BEFORE THE HEARING BOARD OF THE SAN LUIS OBISPO COUNTY
AIR POLLUTION CONTROL DISTRICT
STATE OF CALIFORNIA

In the Matter of

SAN LUIS OBISPO COUNTY AIR POLLUTION CONTROL DISTRICT,
Petitioner,
v.
CALIFORNIA DEPARTMENT OF PARKS AND RECREATION OFF-HIGHWAY MOTOR VEHICLE RECREATION DIVISION, Respondent.
Case No. 17-01

AIR POLLUTION CONTROL OFFICER'S APPLICATION TO MODIFY THE TERMS AND CONDITIONS OF STIPULATED ORDER OF ABATEMENT IN CASE 17-01 DATED OCTOBER 1, 2024

Hearing Date: October 15, 2024
Time: 9:00 a.m.
Location: Board of Supervisors Chambers
1055 Monterey Street, San Luis Obispo, CA

Contents

Introduction

In accordance with Section 6.a of the original Stipulated Order of Abatement in Case 17-01 (SOA), issued April 30, 2018,[1] the Air Pollution Control Officer (APCO) of the San Luis Obispo County Air Pollution Control District (District) submits this Application to Modify the Terms and Conditions of said SOA. For the reasons set forth in the following sections, good cause exists for the San Luis Obispo County Air Pollution Control District Hearing Board (Hearing Board) to approve the proposed amendment.

The proposed amendment would extend the term of the SOA for an additional 3 years, to December 1, 2028, and require the California Department of Parks and Recreation Off-Highway Motor Vehicle Recreation Division (State Parks) to continue to prepare Annual Reports and Work Plans (ARWPs) in 2025, 2026, and 2027. It would also require that State Parks obtain the Hearing Board's approval by October 16, 2028, that off-roading related emissions have been abated. Finally, in approving the amendment, the Hearing Board would be approving the final excess emissions goal.

Background

Original SOA and Previous Modifications

The SOA was approved in 2018 with the dual goals of 1) achieving the state and federal PM_{10} standards and 2) reducing PM_{10} emissions from the Oceano Dunes State Vehicular Recreation Area (ODSVRA) by 50%. Among other things, the SOA also established a Scientific Advisory Group (SAG) composed of experts in fields relevant to controlling wind-blown dust from coastal dunes.

After 4 years of careful study by those experts, as well as continued data collection and analysis, the SAG proposed a refined emissions reduction goal, namely reducing ODSVRA emissions to "pre-disturbance" levels.[2] Their proposal acknowledged that area is naturally sandy and windy, such that even in the absence of vehicular disturbance there would still be dust emissions and periodic exceedances of the PM_{10} standards. The District therefore applied to the Hearing Board in 2022 to amend the SOA to change its goals to: 1) eliminating emissions in excess of natural emissions that contribute to standard violations and 2) reducing ODSVRA emissions to a level consistent with the pre-disturbance scenario identified by the SAG.[3] The Hearing Board approved of this change at their hearing on October 14, 2022.[4] The modification also required that State Parks obtain Hearing Board approval of the final excess emissions goal by October 16, 2024.

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[1] Hearing Board of the San Luis Obispo County Air Pollution Control District, "Stipulated Order Of Abatement," Case 17-01, filed May 4, 2018. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/Filed%20%26%20Approved%20SOA%20Case%2017-01%20Apr-30-18.pdf.

[2] Scientific Advisory Group, "Scientific Basis for Possible Revision of the Stipulated Order of Abatement (SOA)," February 7, 2022. Available online at https://slocounty.granicus.com/MetaViewer.php?meta_id=414120.

[3] "Air Pollution Control Officer's Application to Modify the Terms and Conditions of Stipulated Order of Abatement in Case 17-01," October 5, 2022. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/Application%20to%20modify.pdf.

[4] Hearing Board of the San Luis Obispo County Air Pollution Control District, "Order to Modify Stipulated Order Of Abatement," Case 17-01, filed October 18, 2022. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/SOA%2017-01%20Second%20Amendment%20Final%20Adopted%2010-14-2022%20%26%20Filed.pdf.

Emissions from the ODSVRA cannot be measured directly, and even if they could, the pre-disturbance state of the ODSVRA can only be inferred. Therefore, modeling and assumptions are needed to estimate emission rates and characterize pre-disturbance conditions. While the District, State Parks, and the SAG all agreed on the need to update the SOA's goals, there were still significant unresolved modeling issues at the time of the 2022 hearing, as detailed in the application to modify the SOA filed by the APCO.[3] Therefore, the APCO's approvals of the 2022 and 2023 Annual Reports and Work Plans (ARWPs) included detailed conditions intended to address these concerns.[5,6]

2024 ARWP and Further Model Refinements

On August 1, 2024, State Parks submitted a Draft 2024 ARWP.[7] The District[8] and SAG[9] provided comments to State Parks on the draft, and on September 11, State Parks submitted a Provisional Final ARWP.[10] On September 13, the SAG provided comments on the revised ARWP,[11] and on September 17, the APCO provisionally approved it, stating that "After considering all public comment received at the workshop [to be held October 15, 2024], the District will make a final decision on the draft ARWP. Approval would likely be conditional."[12] The APCO's provisional approval letter is

[5] Gary E Willey to Sarah Miggins, "Conditional Approval of California Department of Parks and Recreation's 2022 Annual Report and Work Plan in Response to Stipulated Order of Abatement Number 17-01" October 21, 2022. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/Final%20Conditional%20Approval%20-%20Revised.pdf.

[6] Gary E Willey to Sarah Miggins, "Conditional Approval of California Department of Parks and Recreation's 2023 Annual Report and Work Plan in Response to Stipulated Order of Abatement Number 17-01," October 18, 2023. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2023-10-18%20Conditional%20Approval.pdf.

[7] California Department of Parks and Recreation, "Oceano Dunes State Vehicular Recreation Area Dust Control Program: DRAFT 2024 Annual Report and Work Plan," August 1, 2024. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024ARWP_APCDDraft_20240801_Reduced.pdf attachments available at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024ARWP_APCDDraft_Attachments_reduced.pdf.

[8] Gary E Willey to Sarah Miggins, "Comments on the California Department of Parks and Recreation's August 1, 2024, Oceano Dunes SVRA Draft 2024 Annual Report and Work Plan in Response to Stipulated Order of Abatement Number 17-01," August 21, 2024. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024-08-21%20APCD%20Comments%20on%20Draft%202024%20ARWP.pdf.

[9] Scientific Advisory Group, SAG Review of CDPR '2024 ARWP_ProvFinal_20240911_reduced'," August 13, 2024. Available online https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/SAG%20Memo%20-%20SAG%20Review%20of%202024%20ARWP%20%28September%2011%20version%29_FINAL_202409132.pdf.

[10] California Department of Parks and Recreation, "Oceano Dunes State Vehicular Recreation Area Dust Control Program: Provisional Final 2024 Annual Report and Work Plan," September 11, 2024. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024ARWP_ProvFinal_20240911_reduced.pdf; attachments available at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024ARWP_ProvisionalFinal_Attachments_reduced.pdf.

[11] Scientific Advisory Group, SAG Review of CDPR "SAG Review of CDPR '2024 ARWP_ProvFinal_20240911_reduced'," September 13, 2024. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/SAG%20Memo%20-%20SAG%20Review%20of%202024%20ARWP%20%28September%2011%20version%29_FINAL_202409132.pdf.

[12] Gary E Willey to Sarah Miggins, "Provisional Approval of California Department of Parks and Recreation's (State Parks) September 11, 2024, version of the 2024 Annual Report and Work Plan in Response to Stipulated Order of Abatement Number 17-01," September 17, 2024. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024-09-17%20APCD%20Provisional%20Approval%20of%202024%20ARWP.pdf.

included in Appendix A. The timeline for submittal and review of the ARWP was followed as specified in the Order to Modify the Existing Stipulated Order of Abatement, issued November 18, 2019.[13,14]

Since the last SOA modification, the District, State Parks, and the SAG have successfully resolved the modeling issues noted above, enabling a fair and scientifically robust comparison of emissions between the ODSVRA as currently configured to the area as it existed in the pre-disturbance scenario. As discussed in the 2024 ARWP, the revised modeling indicates that the ODSVRA emits less dust today than it did before significant vehicular disturbance. For this reason, no new mitigation areas are proposed in the ARWP.

Despite this success, the 2024 ARWP proposes some additional refinements to the modeling. These are relatively minor compared to those made since the previous SOA modification in 2022, and the District does not expect them to change the overall conclusion that emissions are lower now than before vehicular disturbance. Nonetheless, the updates are needed to ensure confidence in the results, so the District cannot, at this time, find that Parks has achieved compliance with the air quality goals of the SOA.

These refinements to the model are detailed in Section 3.2.2 of the 2024 ARWP and include:

- Expanding the modeling domain to include the entire ODSVRA. To date, the modeling has excluded the northern and southernmost portions of the park, which are non-riding areas.
- Updating the boundaries of vegetation islands and revegetation projects. These areas are assumed to be non-emissive. The ODSVRA is a dynamic landscape, and portions of vegetated areas may become covered by shifting dunes, or plantings may otherwise fail, reverting an area to bare sand. Vegetation may also expand as plants mature and spread. To ensure that the model reflects the on-the-ground reality, vegetation boundaries will need to be updated periodically.
- Incorporate additional PI-SWERL emissivity measurements into the emissivity profiles used for defining how much PM_{10} is generated under different wind conditions.

The District regards the final item as having the most potential to change the conclusions of the modeling. As noted in our comments on the SAG's recommendation regarding emissivity assumptions,[15] we continue to have reservations about the emissivity profiles used for modeling the Plover Exclosure area, which is an area that was previously open to vehicles seasonally but has been permanently off limits to vehicles for the last few years. Compared to other areas of the ODSVRA, relatively few PI-SEWRL emissivity measurements have been made there, and the available measurements may not be representative. Using the available data, the current model assumes this

[13] Hearing Board of the San Luis Obispo County Air Pollution Control District, "Order to Modify Stipulated Order Of Abatement," Case 17-01, filed December 9, 2019. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/AMENDED%20Order%20of%20Abatement%2011-18-19_FILED_1.pdf.
[14] All of the aforementioned documents and other related materials are available on the District's website at https://www.slocleanair.org/air-quality/oceano-dunes-efforts.php.
[15] San Luis Obispo Air Pollution Control District, "APCD Comments on the SAG Proposal Re: Emissivity Grids," August 1, 2023. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/Revised%20Comments%20on%20SAG%20proposal%20on%20emissivity%20grids.pdf.

area to be less emissive today than it was prior to vehicular disturbance and also less emissive than other non-riding areas within the current ODSVRA.

At the request of the District, State Parks undertook supplemental modeling in which the Plover Exclosure area was modelled assuming the higher emissivity of the contemporary non-riding area. As noted in a footnote in the 2024 ARWP,[16] this supplementary modeling also found that emissions from the ODSVRA are lower today than in the pre-disturbance scenario, though by a narrower margin. Thus, even if emissions from the Plover Exclosure are underestimated, the overall conclusion that emissions have been reduced to below pre-disturbance levels is likely still valid. For this reason, the APCO has provisionally approved the 2024 ARWP, which, as noted above, does not plan for any additional dust control acreage. The APCO's provisional approval letter is included as Appendix A.

Furthermore, State Parks has been conducting additional PI-SWERL emissivity measurements in the park this year, including in the Plover Exclosure, and the model's emissivity profiles will be updated with these data. If these updates do change the overall conclusion, then State Parks could be required to implement additional dust controls in 2025. The provisional approval for the 2024 ARWP requires this:

> *"These [model] refinements shall be completed in time for updated modeling results to be included in the 2025 ARWP and for additional dust controls to be designed and installed by the expiration of the SOA if the refined modeling suggests that they are needed to comply with the SOA."*

The Proposed Modification of the SOA

Extension of the Term

The primary objective of the SOA modification requested by the APCO is to extend its term out to December 1, 2028. As currently amended, the SOA expires December 1, 2025. Sections 1, 2.a, 3, and 4 of the proposed modification implement this extension. These sections are nearly identical to Sections 1, 3.a, 6, and 7, respectively, of the previous modification of October 14, 2022,[4] with the dates updated to reflect the longer term.

The extension is needed to ensure that State Parks has met the emissions reduction goals of the SOA and to ensure that they can remain in compliance. As noted above, the modeling issues identified at the time of the last modification have been resolved, but additional refinements are needed to improve accuracy. As it stands, the modeling shows that the ODSVRA is less emissive today than prior to vehicular disturbance, but the updates are needed to have full confidence in this conclusion. Results from the refined model are expected by July 2025; if they show that additional dust controls are needed, State Parks would only have until December 1 of that year to implement them unless the term of the SOA is extended.

Whether further controls are need or not, additional time to collect confirmatory data and monitor the dust controls is needed to ensure sustainability of the emission reductions. As discussed in more detail below, analyses of downwind air quality data by the District and State Parks indicate that the

[16] Footnote B to Table 2-9 on page 2-79 of Reference 10.

dust controls are having the desired effect; however, there is significant year-to-year variation, so having more years of confirmatory monitoring would increase confidence in this conclusion.

Finally, extending the SOA to 2028 ensures that the dust controls remain in place and are maintained, "locking in" their air quality benefits.

Approval of Final Excess Emissions Goal

Section 3.b of the previous modification of the SOA, dated October 14, 2022,[4] states that "By October 16, 2024, in consultation with the SAG and CARB [(California Air Resources Board)], the Respondent shall obtain Hearing Board approval of a final excess emissions goal." This was meant to give the Hearing Board final say on whether the goal is sufficient to abate off-roading related emissions that cause standard exceedances. In the current proposed order, the "Findings and Decision of the Hearing Board" section states that "The Hearing Board approves the final excess emissions goal proposed by the Respondent…." Thus, if the Hearing Board approves the proposed modification, it would be approving the final excess emissions goal. (But it would not, at this time, be finding that the final goal has been achieved.)

This "Findings and Decision of the Hearing Board" section of the proposed order goes on to state that

> *"[The] approved excess emissions goal is to reduce PM10 emissions from the ODSVRA to a level at or below a pre-disturbance condition, initially identified by the SAG in the document 'Scientific Basis for Possible Revision of the Stipulated Order of Abatement,' dated February 7, 2022, and subsequently modified as detailed in the 2024 ARWP."*

This is largely a restatement of the initial emissions reductions goal put forth in Section 3.c of the 2022 modification, i.e., the initial goal put forth in 2022 would become the final goal. What has changed since 2022 is that the modeling issues noted at the time have been worked out. The updated protocol is described in Section 2.3.2.2 of the 2024 ARWP ("Current Approach to Excess Emissions Modeling"), which, as already noted, has been provisionally approved by the APCO.

This section of the proposed order also acknowledges that the modeling protocol may continue to evolve beyond the refinements planned in the 2024 ARWP. The District is not aware of any potential refinements beyond those mentioned in the 2024 ARWP, but we have seen that as data is gathered and our collective understanding evolves, opportunities for further refinement become apparent. The proposed order requires APCO approval of any changes beyond those already proposed: "The details of the modeling protocol and the underlying data may continue to be refined; any changes beyond those proposed in the conditionally approved 2024 ARWP are subject to SAG review and the approval of the APCO."

The "Findings and Decision of the Hearing Board" section of the proposed order ends with:

> *"The initial modeling results in the 2024 ARWP indicates that ODSVRA is not in excess of naturally occurring emissions and therefore it may be appropriate for State Parks to move towards a long-term maintenance and adaptive management program to remain in compliance with the Stipulated Order of Abatement as modified."*

This statement acknowledges that the current modeling indicates that no additional dust controls are needed to comply with the SOA. If, as expected, the model refinements do not change this conclusion, then it would be appropriate for State Parks to maintain the existing controls, but no further conversion of open riding area to dust controls would be necessary.

Approval That The Emissions Goal Has Been Met

Section 2.b of the proposed modification states that "By October 16, 2028, in consultation with the SAG and CARB, the Respondent shall obtain Hearing Board approval that the approved excess emissions goal has been met." If approved, this provision would give the Hearing Board the final say as to whether the goal defined above has been met. If State Parks is unable to obtain this approval, then pursuant to California Health and Safety Code Section 42451, the Hearing Board could hold a public hearing and issue an order for abatement requiring further actions.

Other Elements

Section 5 of the proposed order clarifies the process for changing SAG membership, and it also specifies that funding for in-person meetings is at the discretion of the APCO and State Parks. The final two sections are standard language specifying that all other provisions of the original SOA and the first and second amendments remain in effect. If there is a conflict between this amendment and the original SOA and/or the prior amendments, the terms of this amendment prevail. Finally, recitals have been added acknowledging 1) the procedural history, 2) the APCO's reliance on the SOA to abate ODSVRA dust in lieu of enforcement action under Rule 1001, and 3) that State Parks intends to maintain the dust control program.

Dust Controls and Their Effects on Air Quality

Since the SOA came into effect in 2018, the extent of dust controls has expanded greatly, as shown in Figure 1. At present there are 740.1 acres of controls within the ODSRVA, configured as shown in Figure 2. As discussed in the preceding sections, the ARWP modeling indicates that these controls have reduced emissions to such an extent that today the ODSVRA emits less PM_{10} than it did prior to vehicular disturbance. This is a modeled result. The District and State Parks use monitoring data to test whether the modeled emissions reductions are actually occurring. As discussed below, analyses of air quality trends confirms that they are.

A synopsis of the District's analysis appears below; our full analysis is provided in Appendix B, which is taken from the forthcoming 2023 Annual Air Quality Report. These reports are typically published on our website in early November[17] and presented to the District Board of Directors at their meeting later that month. The full 2023 report will be available at that time, but the section on the ODSVRA is provided here to support this application.

State Parks has developed a complementary metric to evaluate the impact of their dust control program on downwind air quality. Called the Total PM_{10} to Total Wind Power Density ratio (TPM_{10}:TWPD ratio), the results of this analysis are also reviewed in this section.

[17] San Luis Obispo Air Pollution Control District, *Air Quality Reports*, https://www.slocleanair.org/library/air-quality-reports.php.

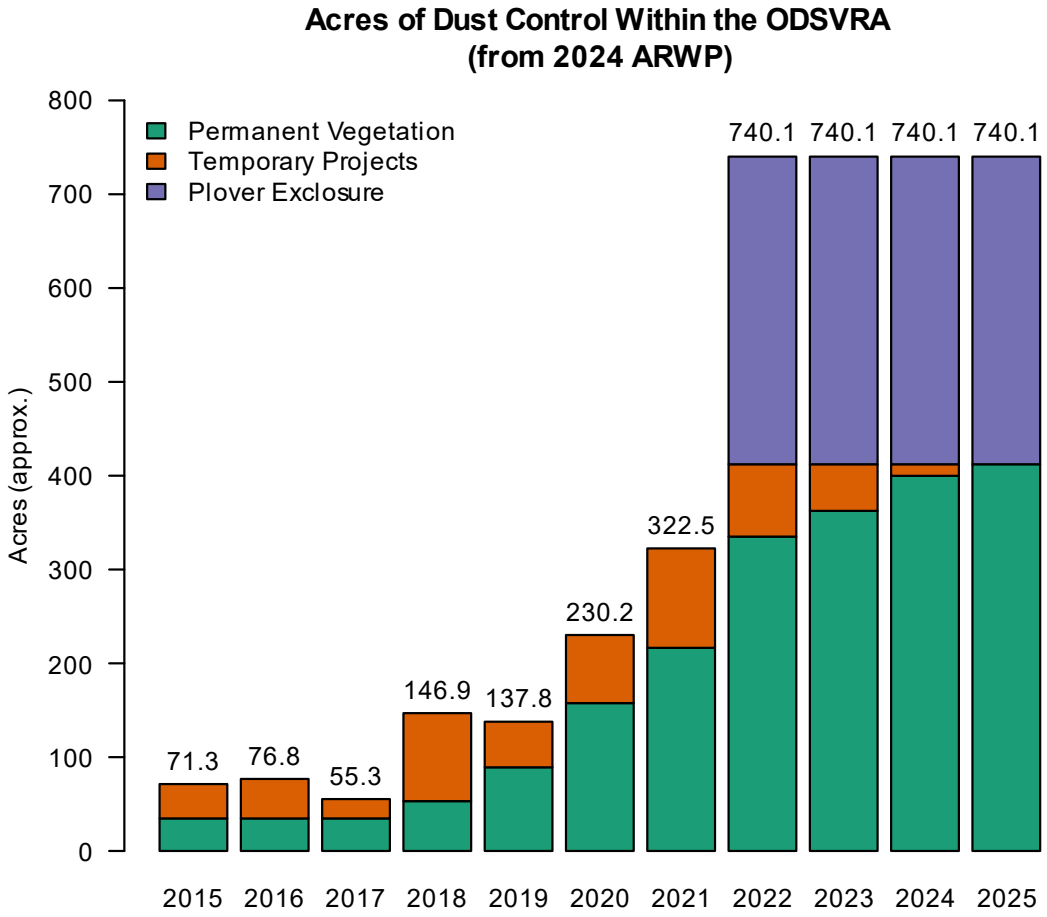

Figure 1: Cumulative dust control acreage within the ODSVRA. Areas are taken from Attachment 01 of the 2024 ARWP (Reference 10). The Temporary Projects category includes wind fence arrays, straw treatments, porous roughness elements, and vehicle exclosures, and the Plover Exclosure category includes the 293.3 acres of the permanently closed plover nesting area and the 34.6 acres of the "foredune beach and corridor" which is closed seasonally for plover protection.

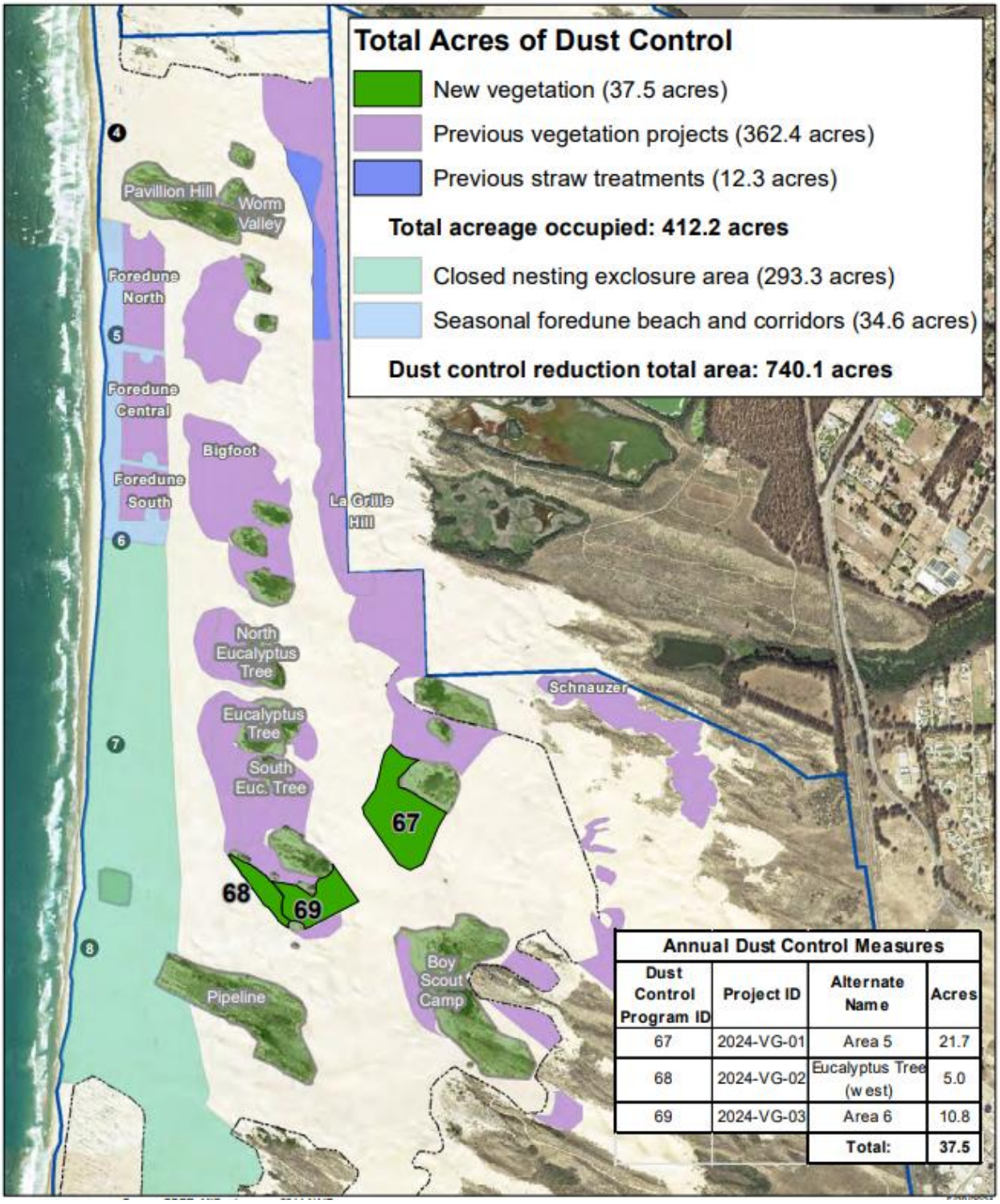

Figure 2: 2024 Dust Controls. Reproduced from Figure A01-15 from Attachment 01 of the 2024 ARWP.

Basic Indicators

Trends in basic air quality indicators all indicate major improvements in PM_{10} levels on the Nipomo Mesa. In 2023, the number of exceedances of the California PM_{10} Standard reached an all-time low at both CDF and Mesa2, the District's monitoring stations directly downwind of the ODSVRA. As shown in Figure 3, below, which is also taken from the forthcoming 2023 Annual Air Quality Report, in the years just before the SOA came into effect there were 60 to 97 exceedances each year at CDF. In 2023, there were just 23. Mesa2 saw even fewer, with only 19.

Similarly, in 2023 there were only 2 hours at CDF when PM_{10} was above 300 $\mu g/m^3$, which is an all-time low—lower even than in 2020 when the park was closed to vehicles for most of the year due to COVID-19. Annual violations of Rule 1001 also reached an all-time low in 2023 with only 11. This is a substantial drop from the previous low of 30 from 2022. See Appendix B for graphs of these trends.

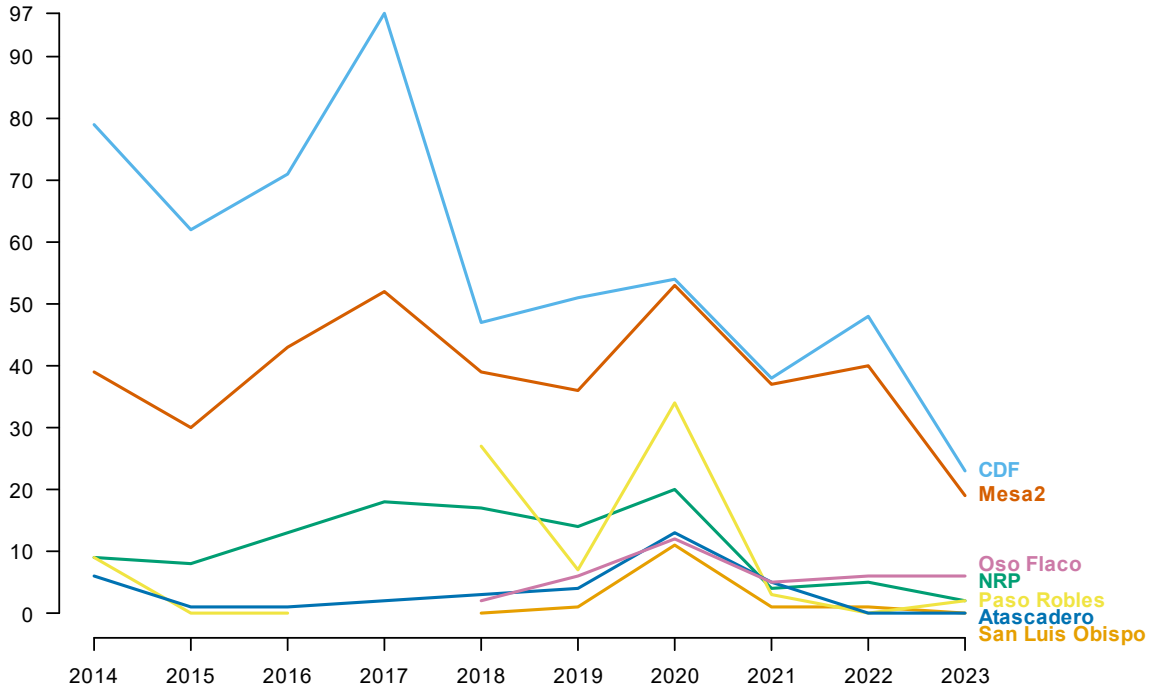

Figure 3: Exceedances of the California 24-hour PM_{10} Standard, 2014–2023.

Difference-in-Differences

The basic indicators discussed above are easily understandable metrics for illustrating long-term changes in air quality; however, they do not account for important factors that also affect PM_{10} levels in the area. Air quality is influenced not only by the dust control projects, but also by non-ODSVRA sources including wildfire smoke and dust transported from the San Joaquin Valley. Annual variations in meteorology, especially the strength and direction of onshore winds, also affect air quality trends. It is the wind that drives dust emissions, so all else being equal, windier years are expected to be dustier and to have more PM_{10} exceedances than less windy years.

As discussed in more detail in Appendix B and the references therein, the District developed a "difference-in-differences" metric to isolate the effect of the mitigations on PM_{10} levels downwind of the ODSVRA. The results of the analysis indicate that the mitigations have now reduced PM_{10} levels at CDF by 38.1% on windy days. In concrete terms, the median wind event day PM_{10} concentration at CDF was 45 $\mu g/m^3$ in 2023; this analysis predicts it would have been 73 $\mu g/m^3$ if these mitigation projects had not been implemented. At Mesa2 where pre-mitigation levels were substantially lower than CDF, there has been a 22.2% improvement.

CDF and Mesa2 show continued year-over-year improvement, even as the footprint of the mitigations remained unchanged in 2023. This is likely due to the continued growth and maturation of previously installed vegetation projects and the conversion of temporary projects to permanent dust controls. The overall improvement at Mesa2 is less than that for CDF (22.2% vs 38.1%), but this is expected as dust levels have traditionally been lower there than at CDF, so larger reductions are needed at CDF to achieve pre-disturbance levels. While the observed percent reduction is larger at CDF than at Mesa2, CDF still exceeds the PM_{10} standard more frequently and has a higher annual average than Mesa2.

TPM_{10}:TWPD ratio

State Parks' contractor, the Desert Research Institute, developed the TPM_{10}:TWPD ratio as a metric to track the impact of the dust control program on downwind air quality. Like the District's difference-in-differences analysis, the methodology isolates the effects of the dust controls by controlling for other factors affecting PM_{10} levels. The metric is described fully in the 2024 ARWP, its attachments, and the references therein.[18]

According to the 2024 ARWP, the TPM_{10}:TWPD ratios for both CDF and Mesa2 have decreased as dust controls have expanded and matured. As with the other metrics discussed above, the TPM_{10}:TWPD ratios for CDF and Mesa2 continued to decrease in 2023 even as there was no change in the footprint of the dust controls from 2022 to 2023. The ARWP states that the "metric indicates that the PM_{10} originating from the ODSVRA has been reduced by approximately 44.5% at CDF using the two-year (2022 and 2023) mean … compared with the baseline year of 2013 when there were few acres of dust control upwind of the CDF station. For Mesa2, the … metric indicates that the PM_{10} originating from the ODSVRA has been reduced by approximately 21% using the two-year (2022 and

[18] See Sections 2.21, 2.3.1, and Attachment 07 of the 2024 ARWP (Reference 10).

2023) mean value". These estimated reductions in ODSVRA-related PM_{10} at CDF and Mesa2 compare very favorably with the reductions derived from the difference-in-differences analysis noted above.

Air Quality Summary

A variety of indicators are evaluated to track changes in PM_{10} levels downwind of the ODSVRA; all agree that air quality has improved substantially as the ODSVRA dust controls have expanded and matured. Together, these various indicators corroborate the emissions reductions estimated by State Parks' emissions model.

Appendix A: Provisional Approval of the 2024 ARWP

SLO COUNTY apcd | Air Pollution Control District
San Luis Obispo County

September 17, 2024

Sarah Miggins
Deputy Director, OHMVR Division
California Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296-0001

SUBJECT: Provisional Approval of California Department of Parks and Recreation's (State Parks) September 11, 2024, version of the 2024 Annual Report and Work Plan in Response to Stipulated Order of Abatement Number 17-01

Dear Sarah Miggins:

Thank you for submitting a revised Provisional 2024 Annual Report and Work Plan (ARWP) on September 11, 2024, as required by Stipulated Order of Abatement Number 17-01 (SOA). The Scientific Advisory Group (SAG) submitted its review of this draft on September 13, 2024. We are provisionally approving this plan as it adequately addresses the comments from both the SAG and the District.

We have scheduled the public workshop for the ARWP to occur during the San Luis Obispo County Air Pollution Control District's (APCD) Hearing Board's annual SOA information update meeting on October 15, 2024. The meeting will be held in person at the San Luis Obispo County Board of Supervisors Chambers located at 1055 Monterey Street, San Luis Obispo. The format for the workshop portion of the meeting will include a presentation of the ARWP by State Parks, and presentation on the adequacy of the ARWP and effectiveness of the mitigation by the SAG and APCD.

After considering all public comment received at the workshop, the APCD's Air Pollution Control Officer (APCO) will make a final decision on the ARWP. Approval would likely be conditional; the conditions of the final approval may include:

- If the Plover Exclosure area, in whole or in part, is reopened to public vehicular access, State Parks shall simultaneously implement District-approved dust controls sufficient to offset the resulting increase in emissions. If feasible, a final set of PI-SWERL measurements should be taken in the area before it is reopened.

- The emissions model shall be refined as proposed in the ARWP, including incorporating 2024 PI-SWERL measurements and expanding the modeling domain. These refinements shall be completed in time for updated modeling results to be included in the 2025 ARWP and for additional dust controls to be designed and installed by the expiration of the SOA if the refined modeling suggests that they are needed to comply with the SOA.

Feel free to contact me with any questions.

Sincerely,

GARY E. WILLEY
Air Pollution Control Officer

t 805.781.5912 f 805.781.1002 w slocleanair.org 3433 Roberto Court, San Luis Obispo, CA 93401

Appendix B: Assessing the Effectiveness of ODSVRA Mitigations[19]

Introduction

Windblown dust from the ODSVRA continues to affect air quality in southern San Luis Obispo County. For two decades, the APCD has been engaged with the California Department of Parks and Recreation (State Parks) in an effort to resolve the issue and improve the region's air quality; these actions are chronicled on the APCD's website.[20] Since daily monitoring began at CDF in 2010, the annual number of exceedances of the California PM_{10} standard there has varied from many as 97 (in 2017) to as few as 23 (in 2023), with most related to ODSVRA dust. Over this period, State Parks has implemented various mitigation projects, with the total area of dust controls ranging from 1 to 740.1 acres.[21]

It would be overly simplistic to attribute year-to-year changes in the number of exceedances solely to changes in the extent of State Parks' mitigation efforts. This is because downwind PM_{10} concentrations are potentially influenced not only by the mitigations, but also by non-ODSVRA sources including wildfire smoke and dust transported from the San Joaquin Valley (SJV), and—most importantly—by variations in meteorology, especially the strength and direction of onshore winds. It is the wind that drives dust emissions, so, all else being equal, windier years are expected to be dustier and to have more PM_{10} exceedances than less windy years.

To quantify the effectiveness of these dust controls, recent Annual Air Quality Reports[22] have analyzed trends in particulate matter on the Nipomo Mesa. Appendix A of the 2017 Annual Air Quality Report proposed a "Difference-in-Differences" approach to disentangling the potential effects of the mitigations from meteorology and other factors. In a nutshell, this method looks at the ratio of PM_{10} concentrations between CDF and Oso Flaco on wind event days, and then asks whether that ratio changes from one year to the next. Comparing to Oso Flaco implicitly controls for inter-annual variations in meteorology and non-ODSVRA PM_{10} sources. This is because the mitigation measures are upwind of CDF but not Oso Flaco, so changes in the mitigations should affect dust levels at CDF but not at Oso Flaco. Meanwhile, both sites should experience the same trends in meteorology, and they should be similarly influenced by wildfires and regional particulate matter events. The Oso Flaco station was installed in mid-2015, so this analysis is only possible for 2016 and later years. 2017 is used as the baseline to compare other years to because it had the least amount of mitigation and is thus the closest possible scenario to a fully unmitigated baseline.

For this analysis, a wind event day is defined as any day when the hourly wind speed at 15:00 at the S1 Tower within the ODSVRA exceeds 9.445 m/s and the hourly wind direction at 13:00 at CDF is

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[19] This appendix presents a preview of "Assessing the Effectiveness of ODSVRA Mitigations" which will appear as Appendix A to the District's forthcoming 2023 Annual Air Quality Report. The full report will be available in November 2024 and will appear on the District's Air Quality Reports webpage here: https://www.slocleanair.org/library/air-quality-reports.php.

[20] https://www.slocleanair.org/air-quality/oceano-dunes-efforts.php;

[21] State of California, Department of Parks and Recreation, Provisional Final 2024 Annual Report and Work Plan, September 11, 2024. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2024ARWP_ProvFinal_20240911_reduced.pdf

[22] San Luis Obispo County Air Pollution Control District, Annual Air Quality Reports for 2015-2022, all available at https://www.slocleanair.org/library/air-quality-reports.php.

between 289.5 and 360 degrees. Any day that was obviously influenced by wildfire smoke or SJV dust transport was excluded from the analysis. While there have been many wildfire days and SJV dust days over the years, only two—October 11, 2021, and July 6, 2020—also met the criteria for being wind event days and were thus excluded from the analysis. See the 2017 Annual Air Quality Report for a more complete description of the methodology.[23]

The methodology of the 2017 Annual Air Quality Report has been used in subsequent Annual Air Quality Reports and presentations to the Hearing Board. Here, the methodology is applied to data from 2023. This year, the methodology is also applied to Mesa2 to quantify the response of PM_{10} levels at that site to the mitigations at the ODSVRA.

Results

The results for 2023 along with earlier years are summarized in Table A1, below.[24] Applying the methodology to the 2023 data yields a statistically significant 38.1% improvement in event-day PM_{10} at CDF compared to the baseline year of 2017 (95% CI: 24.9 to 48.9%; p-value: 7.8E-6). In concrete terms, the median wind event day PM_{10} concentration at CDF was 45 µg/m^3 in 2023; this analysis predicts it would have been 73 µg/m^3 if these mitigation projects had not been implemented.

For Mesa2, the methodology yields a statistically significant 22.2% improvement in event-day PM_{10} compared to the baseline year (95% CI: 6.8 to 35.0%; p-value: 6.8E-3). In concrete terms, the median wind event day PM_{10} concentration at this site was 37 µg/m^3 in 2023, and the analysis predicts it would have been 48 µg/m^3 without the mitigation projects.

Table A1: Summary of Change in Event-Day PM_{10} Ratio at CDF & Mesa2

Table 1: Difference-in-differences results, 2016-2023					
Year	**Total Dust Mitigation Extent (approx. acres)**	**Change, vs 2017 baseline, in Event-Day PM_{10} Ratio**			
		CDF vs Oso Flaco		**Mesa2 vs Oso Flaco**	
		Percent Change	**95% Confidence Interval**	**Percent Change**	**95% Confidence Interval**
2023	**740.1**	**- 38.1 %**	**-24.9% to -48.9%**	**- 22.2%**	**-6.8% to -35.0%**
2022	740.1	- 31.6%	-18.5% to -42.6%	- 13.8%	+1.4% to -26.7%
2021	322.5	- 33.5%	-16.1% to -47.3%	- 7.0%	+11.8% to -22.6%
2020	230.2	- 28.4%	-13.9% to -40.4%	+ 4.6%	+25.4% to -12.9%
2019	137.8	- 7.6%	+23.2% to -30.7%	+ 14.9%	+41.4% to -6.7%
2018	146.9	- 22.4%	-7.4% to -34.9%	- 2.3%	+14.3% to -16.4%
2017	55.3	- 0 %	n. a.	- 0 %	n. a.
2016	76.8	- 12.7%	+16.8% to -38.4%	- 4.2%	+17.8% to -22.0%

[23] San Luis Obispo County Air Pollution Control District, Annual Air Quality Reports for 2017, November 2018. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/2017aqrt-FINAL2.pdf.

[24] On February 9, 2024, District published a preliminary version of this analysis online as part of the document "Frequently Asked Questions: Air Quality and ODSVRA Mitigations," available at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/SOA_FAQ_Jan%202024v3.pdf. That analysis used data for 2023 which at that time was unofficial, so the analysis was deemed unofficial. Since then, the 2023 data has been fully validated and certified. There were no significant changes, and the official results reported here are identical to the unofficial results reported in February.

Discussion

As shown in Table A1, CDF and Mesa2 show continued year-over-over improvement, even as the footprint of the mitigations remained unchanged in 2023. This is likely due to the continued growth and maturation of previously installed dune restoration projects and the conversion of wind fencing and straw treatments to permanent dust controls. The overall improvement at Mesa2 is less than that for CDF (22.2% vs 38.1%), but this is expected as dust levels have traditionally been lower there than at CDF, so larger reductions are needed at CDF than at Mesa2 to achieve pre-disturbance levels. While the observed percent reduction is larger at CDF than at Mesa2, CDF still exceeds the PM_{10} standard more frequently and has a higher annual average than Mesa2, as shown in Figure 10 and 12, above.

The results of these analyses can be compared with the numbers of hours with PM_{10} greater than 300 $\mu g/m^3$ at each site. Unlike the difference-in-differences methodology, this metric does not account for the impact of wildfires and non-ODSVRA dust sources, but it does illustrate how peak concentrations have been affected by the dust mitigations. As shown in Figure A1 and A2, the number of such hours has generally decreased as the extent of the dust control program has increased. An exception to this trend is Mesa2 in 2023. Through October 2023, Mesa2 was on track to have the fewest such hours, but a storm in November resulted in 2023 having slightly more hours than 2022. The winds associated with the November storm were from the southeast, so the source of the elevated PM_{10} was likely not the ODSVRA. Another exception is CDF in 2020. There were substantially fewer hours over 300 $\mu g/m^3$ that year than in 2019 or 2021, despite it having the worst wildfire smoke impacts of any year on record. Also in 2020, the ODSVRA was closed to public vehicular traffic from March 27 through October 30, coinciding with most of the spring and fall windy seasons. Of the 4 hours that exceeded 300 $\mu g/m^3$, only one occurred during the period when the park was closed to vehicles. At Mesa2, this "COVID effect" is not apparent.

The results can also be compared to the annual number of violations of District Rule 1001. The ODSVRA is in violation of section C.3 of the rule every day in which the 24-hr average PM_{10} concentration at CDF exceeds 55 $\mu g/m^3$ and is more than 20% higher than the 24-hr average PM_{10} concentration at Oso Flaco.[25] As shown in Figure A3, below, with eleven violations, 2023 has the fewest annual violations on record.[26] This trend parallels the improvement in CDF levels revealed by the difference-in-differences analysis. Note, however, that comparing the number of Rule 1001 violations from one year to the next is complicated by the fact that the Oso Flaco monitor was offline for significant periods of certain years. For example, there were 10 days in 2017 when CDF PM_{10} exceeded 55 $\mu g/m^3$ but the Oso Flaco monitor was offline, and thus compliance with Rule 1001.C.3 could not be determined.

[25] San Luis Obispo County Air Pollution Control District, Rule 1001 Coastal Dunes Dust Control Requirements, Adopted November 16, 2011, Revised by Court Order CV12-0013, March 7, 2016. Available online at https://storage.googleapis.com/slocleanair-org/images/cms/upload/files/Rule_1001.pdf.

[26] The Oso Flaco monitor was established in 2015. Data from that year is omitted from Figure 3, since it operated for only half of the year, not including the spring windy season when most exceedances of the state PM_{10} standard and Rule 1001 are typically observed.

Finally, the results of this difference-in-differences analysis can be compared with the analysis of the Total PM_{10} to Total Wind Power Density (TPM_{10}:TWPD) ratio reported in State Parks' 2024 Annual Report and Workplan (ARWP).[21] The TPM_{10}:TWPD ratio is a metric developed by State Parks and Desert Research Institute to assess how emissions of wind-blown dust change from year to year. Like the difference-in-differences methodology, it aims to control for interannual changes in meteorology, albeit by a completely different method. According to the 2024 ARWP, the TPM_{10}:TWPD ratios for both CDF and Mesa2 have decreased as dust controls have expanded and matured. As with the other metrics discussed above, the TPM_{10}:TWPD ratios for CDF and Mesa2 continued to decrease in 2023 even as there was no change in the footprint of the dust controls from 2022 to 2023. See Figures A4 and A5, below, which are copied from the ARWP.

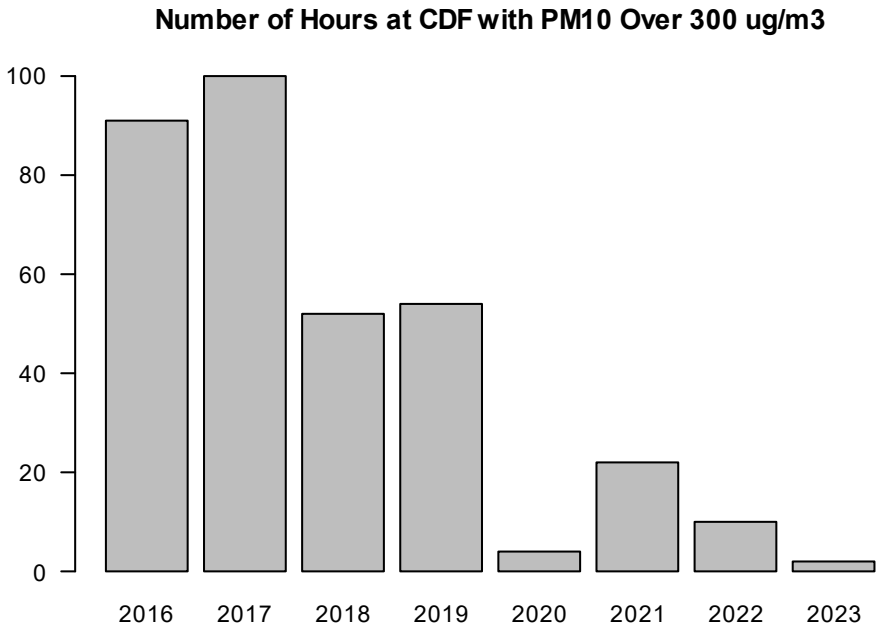

Figure A1: Annual Hours at CDF Greater than 300 µg/m³

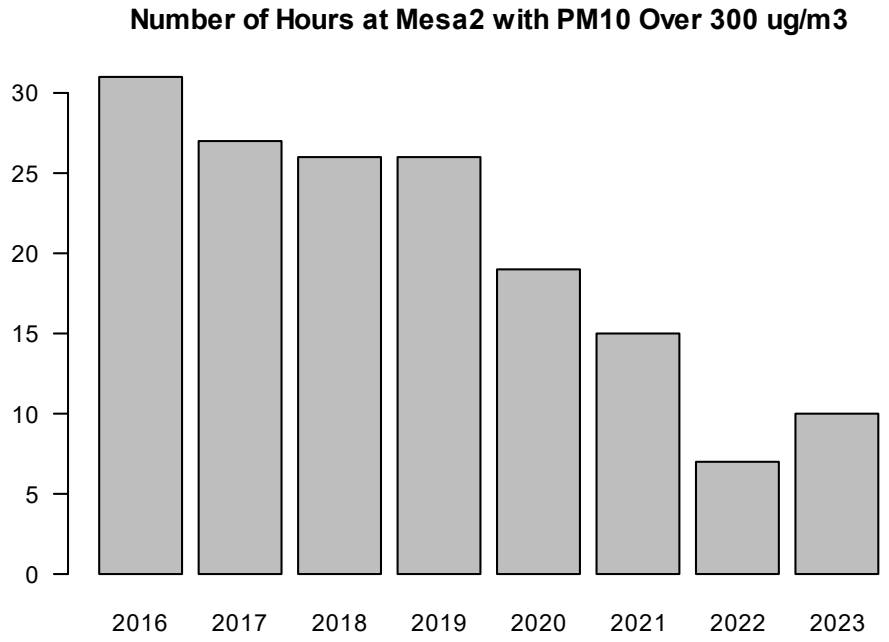

Figure A2: Annual Hours at Mesa2 Greater than 300 µg/m³

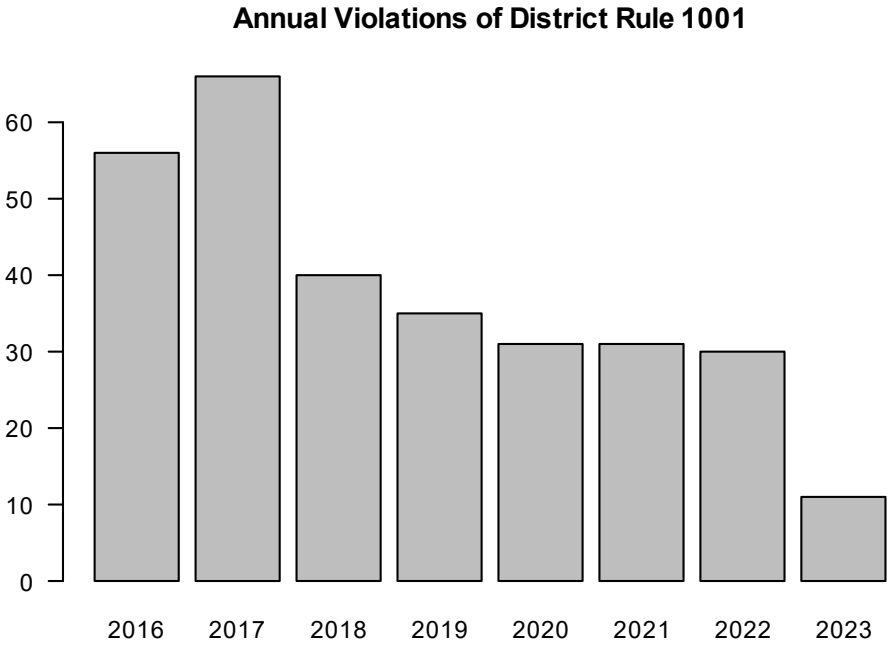

Figure A3: Annual Violations of District Rule 1001

Furthermore, according to the ARWP the "metric indicates that the PM_{10} originating from the ODSVRA has been reduced by approximately 44.5% at CDF using the two-year (2022 and 2023) mean value of 0.16 for equivalent WPD conditions compared with the baseline year of 2013 when there were few acres of dust control upwind of the CDF station. For Mesa2, the TWPD and TPM_{10} measurement-based metric indicates that the PM_{10} originating from the ODSVRA has been reduced by approximately 21% using the two-year (2022 and 2023) mean value of 0.14 for equivalent WPD conditions compared with the baseline year of 2013 (0.18) when there were few dust controls in place at the ODSVRA." These estimated reductions in ODSVRA-related ambient PM_{10} at CDF and Mesa2 compare very favorably with the reductions derived from the difference-in-differences analysis presented in Table A1.

Conclusion

The dust controls deployed at the ODSVRA since 2017 have resulted in large, statistically significant reductions, in downwind PM_{10} concentrations on days when strong winds blow across the ODSVRA. Specifically, compared to 2017, there has been an estimated 38.1% improvement in wind event day PM_{10} at CDF (95% CI: 24.9 to 48.9%; p-value: 7.8E-6) and 22.2% improvement at Mesa2 (95% CI: 6.8 to 35.0%; p-value: 6.8E-3). In concrete terms, the median wind event day PM_{10} at CDF was 45 $\mu g/m^3$ in 2023; this analysis predicts it would have been 73 $\mu g/m^3$ if these mitigation projects had not been implemented.

These estimates are corroborated by the TPM_{10}:TWPD ratio analysis in State Parks' 2024 ARWP, and by annual trends in hours over 300 $\mu g/m^3$ and violations of Rule 1001.

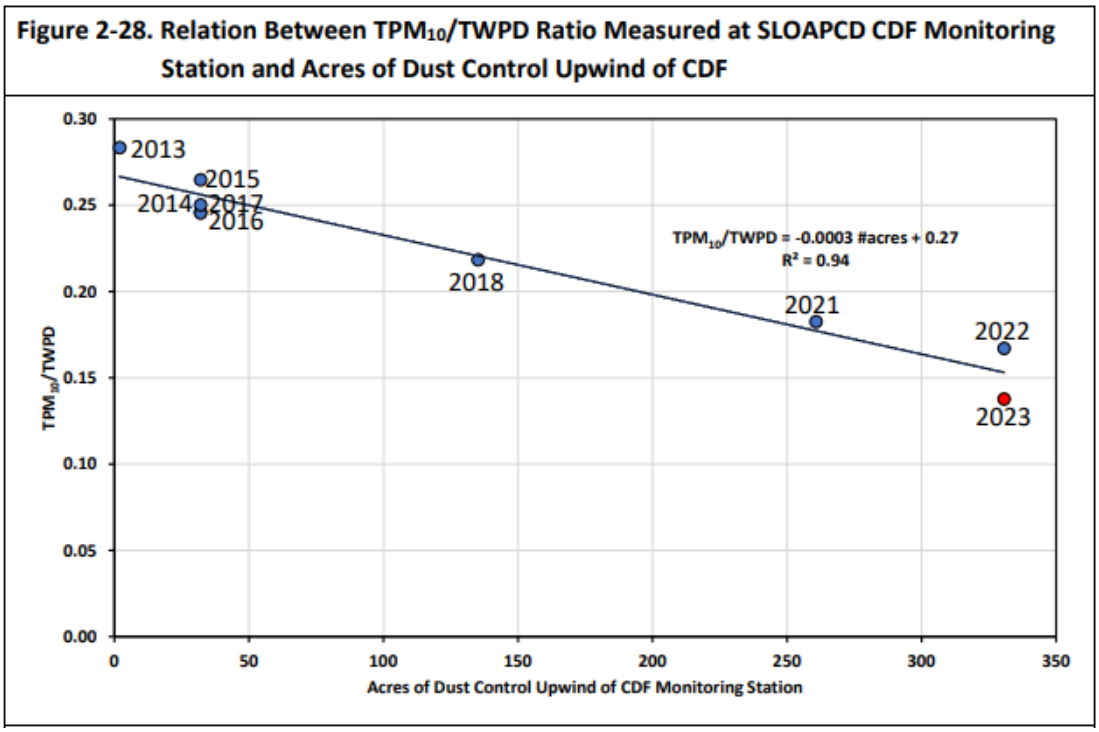

Figure A4: TPM_{10}/TWPD Ratio for CDF. Reproduced from Reference 21, State Parks' 2024 ARWP.

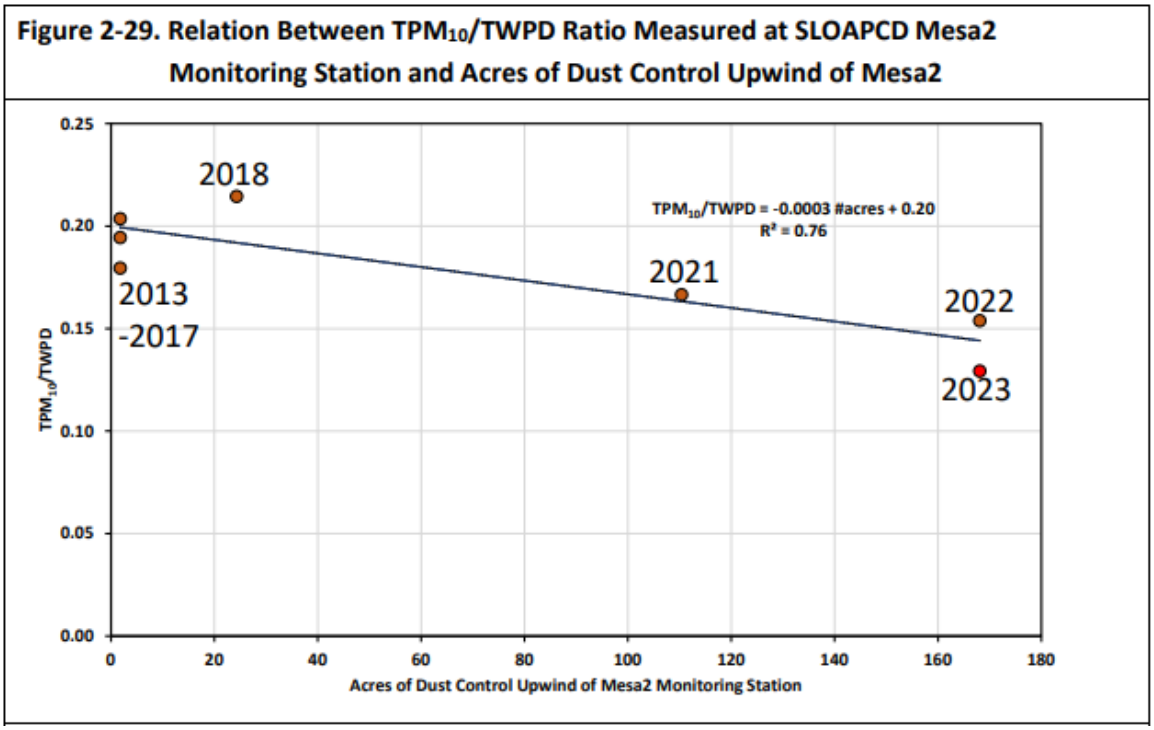

Figure A5: TPM_{10}/TWPD Ratio for Mesa. Reproduced from Reference 21, State Parks' 2024 ARWP.