Interpreting Nipomo Mesa air quality data

It's easy to get confused with different air quality readings provided by a variety of monitors on Nipomo Mesa. What is most useful to Mesa residents is real-time information on what's happening with air quality at any given moment. Let's break this seemingly complicated issue into bite-sized chunks and pull it together with a simple conclusion.

1. Federally Certified Monitors: There are two official SLO County Air Pollution Control District (APCD) monitoring stations that track air quality on the Western Mesa. These locations, locally called 'CDF' and 'Mesa 2' are shown as triangles on the accompanying map. The instrumentation at these stations provides an historical record of actual particulate pollution levels, as required by the EPA and federal regulation. However, the instrumentation isn't capable of providing *real-time* information. Data is reported to the public an hour or longer after-the-fact. Why? These federally certified instruments – called Beta Attenuation Monitors (BAM's) – work by collecting airborne particles for 50-minutes, then analyzing and weighing them in the remaining 10-minutes of each hour. This hourly data takes time to collect, process and publish on EPA's 'AirNow' website, the SLOC APCD website, and also several worldwide air quality reporting sites. When we see the BAM air quality data, we can be confident that it's *quantitatively* accurate – but *qualitatively*, it's hour-old news. When conditions are rapidly changing, as they can on Nipomo Mesa, we can't be confident that the data reflects current conditions.

2. AirVisual Laser Air Quality Monitors: During the last year, APCD has been investigating better ways to publish more timely alerts when air quality is rapidly deteriorating. As part of this effort two AirVisual monitors were deployed on the Mesa in 2018 (shown in blue on the map). One is installed adjacent to the official BAM monitors at APCD's CDF site at the CAL FIRE Station on Route 1. The other is located two miles downwind of CDF near the Eucalyptus-Northwood traffic circle. Both these AirVisual monitors sample and report estimated air quality every five minutes. A year of data collection has shown that the AirVisual monitors and APCD's BAM monitors are almost perfectly time synchronized – as can be seen on the accompanying line graph.

The AirVisuals may be qualitatively near perfect for real-time reporting, but they're quantitatively imperfect. For example - you can see from the graph that the AirVisual monitors read Oceano Dunes dust peaks as only 65-75% of actual levels measured by official BAM instruments. On the other hand, when SLO County had smoke pollution from Northern California wildland fires late last year, the AirVisuals recorded peaks 200% of the BAM's. So, AirVisuals may be able to tell us almost immediately that air quality is changing, and in which direction, but they only provide rough estimates of actual Dunes dust pollution levels.

3. PurpleAir Laser Air Quality Monitors: Most of the PurpleAir air quality monitors on the Mesa were installed as part of a citizen science project sponsored by South Coast Air Quality Management District (AQMD) in the LA basin. PurpleAir monitors (in purple on the map) are in the same crowded, competing group of low-cost laser particle-counting sensors. They can provide useful estimates of air quality in environments to which they're individually best suited. Unlike the AirVisual monitors, which are relatively good at estimating Oceano Dunes dust particulate levels, PurpleAir monitors perform very poorly in this environment. However, PurpleAir has been shown to be better at correctly estimating particulate pollution from wildland fire smoke, and have also been successfully deployed in North County.

4. Air Quality Forecasts: APCD issues a daily air quality forecast. You can find it on APCD's website (slocleanair.org), in the Tribune daily weather report, or subscribe to it by email. You can also subscribe to AirAware mobile text alerts for blowing dust or smoke. AirAware mobile alerts are the fastest way to receive air quality information from official BAM monitors. Overall, APCD air quality forecasts are usually accurate. However, the Nipomo Mesa presents a thorny forecasting problem. That's because blowing dust events are highly susceptible to small changes in wind direction. There is a very narrow band between West-Northwest and Northwest that these events can occur. The events are also highly sensitive to wind speed. A change of just a few degrees on the compass, or a few miles-per-hour can cause the dust plume to appear, disappear, or shift one way or another within a few minutes.

5. Conclusions: We already have the tools we need to follow air quality on Nipomo Mesa. Official BAM monitors at APCD's CDF and Mesa 2 stations can report very accurate pollution levels – but only after-the-fact; while AirVisuals can provide near real-time information when air quality is rapidly deteriorating or improving. Watching both of these together, with an understanding of their different strengths and limitations, can allow us make better informed lifestyle choices.

6. Accessing AirAware Text Alerts and AirVisual Notifications: To subscribe to APCD AirAware mobile text alerts, and select the types of notifications you wish to receive, visit: https://www.slocleanair.org/air-quality-alerts.php

The AirVisual monitor located near the Eucalyptus-Northwood traffic circle is the only "public" AirVisual site currently reporting on the Mesa. It is identified as 'Eucalyptus Roundabout' (or 'EucRA' for short). The online data stream from this monitor has been updating air quality conditions at the site every five minutes, 24/7 for over a year. To access this near real-time information on your smartphone using the AirVisual app, use the EucRA "Share Code": homepage > places tab > three-dot menu > "follow monitor" > woezmtax. You can also set the app to provide visual or audible notifications when Mesa air quality is rapidly declining.

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PurpleAir Monitor
"Winterhaven Way"
SCNP_08

AirVisual Monitor
Unpublished monitor
(Co-located with official
APCD "CDF" monitors)

CAL FIRE
San Luis Obispo
County Fire Sta

Official APCD "CDF"
Air Quality Monitoring Station
"2391 Willow Road"

PurpleAir Monitor
"Bea Court" SCNP_05

PurpleAir Monitor
"Nipomo"

PurpleAir Monitor
"Upper Vista Tesoro"

AirVisual Monitor
"Eucalyptus Roundabout"
(EucRA)

PurpleAir Monitor
"Eucalyptus Road"
SCNP_18

PurpleAir Monitor
"Trail View Place"

Official APCD "Mesa 2"
Air Quality Monitoring Station
"Nipomo-Guadalupe Road"

LEGEND:

Official APCD Monitoring Stations
(BAM PM2.5 FEM Monitors are complient with US Code of Federal Regulations 40CFR § 53. Air Quality readings are published on US EPA's AirNow website - https://airnow.gov/)

AirVisual Monitors (These laser particle-counting monitors provide reliable, near real-time qualitative estimates of changing Oceano Dunes particulate levels, and general air quality on Nipomo Mesa.)

PurpleAir Monitors (These laser particle-counting monitors are primarily useful in estimating changing air quality due to the presence of fire smoke. They do not provide usable estimates of Oceano Dunes particulate dust levels.)

CDF PM 2.5 INSTRUMENT COMPARISON - CDF BAM2.5 + EucRA PM2.5 + PurpleAir PM2.5

PARTICULATE MATTER POLLUTION LEVEL PM 2.5 UG/M3

120
100
80
60
40
20
0

FOG AT CDF SHOWS AS A SMALL 'FALSE POSITIVE' 'YELLOW AIR' READING

FOG AT BOTH CDF & EucRA

07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00 07:00 08:00 09:00 10:00 11:00 12:00 13:00 14:00 15:00 16:00 17:00 18:00 19:00 20:00 21:00 22:00 23:00 00:00 01:00 02:00 03:00 04:00 05:00 06:00

9/8/2019 9/9/2019 9/10/2019

ENDING HOUR PDT

CDF BAM25 EucRA PM2.5 Unpublished AirVisual PM2.5@CDF PurpleAir SCNP_18 PM2.5