filter effluent, or has reached its lifespan according to the manufacturer's specifications.
- Time your filter-replacement schedule so that filters are replaced in early May, the beginning of the ozone season. This ensures that the filter is at peak performance for VOC removal during the high ozone season, resulting in the greatest public health benefits.
- Using a pre-filter can help preserve the life span of your carbon filter, because it can capture particles before they take up surface area on the filter. Pre-filters should be replaced about every 6-8 months for proper air flow.

BIOFILTERS AND CHEMICAL ODOR TECHNOLOGY

Biofilters are an emerging odor technology that could prove to be more cost effective and less resource intensive than carbon filtration once it is refined in the future.

These filters use an organic medium, such as wood chips, that are inoculated with bacteria and consume odorous molecules. Research is currently being conducted on biofilters that contain bacteria that will consume terpenes and will not harm the cannabis plants. Biofiltration is successful at treating biodegradable VOCs, but it requires a large footprint and careful operation control.

Odor absorbing neutralizers: use oils and liquids from plant compounds and mist them into the exhaust air at cultivation facilities to neutralize odorous VOCs. Contact your odor control supplier about the effectiveness of VOC reduction, as it will vary (20%-90%) by product and contact time.

Masking and counteractive agents: use chemical odor control technologies that are misted at the cultivation facility's exhaust. The use of these agents is subject to Colorado's air quality regulations. Higher VOCs are associated with this technology, which lead to more severe impacts of air quality and are not recommended in urban areas.

Ozone generators: are mostly used for sanitization purposes and have also been used in industrial settings to control strong odors. These generators are harmful to humans and can damage or destroy crops because they are a direct emission source of ozone pollution; therefore, ozone generators are not recommended as a best practice for odor control.

Recommended best practices:

- Regularly inspect and perform maintenance checks on your HVAC system and ducting to ensure it is operating optimally and that the airflow is properly controlled. Keep windows and doors closed in cultivation areas, and inspect the infrastructure for potential leaks.
- For greenhouses, "sealing" the grow space and circulating inside air for one week's time is a common practice that allows the VOC concentration to build up within the greenhouse. When it is time to "purge" the greenhouse by bringing in fresh air, do this at a time when the potential for ozone formation is lowest (e.g., evenings, windy days, and cloudy days). Avoid purging air during times that have the highest risk of ozone formation (e.g., mornings, sunny and hot days, and stagnant weather).

- Make sure that the temperature and relative humidity are under control within tolerance levels of the cultivation room. High temperature and humidity will perpetuate any odor issues the facility is producing; this is especially true during the flowering phase of cultivation. Proper air circulation is critical for maintaining temperature and humidity control.
- Have a documented system in place for recording and responding to odor complaints in compliance with Denver's Odor Ordinance.
- Purchase a "scentometer" or Nasal Ranger to be able to quantify odors and record "defensible data" from self-testing. This can be used to determine if your operation is meeting local odor regulations.
- The harvesting phase results in a higher emission of VOCs than other cultivation phases. Time the harvesting phase to minimize its ozone impact, with respect to time of day, time of year and periods with high forecasted ozone. Minimize emissions during the morning and early afternoon, and during the summer.
- Develop training and allocate responsibilities for staff members to ensure best practices are being implemented consistently and continually as a part of the routine facility operating procedure.
- Communicate and coordinate with other cannabis cultivators to learn what solutions are the most practical and effective.

MIP FACILITIES AND EXTRACTION PROCESSES

MIP facilities manufacture marijuana concentrates and infused products such as edibles, ointments, and tinctures.

These methods can be divided into two main categories: solvent and solventless extractions. Solvent extraction methods apply a chemical to remove terpenes and cannabinoids from the plant, which results in a variety of different products. Solventless extraction methods involve the use of physical methods to create concentrates.

The processing of plants where solvents are used to extract cannabis concentrates is considered a manufacturing process that is subject to state air quality regulations. The applicability of the air quality regulations will depend on the annual amount of VOC emissions quantified in tons emitted per year. It is the responsibility of the business to calculate an estimate of their VOC emissions from solvent extraction. For specific guidance on air quality requirements for MIP facilities and how to calculate emissions, visit: **www.colorado.gov/cdphe/greencannabis**.

The Colorado Small Business Assistance Program can also help you calculate your annual air emissions for free by calling 303-692-3175.

Regulatory Applicability

- CCR 212-1 M 605 D4 requires a professional-grade, closed-loop extraction system capable of recovering the solvent, with the exception of ethanol and isopropanol solvent-based systems (CCR 212-1 M 605 E). The disposal of VOCs by evaporation or spillage is prohibited under 5 CCR 1001- 9 Regulation 7 V.A.
- CCR 212-2 R 605 A2 delineates the solvents that are permitted for use. The rule states: "A Retail Marijuana Products Manufacturing Facility may also produce Solvent-Based Retail Marijuana Concentrate using only the following solvents: butane, propane, CO_2, ethanol, isopropanol, acetone, heptane and pentane. The use of any other solvent is expressly prohibited unless and until it is approved by the Division."
- All permitted solvents besides CO_2 are VOC-based and result in direct VOC emissions when evaporated. The law is the same for medical marijuana concentrate production and is provided in CCR 212-1 M 605 A2. This list of solvents was formulated with the health and safety of workers in mind, and using any other solvent is a violation of the law and could also lead to negative air quality impacts. CCR 212-1 M 605 D5 requires that all solvents used are food grade or at least 99% pure.

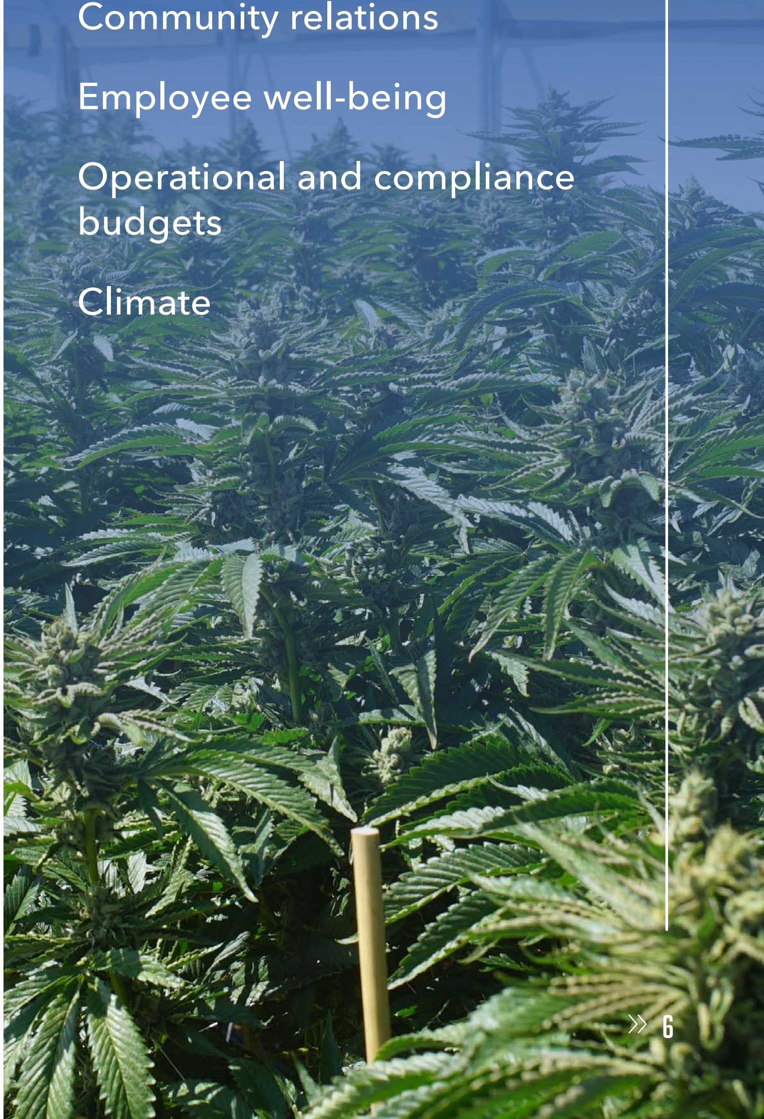
Recommended best practices:

- Regularly inspect and maintain all storage devices of solvents to prevent leaks.
- Conduct regular maintenance and inspection of the extraction system to ensure that it is functioning properly, without direct leaks of the solvent.
- Take caution to prevent leaks during the transfer of solvents between containers and systems at all stages of the production processes.

SUSTAINABILITY

ASPECTS AND IMPACTS

- Effluent discharge
- Regulatory compliance
- Indoor air quality
- Energy consumption
- GHG emissions
- Water quality
- Community relations
- Employee well-being
- Operational and compliance budgets
- Climate



- Never dispose of a solvent through direct evaporation or spillage; ensure that the solvent is always recovered and kept in a closed-loop extraction system or designated container
- Maintain an inventory of all solvent liquids and ensure that the facility operating procedure allocates responsibility to keep an updated list.
- Develop training and allocate responsibilities for staff members to ensure best practices are being implemented consistently and continually as a part of the routine facility operating procedure

CONCLUSION

Limiting activities that emit VOCs and making sure that odor control systems are optimally operating during high ozone periods can substantially improve the air quality impacts of cannabis facilities. It is recommended that an employee committee is designated to develop and implement a BMP plan specific to the facility needs. Establishing and communicating BMPs through adequate training can help ensure that this becomes an integrated part of the routine operation in cannabis facilities. Colorado's cannabis industry can adopt BMPs that improve their air quality impacts, bolster their reputations as stewards of the environment, and control their odor, as well as air quality emissions.

DENVER
PUBLIC HEALTH & ENVIRONMENT

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Footnote 8

View PDF map that can be zoomed

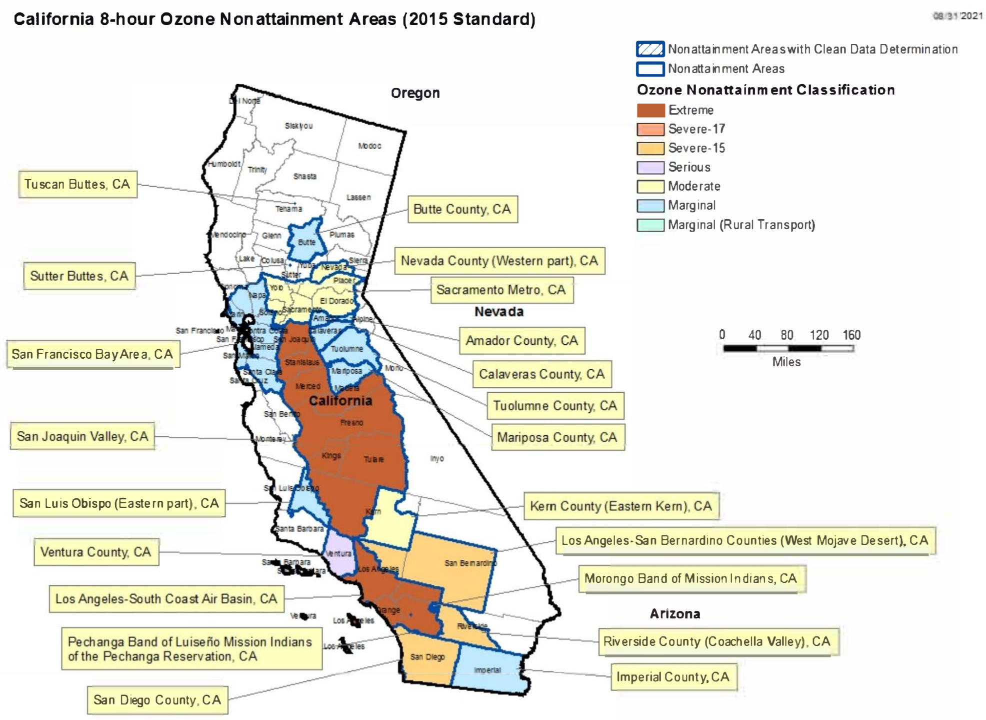


Figure 16.6a HYSPLIT Back Trajectories for Clovis – N. Villa Ave. (06-019-5001).

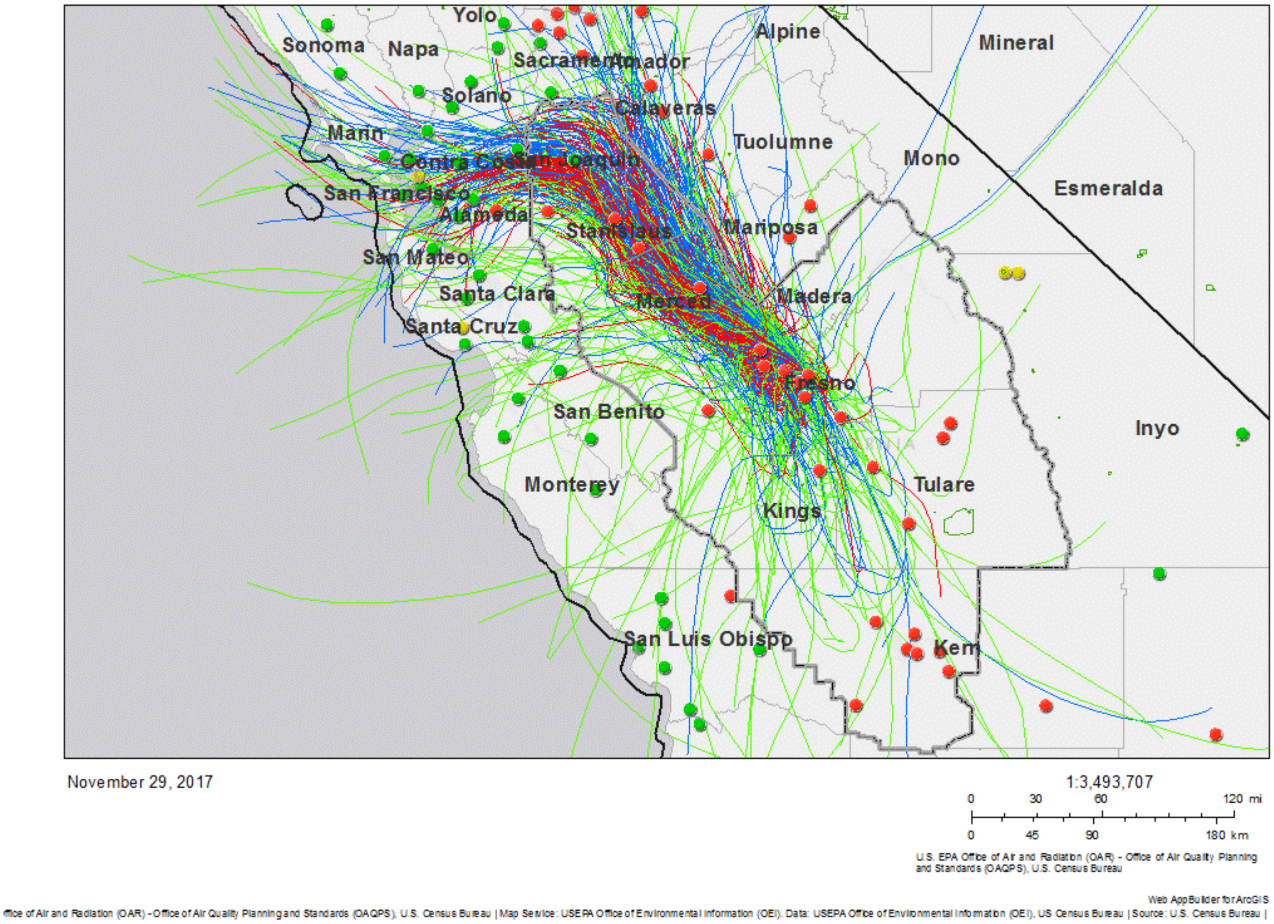


Figure 16.6a shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's intended nonattainment boundary for San Joaquin Valley, CA is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 16.6b HYSPLIT Back Trajectories for Bakersfield - Muni (06-029-2012).

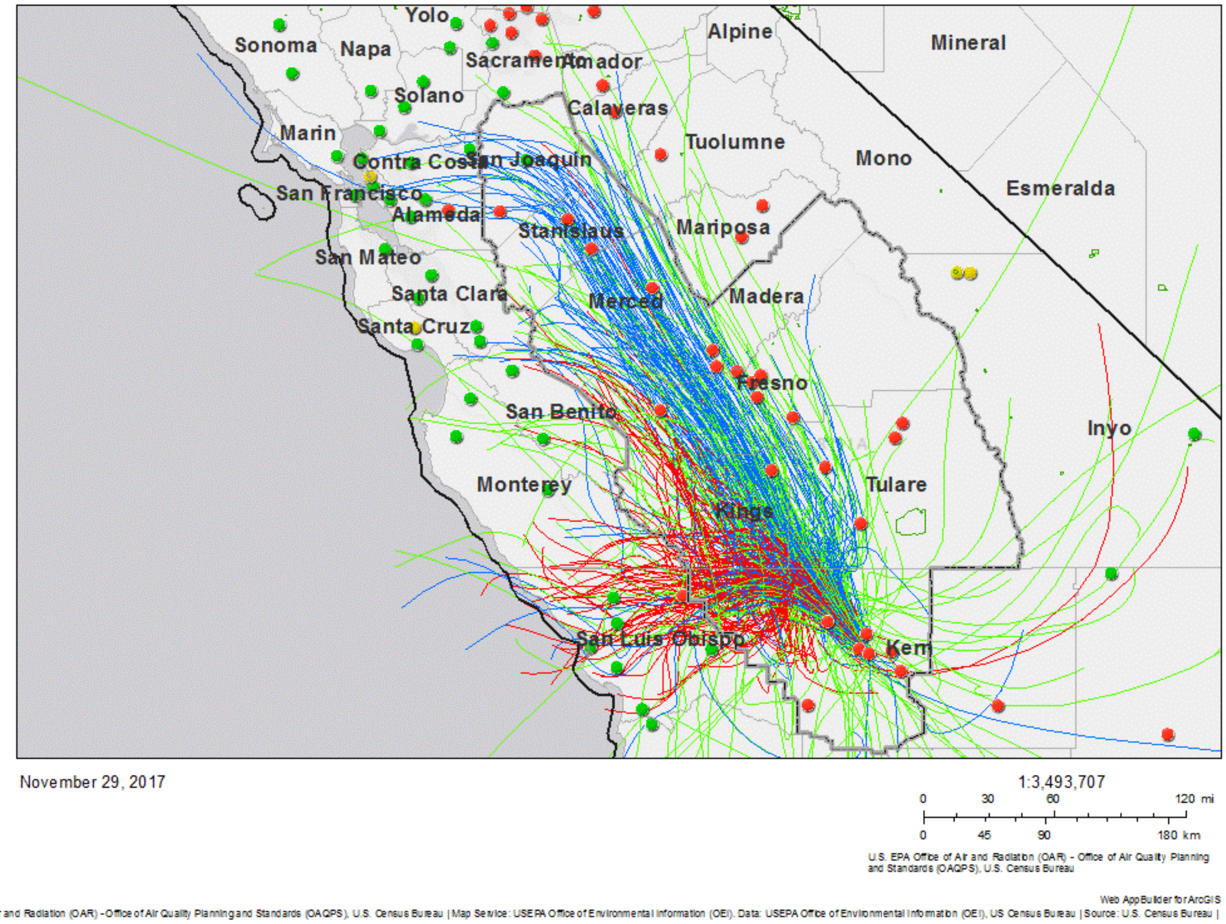


Figure 16.6b shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's intended nonattainment boundary for San Joaquin Valley, CA is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 16.6c HYSPLIT Back Trajectories for Corcoran (06-031-1004).

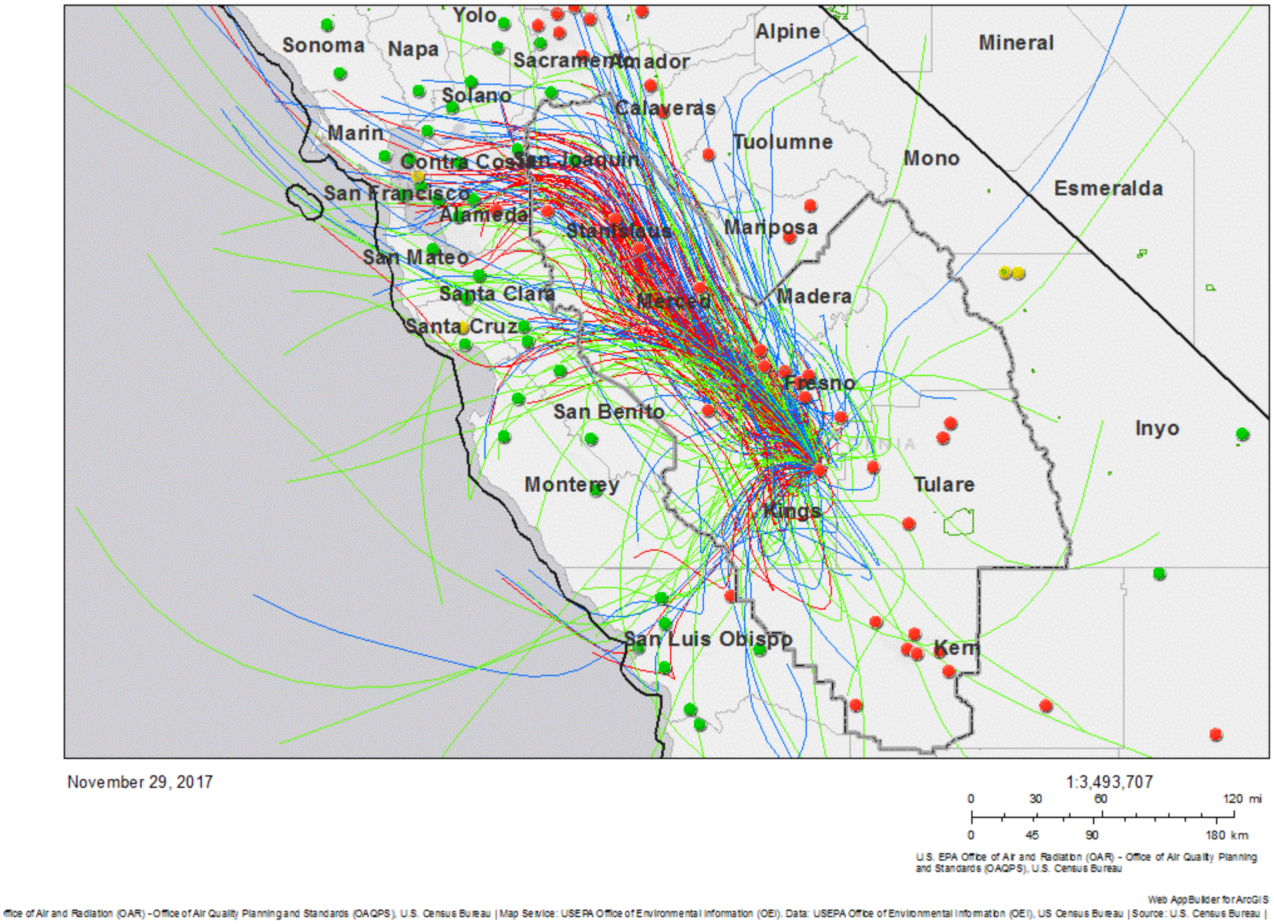


Figure 16.6c shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's intended nonattainment boundary for San Joaquin Valley, CA is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 16.6e HYSPLIT Back Trajectories for Merced – S. Coffee Ave. (06-047-0003).

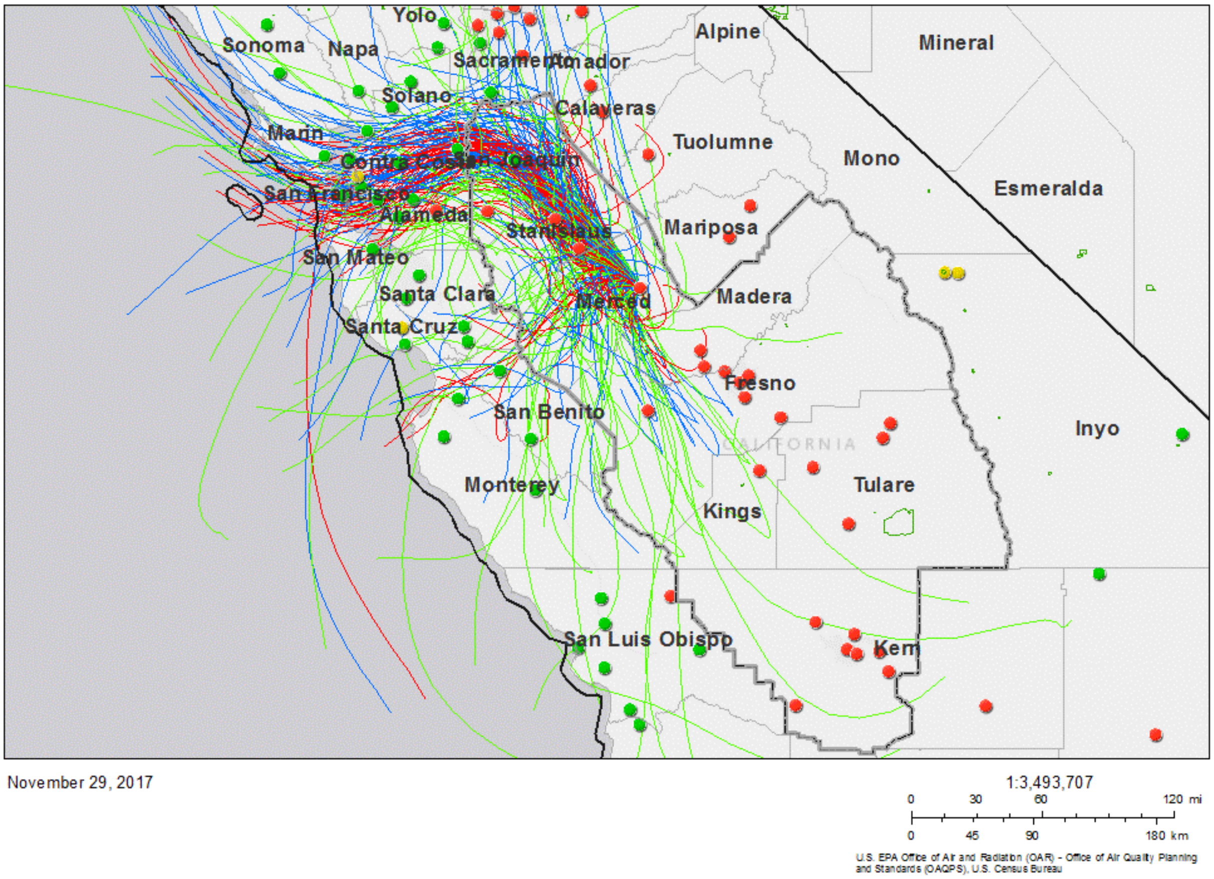


Figure 16.6e shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's intended nonattainment boundary for San Joaquin Valley, CA is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

Figure 16.6h HYSPLIT Back Trajectories for Sequoia – Ash Mountain (06-107-0009).

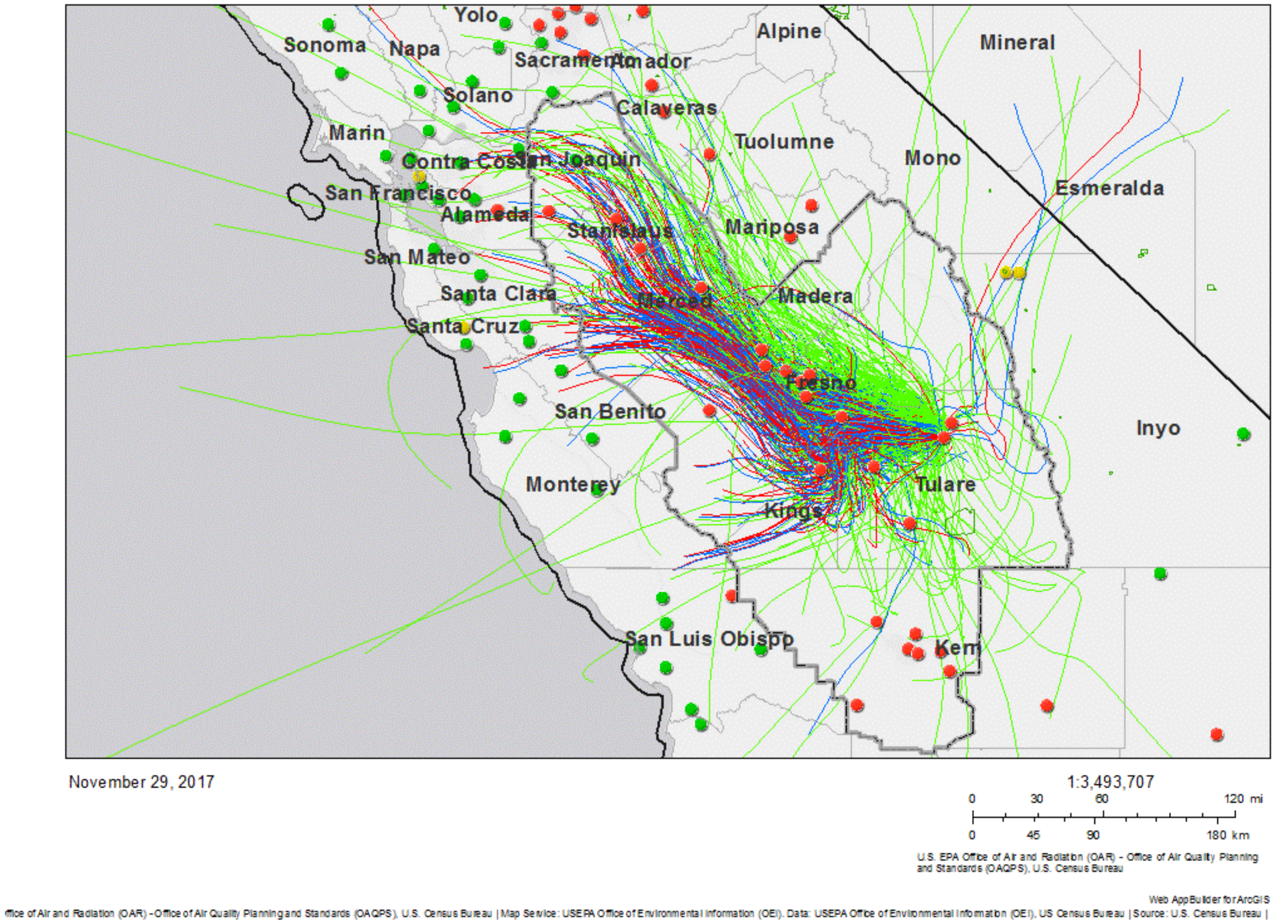


Figure 16.6h shows HYSPLIT back-trajectories starting at 100 (red lines), 500 (green lines), and 1000 (blue lines) meters above ground level, respectively. Trajectories extend back in time 24 hours from 6 p.m. on the day of the exceedance. The EPA's intended nonattainment boundary for San Joaquin Valley, CA is shown as a gray line with a dashed black center. Monitors are shown as red (violating), green (attaining), or yellow (invalid) dots based on 2014-2016 design values. Tribal land boundaries are outlined in green. Please refer to the master legend near the beginning of this document.

The EPA's HYSPLIT analysis shows that the winds during exceedance days are predominately from the north-northwest. This is consistent with the geographic orientation of the San Joaquin Valley and its relationship to the Golden Gate (at the mouth of San Francisco Bay), the key route for air flow between the Pacific Ocean and the Central Valley of California.

The San Joaquin Valley 2007 Ozone Plan[7] includes a conceptual description of ozone formation in the area. The Sierra Nevada, Tehachapi, and South Coast mountain ranges that surround the San Joaquin Valley on the east, south, and west, restrict air flow and ventilation. The summers are hot with little rainfall or cloud cover, and with frequent inversions that trap pollutants below them. Sea breezes (or "marine flows") may bring pollutants from coastal areas into the San Joaquin Valley from the northwest. Recirculation of San Joaquin Valley pollutants can occur via nighttime drainage winds ("slope flows"), which return pollutants that were transported up into mountain valleys during the day. Recirculation can also occur via the "Fresno eddy," a counterclockwise flow that returns polluted air

[7] "Photochemical Modeling Protocol for Developing Strategies to Attain the Federal 8-hour Ozone Air Quality Standard in Central California," California Air Resources Board, May 22, 2007; included as Appendix C to the ARB Staff Report. See especially pp.6-8. Available at http://www.arb.ca.gov/planning/sip/2007sip/sjv8hr/sjvozone.htm

State of California
Office of Administrative Law

In re:
Air Resources Board

Regulatory Action:

Title 17, California Code of Regulations

Adopt sections:
Amend sections: 60201
Repeal sections:

NOTICE OF APPROVAL OF CHANGES WITHOUT REGULATORY EFFECT

California Code of Regulations, Title 1, Section 100

OAL Matter Number: 2017-0303-02

OAL Matter Type: Nonsubstantive (N)

This action by the California Air Resources Board makes changes without regulatory effect section 60201 in Title 17 of the California Code of Regulations. Specifically, this action lists the counties within the South Central Coast Air Basin: Santa Barbara, San Luis Obispo, and Ventura. This action further changes the designation of the Santa Barbara county area from "Nonattainment" to "Nonattainment-Transitional."

OAL approves this change without regulatory effect as meeting the requirements of California Code of Regulations, Title 1, section 100.

Date: April 17, 2017

Thanh Huynh
Senior Attorney

For: Debra M. Cornez
Director

Original: Richard W. Corey
Copy: Trini Balcazar

STATE OF CALIFORNIA--OFFICE OF ADMINISTRATIVE LAW

NONSUBSTANTIVE

NOTICE PUBLICATION/REGULATIONS SUBMISSION

(See instructions on reverse)

For use by Secretary of State only

STD. 400 (REV. 01-2013)

OAL FILE NUMBERS	NOTICE FILE NUMBER	REGULATORY ACTION NUMBER	EMERGENCY NUMBER
	Z-2017-	2017-0303-02N	

For use by Office of Administrative Law (OAL) only

2017 MAR -3 P 3:20

OFFICE OF ADMINISTRATIVE LAW

NOTICE | REGULATIONS

ENDORSED - FILED
in the office of the Secretary of State of the State of California

APR 17 2017

2:51 PM

AGENCY WITH RULEMAKING AUTHORITY
AIR RESOURCES BOARD

AGENCY FILE NUMBER (If any)

A. PUBLICATION OF NOTICE (Complete for publication in Notice Register)

1. SUBJECT OF NOTICE	TITLE(S)	FIRST SECTION AFFECTED	2. REQUESTED PUBLICATION DATE

3. NOTICE TYPE	4. AGENCY CONTACT PERSON	TELEPHONE NUMBER	FAX NUMBER (Optional)
☐ Notice re Proposed Regulatory Action ☐ Other			

OAL USE ONLY	ACTION ON PROPOSED NOTICE	NOTICE REGISTER NUMBER	PUBLICATION DATE
	☐ Approved as Submitted ☐ Approved as Modified ☐ Disapproved/ Withdrawn		

B. SUBMISSION OF REGULATIONS (Complete when submitting regulations)

1a. SUBJECT OF REGULATION(S)
Area Designations for Ozone

1b. ALL PREVIOUS RELATED OAL REGULATORY ACTION NUMBER(S)

2. SPECIFY CALIFORNIA CODE OF REGULATIONS TITLE(S) AND SECTION(S) (Including title 26, if toxics related)

SECTION(S) AFFECTED (List all section number(s) individually. Attach additional sheet if needed.)

ADOPT

AMEND
60201,

REPEAL

TITLE(S)
17

3. TYPE OF FILING

- ☐ Regular Rulemaking (Gov. Code §11346)
- ☐ Resubmittal of disapproved or withdrawn nonemergency filing (Gov. Code §§11349.3, 11349.4)
- ☐ Emergency (Gov. Code, §11346.1(b))
- ☐ Certificate of Compliance: The agency officer named below certifies that this agency complied with the provisions of Gov. Code §§11346.2-11347.3 either before the emergency regulation was adopted or within the time period required by statute.
- ☐ Resubmittal of disapproved or withdrawn emergency filing (Gov. Code, §11346.1)
- ☐ Emergency Readopt (Gov. Code, §11346.1(h))
- ☐ File & Print
- ☐ Other (Specify) ____
- ☒ Changes Without Regulatory Effect (Cal. Code Regs., title 1, §100)
- ☐ Print Only

4. ALL BEGINNING AND ENDING DATES OF AVAILABILITY OF MODIFIED REGULATIONS AND/OR MATERIAL ADDED TO THE RULEMAKING FILE (Cal. Code Regs. title 1, §44 and Gov. Code §11347.1)
N/A

5. EFFECTIVE DATE OF CHANGES (Gov. Code, §§ 11343.4, 11346.1(d); Cal. Code Regs., title 1, §100)

- ☐ Effective January 1, April 1, July 1, or October 1 (Gov. Code §11343.4(a))
- ☐ Effective on filing with Secretary of State
- ☒ §100 Changes Without Regulatory Effect
- ☐ Effective other (Specify)

6. CHECK IF THESE REGULATIONS REQUIRE NOTICE TO, OR REVIEW, CONSULTATION, APPROVAL OR CONCURRENCE BY, ANOTHER AGENCY OR ENTITY

- ☐ Department of Finance (Form STD. 399) (SAM §6660)
- ☐ Fair Political Practices Commission
- ☐ State Fire Marshal
- ☐ Other (Specify)

7. CONTACT PERSON	TELEPHONE NUMBER	FAX NUMBER (Optional)	E-MAIL ADDRESS (Optional)
Trini Balcazar, Regulations Coordinator	916 445-9564	916 322-3928	trinidad.balcazar@arb.ca.gov

8. **I certify that the attached copy of the regulation(s) is a true and correct copy of the regulation(s) identified on this form, that the information specified on this form is true and correct, and that I am the head of the agency taking this action, or a designee of the head of the agency, and am authorized to make this certification.**

SIGNATURE OF AGENCY HEAD OR DESIGNEE

DATE
2/27/2017

TYPED NAME AND TITLE OF SIGNATORY
Richard W. Corey, Executive Officer

For use by Office of Administrative Law (OAL) only

ENDORSED APPROVED

APR 17 2017

Office of Administrative Law

Final Regulation Order

AREA DESIGNATIONS FOR STATE AMBIENT AIR QUALITY STANDARDS
Chapter 1. Air Resources Board
Subchapter 1.5. Air Basins and Air Quality Standards
Article 1.5 Area Pollutant Designations

[Note: The preexisting regulation text is set forth below in normal type. The amendments are shown in *underline italics* to indicate additions and ~~strikeout~~ to indicate deletions.]

Amend sections 60201 title 17, California Code of Regulations, to read as follows:

§ 60201. Table of Area Designations for Ozone.

Area	***Designation***
North Coast Air Basin	Attainment
San Francisco Bay Area Air Basin	Nonattainment
North Central Coast Air Basin	Nonattainment-Transitional
South Central Coast Air Basin	~~Nonattainment~~
Santa Barbara County	*Nonattainment-Transitional*
San Luis Obispo and Ventura Counties	*Nonattainment*
South Coast Air Basin	Nonattainment
San Diego Air Basin	Nonattainment
Northeast Plateau Air Basin	Attainment
Sacramento Valley Air Basin	
Colusa and Glenn Counties	Attainment
Sutter and Yuba Counties	Nonattainment-Transitional
Butte, Shasta, and Tehama Counties	Nonattainment
Placer, Sacramento, Solano, and Yolo Counties	Nonattainment
San Joaquin Valley Air Basin	Nonattainment
Great Basin Valleys Air Basin	
Alpine County	Unclassified
Inyo County	Nonattainment
Mono County	Nonattainment

§ 60201. Table of Area Designations for Ozone. (continued)

Area	*Designation*
Mojave Desert Air Basin	Nonattainment
Salton Sea Air Basin	Nonattainment
Mountain Counties Air Basin	
Amador, Calaveras, El Dorado, Nevada, Placer, Mariposa, and Tuolumne Counties	Nonattainment
Plumas and Sierra Counties	Unclassified
Lake County Air Basin	Attainment
Lake Tahoe Air Basin	Nonattainment-Transitional

NOTE: Authority cited: Sections 39600, 39601 and 39608, Health and Safety Code. Reference: Sections 39608 and 40925.5, Health and Safety Code.

FINAL REGULATION ORDER

CALIFORNIA CODE OF REGULATIONS
Title 17. Public Health
Division 3. Air Resources Board
Chapter 1. Air Resources Board
Subchapter 1.5. Air Basins and Air Quality Standards
Article 1.5 Area Pollutant Designations

Amend section 60201, title 17, California Code of Regulations to read as follows:

[Note: Additions are shown as *underline italics* and deletions as ~~strikeout~~.]

§ 60201. Table of Area Designations for Ozone.

Area	*Designation*
North Coast Air Basin	Attainment
San Francisco Bay Area Air Basin	Nonattainment
North Central Coast Air Basin	Nonattainment-Transitional
South Central Coast Air Basin	
Santa Barbara County	~~Nonattainment-Transitional~~*Attainment*
San Luis Obispo and Ventura Counties	Nonattainment
South Coast Air Basin	Nonattainment
San Diego Air Basin	Nonattainment
Northeast Plateau Air Basin	Attainment
Sacramento Valley Air Basin	
Colusa and Glenn Counties	Attainment
Sutter and Yuba Counties	
Sutter Buttes	Nonattainment
Remainder of Sutter and Yuba Counties	~~Attainment~~*Nonattainment*
Butte, Shasta, and Tehama Counties	Nonattainment
Placer and Sacramento Counties	Nonattainment
Solano and Yolo Counties	Nonattainment-Transitional
San Joaquin Valley Air Basin	Nonattainment
Great Basin Valleys Air Basin	
Alpine County	Unclassified
Inyo County	Nonattainment
Mono County	Nonattainment
Mojave Desert Air Basin	Nonattainment
Salton Sea Air Basin	Nonattainment
Mountain Counties Air Basin	
Amador, Calaveras, El Dorado, Nevada, Placer, Mariposa, and Tuolumne Counties	Nonattainment

Plumas and Sierra Counties	Unclassified
Lake County Air Basin	Attainment
Lake Tahoe Air Basin	Attainment

NOTE: Authority cited: Sections 39600, 39601 and 39608, Health and Safety Code. Reference: Sections 39608 and 40925.5, Health and Safety Code.

Footnote 17

Final Regulation Order

Amend sections 60201 and 60210, title 17, California Code of Regulations, to read as follows:

[Note: The proposed amendments are shown in underline to indicate additions and ~~strikeout~~ to indicate deletions from the existing regulatory text.]

§ 60201. Table of Area Designations for Ozone.

Area	Designation
North Coast Air Basin	Attainment
San Francisco Bay Area Air Basin	Nonattainment
North Central Coast Air Basin	~~Nonattainment-Transitional~~Attainment
South Central Coast Air Basin	
Santa Barbara County	~~Attainment~~Nonattainment
San Luis Obispo and Ventura Counties	Nonattainment
South Coast Air Basin	Nonattainment
San Diego Air Basin	Nonattainment
Northeast Plateau Air Basin	Attainment
Sacramento Valley Air Basin	
Shasta	Nonattainment-Transitional
Colusa and Glenn Counties	Attainment
Sutter and Yuba Counties	
Sutter Buttes	Nonattainment
Remainder of Sutter and Yuba Counties	Nonattainment
Butte, Shasta, and Tehama Counties	Nonattainment
Placer and Sacramento Counties	Nonattainment
Solano and Yolo Counties	Nonattainment-Transitional
San Joaquin Valley Air Basin	Nonattainment
Great Basin Valleys Air Basin	
Alpine County	Unclassified
Inyo County	Nonattainment
Mono County	Nonattainment
Mojave Desert Air Basin	Nonattainment
Salton Sea Air Basin	Nonattainment
Mountain Counties Air Basin	
Amador County	Nonattainment-Transitional
~~Amador,~~ Calaveras, El Dorado, Nevada, Placer, Mariposa, and Tuolumne Counties	Nonattainment
Plumas and Sierra Counties	Unclassified
Lake County Air Basin	Attainment
Lake Tahoe Air Basin	Attainment

Note: Authority cited: sections 39600, 39601, and 39608, Health and Safety Code. Reference: sections 39608 and 40925.5, Health and Safety Code.

§ 60210. Table of Area Designations for Fine Particulate Matter ($PM_{2.5}$).

Area	Designation
North Coast Air Basin	Attainment
San Francisco Bay Area Air Basin	Nonattainment
North Central Coast Air Basin	Attainment
South Central Coast Air Basin	
San Luis Obispo County	Attainment
Santa Barbara County	Unclassified
Ventura County	Attainment
South Coast Air Basin	Nonattainment
San Diego Air Basin	Nonattainment
Northeast Plateau Air Basin	Attainment
Sacramento Valley Air Basin	
Butte County	Nonattainment
Colusa, Glenn, Placer, Sutter and Yuba Counties	Attainment
Sacramento County	Attainment
Shasta County	Attainment
Remainder of Air Basin	Unclassified
San Joaquin Valley Air Basin	Nonattainment
Great Basin Valleys Air Basin	Attainment
Mojave Desert Air Basin	
San Bernardino County	
County Portion of federal Southeast Desert Modified AQMA for Ozone[1]	Attainment
Remainder of San Bernardino County and Kern, Los Angeles, and Riverside Counties	~~Unclassified~~Attainment
Salton Sea Air Basin	
Imperial County	
City of Calexico[2]	Nonattainment
Remainder of Imperial County and Riverside County	Attainment
Mountain Counties Air Basin	
Plumas County	
Portola Valley[3]	Nonattainment
Remainder of Plumas County and Amador, Calaveras, El Dorado, Mariposa, Nevada, Placer, Sierra, and Tuolumne Counties	Unclassified
Lake County Air Basin	Attainment
Lake Tahoe Air Basin	Attainment

[1] section 60200(b)
[2] section 60200(a)
[3] section 60200(c)

Note: Authority cited: sections 39600, 39601 and 39608, Health and Safety Code. Reference: section 39608, Health and Safety Code.

apcd air pollution control district
SANTA BARBARA COUNTY

February 19, 2021

Clerk of the Board
California Air Resources Board
1001 I Street
Sacramento, California 95814

Re: Proposed 2020 Amendments to Area Designations for State Ambient Air Quality Standards

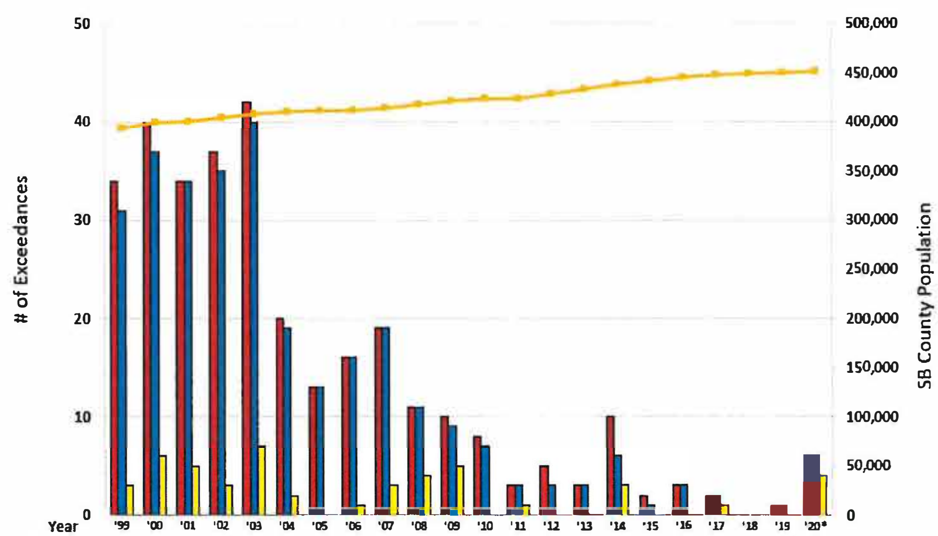
Dear Chair Randolph and Members of the Board,

Santa Barbara County Air Pollution Control District (District) appreciates the opportunity to comment on the California Air Resources Board (CARB) Proposed 2020 Amendments to the Area Designations for State Ambient Air Quality Standards.

In 2019, we were pleased that, after decades of hard work and progress, Santa Barbara County was designated attainment for the State 8-hour ozone standard. We were cautiously optimistic that through all the measures being implemented locally and statewide, we could maintain that status into the future. However, we are aware that weather and air pollutant emissions vary, leading to different pollutant concentration outcomes from one year to the next. Unfortunately, two values recorded in 2019 that are now included in the three-year data set (2017 to 2019) have led to a change in designation back to nonattainment, as indicated in CARB staff proposal.

The District has rigorously followed the triennial air quality plan and update schedule to achieve and maintain the ozone standard by the earliest practicable date, as required by the California Clean Air Act. The local ozone plans serve as our roadmap to develop cost-effective rules and programs to reduce ozone precursors from local sources. Local rules have been adopted, implemented, and enforced to expeditiously attain the State ozone standard. While emissions from stationary sources make up 12% of the total ozone precursor emissions in Santa Barbara County, it is imperative that our local efforts are well supported by CARB's steadfast actions to reduce emissions from sources outside the District's regulatory control such as mobile and area sources.

Over time, the number of exceedances of the State ozone standard in Santa Barbara County has greatly dropped, while population continues to grow. The chart to the right is a great illustration of the success achieved when appropriate steps are taken at both the local and state levels. With



Year	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15	'16	'17	'18	'19	'20*
State 8-hour	34	40	34	37	42	20	13	16	19	11	10	8	3	5	3	10	2	3	2	0	1	6
Fed. 8-hour	31	37	34	35	40	19	13	16	19	11	9	7	3	3	3	6	1	3	2	0	1	6
State 1-hour	3	6	5	3	7	2	0	1	3	4	5	0	1	0	0	3	0	0	1	0	0	4
Population																						

*Data for 2020 is preliminary

the high of 42 exceedances of the State ozone standard in 2003, the District measured a significant reduction in number of ozone exceedances in the 17 years that followed – to the point in 2018 when no exceedances were measured. To maintain this level of success, CARB's continued efforts to reduce emissions from mobile sources is imperative.

The wildfire impacts that California experienced in the late summer and fall of 2020 were a harsh reminder that weather, climate, and other conditions outside of our control can lead to unhealthy air quality, even when the fires are not occurring in our region. As directed by California Senate Bill 1260 and in coordination with other local agencies, the District has facilitated prescribed burning in strategic locations in Santa Barbara County, with the long-term goal of avoiding catastrophic wildfires. The District also works with CARB to provide a regional cache of portable air quality monitors available for deployment during prescribed burns. Although these efforts have been successful, we acknowledge that there is a long way to go, and we will continue to partner with state and local agencies to improve outcomes. During the 2020 wildfires, the District measured both particulate matter and ozone levels that exceeded state and/or federal air quality standards. The District deeply appreciates CARB's willingness to work with air districts to demonstrate that these measurements qualify as exceptional events that were affected by catastrophic wildfires.

The District requests CARB's full support and partnership in addressing our common air quality goals. While CARB's staff report for the proposed 2020 amendments to area designations characterizes the overall fiscal impact to the District to be relatively minimal over the three-year period, it must be noted that the District is already implementing many other responsibilities without additional revenue. To be specific, CARB recently decided to close two air monitoring stations in Santa Barbara County that provide valuable air quality information for the highest populated regions of the county. In response, the District worked to reallocate resources and take over the ongoing operation, quality assurance, and data submittal for these monitoring stations without any additional revenue to cover this new expense. Another example is CARB's newly adopted Regulation for the Reporting of Criteria Air Pollutants and Toxic Air Contaminants that will result in additional staff time to implement. Once again, the District is required to take on additional responsibilities without additional revenue to compensate for staff time.

Voluntary programs are an important tool to achieve near-term emission reductions from mobile sources, such as ocean-going vessels and on-road and off-road vehicles. However, they require significant funding and staff resources. We request your support to identify funding that will allow the District to successfully implement these critical programs. Together, we will work to both attain and maintain state and federal ambient air quality standards, to help the community better understand emission sources and air quality issues, and to protect our diverse populations from the effects of air pollution.

Sincerely,

Aeron Arlin Genet
Air Pollution Control Officer

cc: Richard Corey, CARB Executive Officer
Edie Chang, CARB Deputy Executive Officer