SLO COUNTY apcd
Air Pollution Control District
San Luis Obispo County

February 25, 2019

Dan Canfield
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California Department of Parks and Recreation
P.O. Box 942896
Sacramento, California 94296-0001

SUBJECT: California Department of Parks and Recreation's February 1, 2017 Oceano Dunes SVRA Concept Draft Particulate Matter Reduction Plan in Response to Stipulated Order of Abatement Number 17-01

Dear Mr. Canfield,

We are in receipt of your February 1, 2019 Oceano Dunes SVRA Concept Draft Particulate Matter Reduction Plan (DPMRP). The District is disappointed with State Parks' contracting issues which have delayed the input from the Scientific Advisory Group (SAG); this delay has resulted in the SAG having a compressed timeframe to complete their preliminary recommendations by February 25, 2019. As we discussed in our meetings with the SAG on February 6 & 7, your submitted DPMRP is more of an outline than a plan and that upcoming CEQA compliance efforts over coming months should include all possible projects that could be considered in the annual work plans over the next four years.

As we discussed, we can hold a joint meeting to review the concept DPMRP and the CEQA Notice of Preparation efforts. We have reserved the South County Regional Center, 800 West Branch Street in Arroyo Grande, for this joint meeting on May 1, 2019 at 6 p.m.

Please note, as it stands right now, the DPMRP asserts that State Parks can't comply with Stipulated Order of Abatement Number 17-01 (SOA #17-01) which is not acceptable. The District believes that compliance is possible and that is supported by last year's measured PM10 reductions which greatly exceeded expected reductions from the fencing that occurred. Modeling is a great tool, but it requires reevaluation as system dynamics change during changes to the landscape and source particles. For example, foredune growth would increase control through both terrain effects on surface wind speeds and emissivity decreases as the mass of fine particles from saltation decreases. That said we cannot approve a PMRP that does not commit to compliance with the SOA #17-01. The PMRP must create a path for compliance or State Parks will need to petition the Hearing Board to alter conditions of the order. The District does not believe that SOA #17-01 condition #2 holds State Parks accountable for exceedances of the state or federal standards that are not attributed natural background levels of undisturbed sand sheets. To support this determination, the initial target level of 50% reduction in condition 2.c was based on the assumption a background component. Should the hearing Board disagree with this determination, the SOA#17-01 may need to be revised but we do not currently believe that is warranted. We have also enclosed some more detailed comments in attachment 1 and the comments submitted by the SAG.

In order to give the public an adequate chance to review a more refined PMRP that meets requirements of the SOA #17-01 before the May 1st workshop, the changes requested by the SAG and the District should be addressed by March 22, 2019. I intend to post and circulate a revised draft PMRP at least 30 days prior to the May 1st workshop.
In addition, we have been advised by State Parks that the permanent track out systems will not be installed by the June 30, 2019 requirement in SOA #17-01 condition 1.c. Prior to June 30, 2019, Parks will need to get APCO approval to install temporary equivalent systems until the hard construction can be completed.

The District also encourages State Parks to accelerate their Public Works Plan that is being developed concurrently and to consider offsetting any acreage loss for recreation and camping away from the foredune and populated areas.

Respectfully,

Gary E. Willey
Air Pollution Control Officer

Enclosures
cc: Hearing Board, District Board, District Counsel & SAG

Attachment 1 Draft PMRP

Scope

The subject of these comments is the "Oceano Dunes State Vehicular Recreation Area Draft Particulate Matter Reduction Plan, Preliminary Concept" (OHMVR, 2019) submitted by State Parks' OHMV Division on February 1, 2019. This the pre-SAG-comments version of the PMRP.

General Comments

Lack of detail

> Summary: Because of timing issues and public involvement, the document should include a preview of the 2019 mitigation activities, even though SOA does not list it as requirement of the plan.

The submitted document outlines an overall framework for reducing dust emissions from the ODSVRA over the next 4 years, but it lacks details about what Parks' is actually planning to implement in the near term. Even though the Stipulated Order of Abatement ("SOA"; SLOAPCD Hearing Board, 2018), does not require these details in the PMRP it would be advantageous for the public if more details could be included. (The SOA specifies the Annual Report and Work Plans, due August 1 of each year, as the documents specifying what mitigation measures will actually be implemented.)

Effect of 2018 mitigations on downwind PM_{10}

> Summary: The District estimates that the mitigations deployed in 2018 achieved a 22% decrease in downwind PM_{10} levels relative 2017, after controlling for meteorological effects.

The District has analyzed preliminary[1] air quality data from 2018 and the results are encouraging. Specifically, we believe that the mitigation efforts undertaken in 2018 were successful in reducing PM_{10} levels downwind of the riding area by 22% (95% Confidence Interval: 7.4 – 34.9%). This validates that Parks' mitigation strategies—revegetation and arrays of wind fences and straw bales—are effective when employed at a large enough scale. As that scale increases, we expect to see further improvements in downwind air quality.

Details of this analysis are given in the following sections.

[1] At this time, all 2018 data is preliminary since the full dataset for the year has not yet been validated or certified. Federal regulations give the District until May 1, 2019, to fully validate and certify these data.

Background and Methodology

From 2011 to 2017, the annual number of exceedances of the state PM_{10} standard at CDF varied from as low as 62 to as high as 97. Preliminarily, there were 52 in 2018.[1] It would be naïve to attribute these year-to-year changes solely to changes in the extent of Parks' mitigation efforts. As discussed in the 2017 Annual Air Quality Report (SLOAPCD, 2018), downwind PM_{10} concentrations are potentially influenced not only by the mitigations, but by a variety of other factors including meteorology (in particular, the strength and direction of on-shore winds), regional PM events, wildfires, and non-ODSRVA sources.

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, as asks whether that ratio changes from one year to the next. The crux of the idea is that comparing to Oso Flaco implicitly controls for inter-annual variations in meteorology and other factors. This is because the mitigation measures are upwind of CDF but not Oso Flaco, so changes in the mitigations should affect CDF but not Oso Flaco. Meanwhile, both sites should experience approximately the same trends in meteorology, and they should be similarly influenced by wildfires and regional PM events.

See SLOAPCD, 2018, for a more complete description of the methodology. All data and computer code needed to fully reproduce this analysis are available online at https://github.com/sloapcdkt/2018DiD.

Results

This method requires PM_{10} data from Oso Flaco and CDF as well as wind data from CDF and the S1 tower. The 2018 dataset from CDF and Oso Flaco is not yet fully validated so this analysis must be considered preliminary. The S1 data used in this analysis was obtained from State Parks, and its validation status is unknown.

The first full year of data from Oso Flaco was 2016, thus the only year-to-year comparisons that are possible are 2016 vs 2017, 2016 vs 2018, and 2017 vs 2018. The 2017 Annual Air Quality Report compared 2016 and 2017 and found no significant difference in the CDF/Oso ratio. This was not surprising, since the ODSVRA mitigations for those years were small (40 and 20 acres, respectively), and the change from year to year was also small (20 acres). As discussed in that report, 2017 was selected as the baseline to compare future years to, since it had the least amount of mitigation and is thus the closest possible scenario to a fully un-mitigated baseline. This analysis thus compares 2018 to 2017.

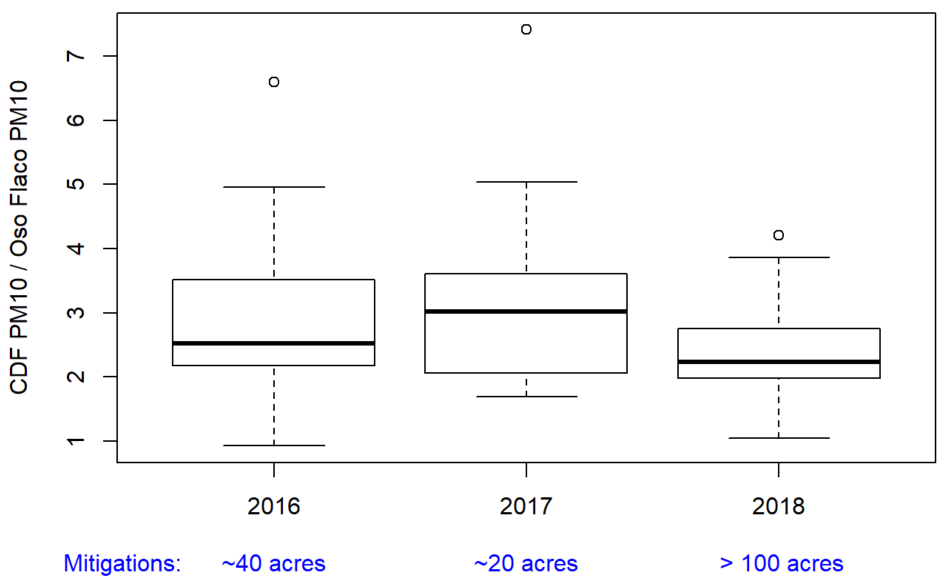
Running the analysis comparing 2018 to 2017, shows a statistically significant decrease in event-day CDF PM_{10} relative Oso Flaco of 22.4% (95% CI: 7.4 - 34.9%; p-value: 0.0061).

This is visualized in Figure 1, which display boxplots of the CDF/Oso Flaco ratio for 2016 through 2018; the ratios for 2018 are shifted to lower values compared to the earlier years.

In principle, the decrease in the ratio could be due to either a decrease in the CDF levels or an increase in Oso Flaco levels. To make sure it's not the latter we can look at the (geometric) average PM10 levels on the wind event days. As shown in Table 1, below, the CDF average for 2018 is indeed lower than for 2016 and 2017, and rather than increasing in 2018, the average level for Oso Flaco actually decreased. Thus, the decline in the CDF/Oso Flaco ratio can be attributed to declining CDF levels rather than increasing Oso Flaco levels.

Table 1: Geometric Average Wind Event PM_{10} Concentrations			
Site	**2016**	**2017**	**2018**
CDF	74.6	82.9	62.7
Oso	29.1	29.6	28.3

Figure 1:
CDF to Oso Flaco PM10 Ratio on Wind Event Days



Specific Comments

Section 3: PMRP Modeling Methodology

> Summary: Include a comparison between the new DRI Lagrangian model and the original ARB model.

The design of the SOA was informed by a dispersion model developed by ARB, and the SOA calls for the continued use of this model or "other modeling subject to the review of the SAG." In accordance with this option, the PMRP uses a new “Lagrangian Stochastic Particle Dispersion Model” created by DRI instead of the original ARB model.

The PMRP does not discuss why the DRI model is being used in place of the ARB model. There is no discussion of benefits or limitations of the models, and no comparison of the models’ results. The District suspects that choice was made for convenience: DRI is a under contract with Parks and presumably can respond to modeling requests in a much timelier manner than ARB. This will likely reduce delays in planning and deploying mitigations, which is something that the District generally supports.

Nonetheless, in order for the District and public in general to have confidence in the new DRI model, a critical comparison to the original ARB model is needed. The accuracy and bias of the models’ predicted PM_{10} concentrations should be compared; if the DRI model performs significantly worse than the ARB model, then its use will need to be reconsidered. Similarly, the spatial predictions should be compared. For example, Figure 4-2 of the PMRP shows which areas of the ODSVRA contribute most to PM_{10} concentrations at CDF, according to the DRI model. An analogous figure could be generated using the ARB model, and the two figures could then be compared. If they differ significantly, then some justification other than expediency will be needed for selecting one model over the other.

> Summary: The model does not capture changes in the wind field caused by mitigation elements, and therefore likely underestimates mitigation effectiveness.

A mitigation element such as a patch of vegetation or an array of fencing or straw bales reduces PM_{10} emissions by reducing wind shear. If wind shear is reduced within the mitigation element, then logically it must be reduced to some extent in the “shadow” of the element as well. In other words, surface wind speed is slowed over the mitigation element; after the element, the wind speed gradually increases to its original value—the transition is not instantaneous.

This effect is not captured in the model—and presumably it cannot be since the model uses a fixed set of meteorological inputs from 2013—but it likely causes a reduction in downwind PM_{10} concentrations, as open sand in the lee of mitigation elements experiences somewhat lower wind speeds. Thus, the model likely underestimates mitigation effectiveness. While this probably cannot be fixed, it should at least be noted in the PMRP.

Section 4.1: SOA 2013 Baseline Time Period

> Summary: Rather than using a single day as the baseline (e.g. May 23, 2013), consider using an average of high PM days.

SOA Condition 2.c states that the “development of the [PMRP] shall begin by establishing an initial target of reducing the maximum 24-hour PM_{10} baseline emissions by fifty percent (50%), based on air quality modeling based on a modeling scenario for the period May 1 through August 31, 2013”. As noted in the PMRP, there is some ambiguity here: does “maximum 24-hour PM_{10} baseline emissions" refer to emissions from the riding area only (in which case, May 23, 2013 would be the baseline) or to emissions from the entire ODSVRA (in which case it would be May 22, 2013).

A problem with designing mitigations for any one specific day is that if the target day is not representative of typical wind event days, then the resulting mitigations may not be effective on typical days. For example, if the wind direction on May 22 or 23, 2013, was atypical, then mitigations designed to for that wind pattern may not be in the correct locations to influence downwind PM_{10} levels during typical wind events. Therefore, the District supports the use of an aggregate baseline in place of a single-day baseline. This could be the top ten highest emission days, or even an average of all "wind event days" as defined by some reasonable metric.

Whether the existing SOA allows for an aggregate baseline is not entirely clear. It is obvious that the phrase "initial target" refers to "50%", but it could be argued that everything after the phrase "initial target" is mutable, and once this initial target has been evaluated, other targets—including ones based on aggregate rather than maximum 24-hour emissions—could be adopted.

Section 4.2: Maximum 24-Hour PM_{10} Baseline Emissions Analysis

> Summary: Clarify if non-ODSVRA open sand sources are included in Table 4-1.

In Table 4-1 it is not clear if "Riding and Non-Riding Areas" includes open sand outside of the ODSVRA, e.g. the Pismo Dunes Natural Preserve and the private lands east of the ODSVRA. This should be clarified. Optionally, it might be informative if this table has columns for "Riding Area Only", "Entire ODSVRA (including non-riding areas)", and "Entire Model Area (including non-ODSVRA areas)".

> Summary: The baseline emissions scenario should only include emissions from the riding area.

As noted in the PMRP, "SOA Condition 2.c does not specify the geographic boundary to be associated with the maximum 24-hour PM_{10} baseline emission day." The SOA is premised on the principle that OHV activity increases the emissivity of the Oceano Dunes, resulting in higher downwind PM_{10} concentrations than there would otherwise be in the absence of OHV activity. It therefore makes sense to focus on emissions from the open riding area, since current emissions from non-riding areas are already likely to be similar to what they would be in the absence of OHV activity. Therefore, if May 22, 2013, were selected as the maximum 24-hour PM_{10} baseline, then the initial emissions reduction target would be 75.8 metric tons, i.e. 50% of that day's "Riding Area Only" emissions of 151.6 metric tons from Table 4-1.

Defining baseline emissions in this manner affects various calculations later in the PMRP. For example, in Section 5.1.1, it is stated that "Pre-SOA" mitigations reduced baseline emissions by 1.8%, but if the baseline is defined as "Riding Area Only" emissions, then the reduction would be 2.3%. Similarly, using the "Riding Area Only" baseline would change the estimated emissions reduction for "Pre- and Initial SOA" mitigations from 9.3% (for May 22, 2013, from Table 5-4) to 11.9%.

While this target is based on emissions from the open riding area, Parks' would still be able to pursue emissions reductions outside of the riding area.

Section 4.3: 24-Hour PM_{10} Baseline Concentration Analysis

Summary: Characterize the uniqueness of the baseline period.

This section concludes by stating that "focusing dust remediation efforts within this corridor would most effectively result in a reduction of PM_{10} concentration at CDF, *provided meteorological conditions are near-identical to those that occurred on May 22, 2013* [emphasis added]". The District agrees with this observation and suggests the addition of a brief analysis of the day's uniqueness. It is expected that that the wind speed was unusually high, perhaps among the highest recorded, but if wind direction or other parameters were atypical, then it would be important to know this. The analysis in section 4.4.1 notes that wind speeds this high are very unusual, but no information is given about the wind direction or other possibly important parameters (humidity, temperature, soil moisture, stability, etc.)

In a previous comment, we suggested using an aggregate of days for the baseline rather than a single day. If this is done, then the analysis could look at how typical or atypical the aggregate is.

Section 5: Preliminary Compliance Analysis

Summary: See comments on calculating the baseline emissions scenario, above.

As noted above in the comments on Section 4.2, if the baseline emissions scenario is calculated using only emissions from the riding area, then the calculations of emissions reduction in Table 5-1, 5-3, and 5-4 change, resulting in higher calculated percent reductions from the mitigation measures.

Section 5.4.1: Modeled Maximum 24-Hour PM_{10} Baseline Emission Reduction

Summary: Consider a scenario in which the riding area emissivity is modeled as the mean or median of the non-riding area emissivity.

Table 5-10 presents modeling results for the scenario of 100% control over the entire SVRA open riding and camping area. The point of the table appears to be that about 25% of the PM_{10} measured at CDF is from open sand outside of the riding area. It would be informative if instead of (or in addition to) running the model with riding/camping area emissivity set to 0 (i.e. 100% control), emissivity was set to the mean (or perhaps median) emissivity of the non-riding areas. The CDF PM10 levels modeled in this scenario might constitute a useful "floor" for what can realistically be achieved. After all, the goal is to get emissions down to what they'd be in the absence of OHV activity, not to reduce emissions to zero.

Section 6.1: Vegetation

Summary: If native seed/seedlings are limited, consider increasing the planting of sterile grasses as an interim measure.

As noted in this section, there are logistical constraints on the number of acres which can be revegetated each year; chief among them is that the stock of native plants is limited. The section also notes that Parks already plants “seeds of hybrid, sterile, annual grass” in order to “provide additional cover on the area” being revegetated with native species. This suggests that seed/seedling limitation could be overcome by planting more of the sterile grass species. The District recognizes that planting sterile grasses alone, without the native species, is inefficient as these areas would need to be replanted every year. Nonetheless, this strategy could help to quickly increase the vegetation on the ODSVRA and thus benefit PM_{10} reduction efforts.

Section 7.3.1 Carbon and DNA Scripps Study

> Summary: It is very unlikely that marine biological material contributes significantly to PM_{10} measured downwind of the ODSVRA during wind events. The District discourages Parks from devoting further resources towards investigating this as a potential source.

Researchers from Scripps Institute of Oceanography (SIO) previously analyzed media from EBAM samplers deployed on the ODSVRA and were able to identify DNA sequences from marine organisms. Parks’ now proposes working with SIO to conduct further studies “regarding potential marine contributions to PM_{10} concentrations at and downwind of Oceano Dunes SVRA”. Based on our review of the initial study findings (Palenik, 2018) and discussion with the study’s primary investigator, the District believes that such studies are unlikely to generate information that will be useful in mitigating ODSVRA dust impacts; we therefore encourage Parks to use their resources elsewhere.

The following comments refer to the Palenik, 2018, report:

- The mass of the detected DNA (and any associated biological matter) was not quantified, so it is impossible to know whether it makes a significant contribution to the EBAM PM_{10} masses.
    - The mass contribution is likely to be very small.
    - Previous speciation studies by the District have shown the bulk of PM_{10} dust collected downwind, especially during dust events, is “Crustal” materials.
    - According the report, *directly above the ocean* only 10% of particulate matter (by volume, size fraction not specified) is of biological origin.
- Marine aerosols constituting a significant fraction of PM_{10} mass is not consistent with spatial patterns of ambient PM_{10} observed in the regulatory data (e.g. CDF vs Oso Flaco), the EBAM data (i.e. DRI report “Wind and PM10 Characteristics at the ODSVRA from the 2013 Assessment Monitoring Network”) or the PI-SWERL report. All show that areas downwind of the riding area receive more dust than non-riding areas or that the riding area is more emissive than the non-riding areas.
- Even if the EBAM tapes did contain significant mass from marine biological material, this would not necessarily mean that the regulatory monitors are also influenced by this source.

- Blank analysis is not reported (or, according to the author, performed), so it is impossible to assess whether the tapes may have been contaminated before or after sample collection.
    - In fact, most of the common bacterial “hits” on the EBAM tapes (including the top hit) were not found in the sea water nor the beach sand sample. (Table 2).
    - Similarly, most of the common eukaryote “hits” on the EBAM tapes (including the top 2 hits) were not found in the sea water nor the beach sand sample. (Table 3). (Though many hits are consistent with diatoms based on comparison to a database).
- It is not disclosed exactly which hour(s) (or in some cases, days) were analyzed, so it is unknown if the results correlate with known PM or wind events or fog events. In fact, the samples selected for analysis were typically just the most recent samples available, since DNA from these samples would be “fresh”.

For these reasons, the District does not think this warrants further investigation. Parks and SIO are, of course, free to conduct whatever research they wish to do, and the project may prove interesting for other, unrelated research questions. If further investigations along these lines are conducted, the District encourages Parks/SIO to analyze samples from dust events/high PM_{10} days as well as calm/low PM_{10} days to see if there is any difference. The District can make BAM tapes from CDF, Mesa2, and/or Oso Flaco available for analysis if requested.

References

OMHVR, 2019. “Oceano Dunes State Vehicular Recreation Area Draft Particulate Matter Reduction Plan, Preliminary Concept.” California Department of Parks and Recreation, Off-Highway Motor Vehicle Recreation Division, February 1, 2019.

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