SLO COUNTY apcd
Air Pollution Control District
San Luis Obispo County

November 22, 2013

Christopher Conlin, Deputy Director
Off-Highway Motor Vehicle Recreation Division
California Department of Parks and Recreation
1725 23rd Street, Suite 200
Sacramento, California 95816

SUBJECT: Temporary Baseline Monitoring Program – First Draft

Dear Mr. Conlin,

APCD staff have reviewed the above referenced draft plan (TBMP). Unfortunately, very little of the data used in preparing the draft TBMP is actually provided in the document, making it very difficult to evaluate the actual basis of the assumptions used and conclusions reached. In addition, a substantial portion of the May – July 2013 data collected for the study and used as the basis for recommendations in this report did not meet the established quality assurance criteria; the very poor condition of the monitoring equipment when it was removed and failure to perform any final collocation and quality assurance analysis also calls into question all the data collected after July. Thus, the data that is ultimately made available from this study will be limited in scope. Finally, no analysis of differences in emissivity within the SVRA was conducted prior to locating the monitoring transects, sand flux analysis was not performed, and a valid vehicle activity survey was never conducted, all of which were identified numerous times by APCD as essential information in determining where emission controls and monitoring sites should be located.

These shortcomings, combined with failure to follow several of the analysis procedures identified in the approved MSSP, and the selective weighting and prioritization applied by State Parks (SP) to the site selection criteria mutually agreed to in the MSSP, make the conclusions and recommendations made in this report very difficult to support. In addition, there are numerous areas in the report that significantly mischaracterize the intent and requirements of both the MSSP and Rule 1001. These issues are detailed in the specific comments below and should be addressed in the next version of this draft plan.

Specific Comments

Page 8, 2.1 Methodology For Developing Desktop Grid
Of the 168 potential monitoring sites evaluated in your desktop exercise, 158 were eliminated from consideration with only a few summary sentences devoted to explaining why. In a conference call on October 8, 2013, State Parks indicated that some sites were eliminated because they appear to be influenced by both CDVAA and non-CDVAA areas.

APCD agrees that ideally the CDVAA site would be solely influenced by the CDVAA, the control site would be solely influenced by a non-riding area, and the two sites would be identical in terms of shoreline wind speeds, distance from shore, elevation, and upwind topography, etc. In reality, it is highly unlikely that any pair of site locations will meet this ideal, and the MSSP acknowledges this by specifying acceptable differences in wind speed (± 15%), elevation (± 10 m), distance from shore (± 100 m), etc. For source influence, the MSSP criterion is *"CDVAA/Control Source Area overlap minimized"*. From our October 8, 2013 conference call, it appears State Parks has selected sites by applying the requirement that overlap be not merely minimized but eliminated.

If the actual source influence criterion specified in the MSSP had been applied as designed, considerably more potential monitoring sites would have been identified than the 10 considered in the Draft TBMP. All of the approved selection criteria are intended to be harmonized to work in concert, not individually, so that the sites that best fit the sum total of all the criteria would be considered. Thus, it is acceptable for the control site monitor to have a small degree of influence from the CDVAA, and vice versa, if the other selection criteria are favorably comparable. No sites should be eliminated until all the selection criteria have been applied, unless it is completely obvious to both parties that the site is not suitable for consideration. Thus, State Parks elimination of sites in areas with different topographic elements based on the assumption that wind profiles are presumed to be different in such areas is also unwarranted unless they fail to meet a majority of the Table 1 criteria.

Based on the other analyses provided in the document and data collected at APCD monitoring sites, we believe State Parks must also evaluate and consider placing CDVAA monitors at or near sites B6, C6, D6, B7, C7, or D8.

Page 8, Table 2
The column labels in this table appear to be switched.

Page 11, 2.2 Methodology for Selection and Analysis of Wind Data
<u>Timeframe</u>
The discussion under "Time Frame" identifies the period of May – July as *"The windiest season and resultant dust events on the Mesa occur at this time of year."* This is incorrect. Historical data and the 2013 APCD report on "<u>Air Quality Trends: 1991-2011</u>" shows the period from March through May as the windiest season, when the highest PM concentrations and highest frequency of health standard exceedances are measured on the Mesa. As described in the Trends report, PM10 levels tend to peak in late May, with a secondary peak occurring in late October or early November. January and July typically have the lowest PM10 levels.

Data Restrictions and Filters

Table 3 of the approved MSSP specified that wind speeds *at the shoreline* should be used to evaluate comparability of the CDVAA and control site monitors. This is because what happens in between the shoreline and a monitoring site downwind will likely influence wind speeds—and thus saltation and dust generation—in the area upwind of the monitoring site. If OHV activity decreases surface roughness by flattening foredunes and preventing the growth of vegetation that would otherwise occur, then wind speeds—and thus saltation and dust generation—would be expected to be greater in the riding area if all other factors were equal. Similarly, two transects with the same wind speed at, for example, 2500 meters (m) from the shore, may have substantially different wind speeds at the shoreline and at intermediate distances due to the surface features along each transect.

The draft TBMP is, of course, limited to analyzing the wind data that are available; the analysis conducted here considers only 10m wind data. While there only 5 sites within the SVRA with 10m wind data, there are 12 sites with 3m wind data and at least 3 more sites (i.e., the mile-marker posts) providing wind data at an intermediate height. Furthermore, with exception of the S1 tower, all of 10m towers are located 1 to 2.4 *kilometers* from the shoreline, while a subset of the 3m wind sensors (T1A, T2A, T3A, and T4A) is located substantially closer to the shore (409 to 860 m) and have much narrower range of distances to the shore. For the purpose of evaluating the comparability of a pair of CDVAA and control site monitors, an analysis of this subset (possibly supplemented with milepost data) would be more informative. Unfortunately, the wind data collected from the 3m sensors on the EBAMs and Particle Counters is of questionable viability due to problems with instrumentation operations and quality assurance for the data collected. Thus, such analysis may prove unfruitful.

For the analysis that was performed, the data filters applied to the dataset result in different hours being analyzed for different sites. So, as shown in Table 3 (page 15), the average wind speed for Site 1C is based on 199 hourly records, while that for Site 4B is based on 261. To truly get a sense of the comparability of conditions among sites, the same hours should be analyzed for all sites. One approach might be to analyze all hours when CDF or Mesa2 PM_{10} is greater than 50 ug/m^3 and the wind at *any* site is out of the northwest and greater than 5 m/s. (Note that, based on the study data, PM levels are much higher within the SRVA than at CDF or Mesa2; so there are likely many hours when PM_{10} is less than 50 ug/m^3 at CDF/Mesa2, but much greater than this within the SVRA. Thus, an alternative would be to filter wind records in a similar fashion based on EBAM measurements from within the SVRA.)

The statement is also made in this section that: "*DRI found that there was no significant difference in the threshold wind speed, whether data came from inside the OHV riding area of the dunes or in the non-ride areas.*" This is a substantial misrepresentation of the analysis performed by DRI in Attachment 1. What they do conclude is that average wind speeds, and mean threshold wind speeds for saltation, increase from north to south, and that Transects 3 and 4 experience higher magnitude wind gusts than Transects 1 and 2. If you pair Transect 1 with Transect 2, and Transect 3 with Transect 4, Table 2 in Attachment 1 shows the 10 m mean threshold wind speed at T1A to be 33% higher than at T2C; similarly, the 10 m mean threshold wind speed at T4B is 37% higher than T3C. In other words, the limited data available indicates saltation occurs at lower wind speeds in the riding area than the non-riding areas. DRI qualifies their analysis by stating the small sample size and overlapping standard deviations makes these and other relationships difficult to state definitively.

It is important to note that preliminary analysis of the sensit data by APCD indicates some of that data to be of questionable quality, likely due to improper maintenance of the required height above ground level of the instrument. Review of the quality assurance data for these instruments will be necessary to validate this data.

Page 12, 2.3 Methodology for Topographic and Aerial Analysis

SP states that presence or absence of foredunes was not prioritized in the desktop analysis because wind speed and open sand acreage are more important in relation to saltation and dust generation. We strongly disagree. This is inconsistent with the agreed upon selection critieria in Table 1, which states that foredune presence or absence and vegetation coverage versus open sand acreage should be representative of the CDVAA and control areas respectively. Such a change is inappropriate and represents an arbitrary reinterpretation and selective prioritization of the agreed upon criteria in Table 1.

It is also inconsistent with the conclusions of your own 2007 Vegetation Island study, which states (pages 8-10) that re-establishment of foredunes is necessary "*...to slow the inward advancement of sand*", and that "*Foredunes should be established along the coast west/northwest of all areas where inland vegetation is desired*". It is clear that consideration of foredunes are as important, if not more so, than wind speed and open sand acreage in relation to saltation and dust generation.

SP also states that "*Observations of real-time PM10 data collected during Spring 2013 that indicated hourly PM10 concentrations were highest in Transect 4, support further analysis and inclusion of PM10 data for site selection purposes.*" This statement is highly misleading. The APCD Phase 2 study also showed some of the highest hourly PM concentrations occurred at our Oso Flaco site; however, the frequency and extent of high PM concentrations at that site was far lower than monitoring sites downwind of the riding area, even though wind speeds at Oso are substantially higher than elsewhere in the SVRA. APCD evaluation of the May – July data collected by SP in this study shows a very similar result, with Transect 2 in the Le Grande tract consistently showing higher hourly and 24-hour PM10 levels than any other transect. That would be a far more accurate statement than the one referenced above. Nonetheless, no analysis of the EBAM data is presented in this report, so any statements regarding such data are inappropriate unless supported by peer-reviewed analysis of all the data.

Page 12, 2.4 Methodology for Dune Source Dispersion and Monitoring Sites

It is stated that: "*Specific dune source dispersion exercises were not conducted for the desktop sites evaluated in this TBMP because visual screening indicated nearly all of the sites would be influenced by either the CDVAA or a Control Site.*" As mentioned previously, minor influence of one area by the other is not adequate cause for eliminating a potential site from consideration. Dispersion modeling, as proposed in the approved MSSP, is a far more appropriate tool to use than the highly subjective visual screening used here because it uses actual hour-by-hour wind conditions during the modeling period to identify the source areas affecting the air quality impacts at a given monitoring station.

Page 16-17, 3.1 Wind Conditions and Land Cover

Table 4 will need to be revised once additional sites are considered for comparability, as discussed previously in our comments on Section 2.1 above.

In addition, SP continues to focus discussion in this section on the amount of open sand acreage in evaluating riding area and control site comparability. This is inappropriate and inconsistent with the MSSP. It is expected that riding area sites will have far less vegetation cover due to destruction by vehicle activity, as discussed in detail in numerous conference calls regarding the draft MSSP before its approval. Thus, the Table 1 criterion for <u>*Open Sand/ Vegetation, % Coverage*</u> was mutually agreed to be: *"Coverage upwind of CDVAA and Control monitor sites is representative of CDVAA and Control Source areas, respectively".* The discussion and analysis for this section should be changed accordingly.

Page 17, 3.2 Topography

The draft TBMP describes the vegetation in portions of the northern non-riding areas as "non-native and invasive". This may be true, but that has little bearing on the selection of comparable sites. Similar vegetation and foredunes would likely be present in the riding areas if not for the vehicle activity. The flattening of foredunes in areas with intensive OHV recreation, such as the areas upwind of A4 through A6, undoubtedly causes wind speeds to be higher further inland relative to protected areas with foredunes and similar wind exposure. This, along with destruction of natural vegetation by vehicles, likely affects the topographical profiles downwind. In other words, once areas are designated for OHV recreation, the activity itself changes many features of those areas as compared to areas protected from OHV recreation. Thus, it is inappropriate to use those resulting differences as a primary reason to exclude a particular pairing from consideration, which appears to be the intent of the discussion in this section.

Page 18, 3.3 Vehicle Activity

This section notes that *"In general, the area with the most OHV activity includes the shoreline area...along the stretch of damp, hard pack sand, near the mean high tide line."* In terms of dust emissivity, this area is the least likely influenced by OHV activity, as it is naturally without vegetation and normally damp or wet. APCD is most concerned about the area where OHV activity is expected to increase emissivity: The area inland of the shoreline, where it is typically dry and more prone to sand movement and saltation if not vegetated. Of this area, this section states *"it is difficult to use the [2012] vehicle survey data to determine influence on one CDVAA site or another. It is most probable that vehicle activity is high within the upwind [area of influence] for each CDVAA site..."*. SP has clearly not conducted an adequate assessment of OHV activity on the dunes, so there is no data to support this assumption. SP goes on to suggest that because CDVAA Site C8 has the largest upwind AOI, that would be the best representation of highest vehicle activity. Such a conclusion is completely speculative and again, unsupported by any data. Riding area acreage is not a suitable surrogate for actual data on vehicle activity.

What is known with certainty, is the Le Grande tract area upwind of sites A4, A5 and A6 is where nearly all the camping occurs and where the greatest concentration of bathrooms are located. Off highway vehicles are driving in and out of this area all day long as they leave and return to their base and for using the bathrooms. Given the smaller size of this area compared to the area upwind of sites C7, C8 and C9, it is safe to say that the Le Grande tract likely experiences the highest density of OHV use per acre of any area in the SVRA. All of these factors are very strong indicators that this is one of the highest vehicle activity areas in the SVRA and should be acknowledged as such in this report.

Page 19: Figures 8 and 9
If possible, it would be informative to note the direction along which these profiles were calculated. It would also add clarity if the positions of the potential monitoring sites could be noted on the profiles. Finally, there appears to be a typo in Figure 9, with C13 standing in for C14.

Pages 20-22: 4 Preliminary Conclusions and Next Steps
SP begins this section with the following statement:
"The Dust Rule requires the OHMVR Division to select locations to monitor PM10 generated from the dune-building process of saltation. The locations are to be downwind of the OHV riding area of the dunes and downwind of dunes where OHV recreation is prohibited."

This is a complete mischaracterization of the rule and its intent. The intent of the rule is to monitor downwind of high vehicle activity areas and downwind of a comparable non-riding area; the rule was designed to determine the PM10 emission contribution of soils disturbed by vehicle activity, after substracting out natural wind-blown dust emissions from a non-riding area.

This section also states that a limitation of the dust rule is that it presumes higher readings downwind of the riding area monitor compared to the control site monitor are solely attributable to OHV recreation. SP goes on to state that *"[t]he saltation process occurs where there are dunes, not where there are dunes and OHV recreation*." APCD agrees saltation occurs in all sand dune areas; the rule is designed to account for that by evaluating data for comparable sites, where the primary difference is presence or absence of OHV recreation. It also provides a 20% buffer to accommodate natural variabilities that may occur from site to site.

Paragraph 3 states that, in looking for comparable monitoring sites, "*...the areas upwind of a CDVAA Site and a Control Site should have similar amounts of open sand acreage*." Paragraph 5 in this section continues the argument that upwind area of open sand is the most important criteria to use in finding comparable sites. Again, this is completely inconsistent with the site selection criteria, as stated above in our comments on Section 3.1. This specific issue was discussed in depth by State Parks and APCD in developing the criteria, which states *"Coverage upwind of CDVAA and Control monitor sites is representative of CDVAA and Control Source areas, respectively"*. As previously discussed, the riding areas are expected to have more sand and less vegetation because riding destroys any vegetation left unprotected.

It is unacceptable for State Parks to arbitrarily change the application of the Table 1 criteria mutually agreed to by both parties, and APCD will not approve any site recommendations that are based on State Parks reinterpreting those criteria, as is the case here. Unfortunately, most of the discussion in this section focuses on open sand area and advances highly subjective and very speculative arguments to reach a conclusion that sites C8 and C14 are most comparable. Such a conclusion is not supported by the Table 1 criteria or the limited data presented in this report.

In reviewing the Table 5 analysis of site comparability for the limited number of sites chosen for comparability by SP, the two columns related to open sand area must be removed as they are not part of the Table 1 selection criteria agreed upon in advance of the study, as discussed above. In addition, the column titled *"vehicle activity,"* should be removed as it is simply speculation unsupported by a valid survey. As mentioned in our comments on vehicle activity above, the Le Grande tract likely has the highest density of OHV use per acre of any area in the SVRA.

In looking at Table 5, even with the open sand area columns, CDVAA sites A4, A5 and A6 are far more comparable to control site A2 than CDVAA site C8 is to control site C14 in terms of upwind AOI and site elevation; the "A" site pairs also average about a 45% difference in upwind open sand area, which is closer than the "C" site pairs at over 50%, even though that's not a valid criteria to use.

In terms of wind comparability, the difference in average wind speed between A4, A5 and A6 compared to A2 (9.9%) is very similar to the difference between C8 and C14 (-8.6%). It is important to note, however, that the average wind speed from Site T4B was used as a surrogate for C14, and these sites are separated by about a kilometer. There is, therefore, a large uncertainty in the comparability of wind speeds between C8 and C14. It is also important to note that, as shown in Figure 18 in Attachment 1, the wind gust frequency distribution, which is the driving force behind saltation, is far more comparable between transects 1 and 2 than between transects 3 and 4. Transect 4, in particular, has the highest average wind speeds of any area, and a much larger frequency of very high wind gusts above 14.5 m/s.

Finally, it is important to note that siting of the CDVAA monitor must be downwind from major control installations, which at this point have not been identified. However, any controls placed must be capable of reducing PM10 concentrations measured at our CDF and Mesa 2 monitoring sites. Reducing PM10 at our CDF site is of highest first priority because of the exceedances of the federal PM10 standard and the risk of federal intervention in this entire process if that is not reduced. As we have stated many times, it is quite clear from all the data examined, including the preliminary data produced in this study, that the Le Grande tract area is the primary emission source impacting the CDF site. Thus, at a minimum, controls will need to be placed in that region, and the CDVAA monitoring site will need to be downwind of that area to measure effectiveness of the controls.

Thus, APCD believes that a CDVAA monitor located downwind of the LeGrande tract and a control site downwind of the nature preserve to be most appropriate: SP's analysis shows those areas to be most similar in terms of AOI elevation with comparable winds; high vehicle activity is clearly present in the Le Grande tract area; and it's the source area most impacting the CDF monitoring site.

As mentioned in our comments on Section 2.1 above, we also believe it essential that evaluation of potential CDVAA sites downwind of the Le Grande tract includes several sites eliminated by State Parks in their desktop exercise; namely sites at or near B6, C6, D6, B7, C7, or D8.

Summary

In summary, APCD staff find the main body of this report to be significantly lacking in scientific objectivity. The mutually agreed upon analyses and site selection criteria in the MSSP is mischaracterized and not properly followed in several instances; little data is presented to support many of the statements and recommendations made in the report; and some of the analyses presented rely on selective interpretation of data and information and appear designed to lead the reader to a predetermined conclusion.

As stated above, the information and data presented in this report does not support the recommendations made for CDVAA and control site monitors. APCD analysis of our own data, preliminary data from this study, and information presented in this report indicate a CDVAA monitor downwind of the Le Grande tract and a control site monitor downwind of the Nature Preserve to be the best locations for monitoring compliance with Rule 1001.

Additional comments on Attachment 1 are presented below.

Please contact me if you have any questions or need additional information regarding these comments. We look forward to working through this process with you and your staff to achieve an acceptable and approvable result.

Sincerely,

Larry R. Allen
Air Pollution Control Officer

Cc: Ronnie Glick

COMMENTS ON ATTACHMENT 1

Average Threshold Wind Speed for Saltation

APCD staff have several comments and questions on this section:

1. Please clarify whether "particle entrainment" refers to sand particle entrainment or to fine particle entrainment.
2. It is stated that measurement of the wind speed (or wind shear) and the presence or absence of saltating sand or elevated levels of dust (i.e., PM10) at a frequency of at least 1 Hz is needed to produce results with high confidence. The wind measurements and sensit counts were recorded continuously on a data logger, so it seems it should be possible to determine what 1-min wind gusts produce saltation. Please clarify.
3. It is stated that sensit counts of one were treated as zero in this analysis. Please explain this.
4. It is stated that 10 m threshold wind speeds were estimated for at the 3m wind sites on the same transect by using the 3 m to 10 m threshold wind speed ratio. Given the preliminary data we have seen and the accompanying quality assurance records, it appears some of the 3m wind data was likely out of spec and invalid, as described in our comments under section 2.2, above. Further confirmation of this is required. Given that, the 10 meter data is most appropriate to use for this analysis; estimates for the other sites are inappropriate unless/until the 3m data is validated.
5. It is stated below Table 2 that *"The 10 m wind speed threshold at positions T3C and T4B are 5.5 (±1.1 m/s) and 5.6 (±0.6 m/s), which also suggests that the difference between them is too uncertain to unambiguously declare they are different."* However, Table 2 shows the 10 m wind speed threshold at positions T3C and T4B to be 4.52 and 6.21, respectively; this represents a difference of nearly 40%. Please explain these differences.