



**San Joaquin Valley**  
AIR POLLUTION CONTROL DISTRICT

## Technical Evaluation of Sensor Technology (TEST) Program

*Dylos Sensor  
2021 – 4<sup>th</sup> Quarter*



## **Introduction and Sensor Profile**

This analysis report is focused on assessing the performance of the Dylos DC1100 sensor as a part of the District's Technical Evaluation of Sensor Technology (TEST) Program. The Dylos sensor uses optical laser-based particle counting methodology to estimate the concentration of PM<sub>2.5</sub> and PM<sub>10</sub>. The Dylos sensor counts and measures the size of the individual particles to calculate a mass concentration.

## **Background and Approach of Evaluation Test**

In May 2019, the District installed three Dylos sensors at the Clovis-Villa air monitoring station for the purpose of testing the Dylos sensors in the San Joaquin Valley and comparing the performance of the collocated Dylos sensors to the Federal Equivalent Method (FEM) PM<sub>2.5</sub> analyzer. The data sets analyzed for this report compare PM<sub>2.5</sub> data collected from the Dylos sensors and the MetOne BAM-1020 FEM monitor collocated at the regulatory air monitoring site. The scatter plots and time series graphs below show how the datasets compare for both hourly values and the 24-hour average.

## **Overview of Analysis Findings from Current Period**

The analysis for this report covers the time period of October 2021 through December 2021 (2021 – 4<sup>th</sup> Quarter). During this period, hourly data was removed from the calculation of bias when either the Dylos sensor or regulatory monitor did not have a valid hourly sample. For the 24-hour averages, only days with 18 or more valid hourly samples (75% or greater completeness) are included.

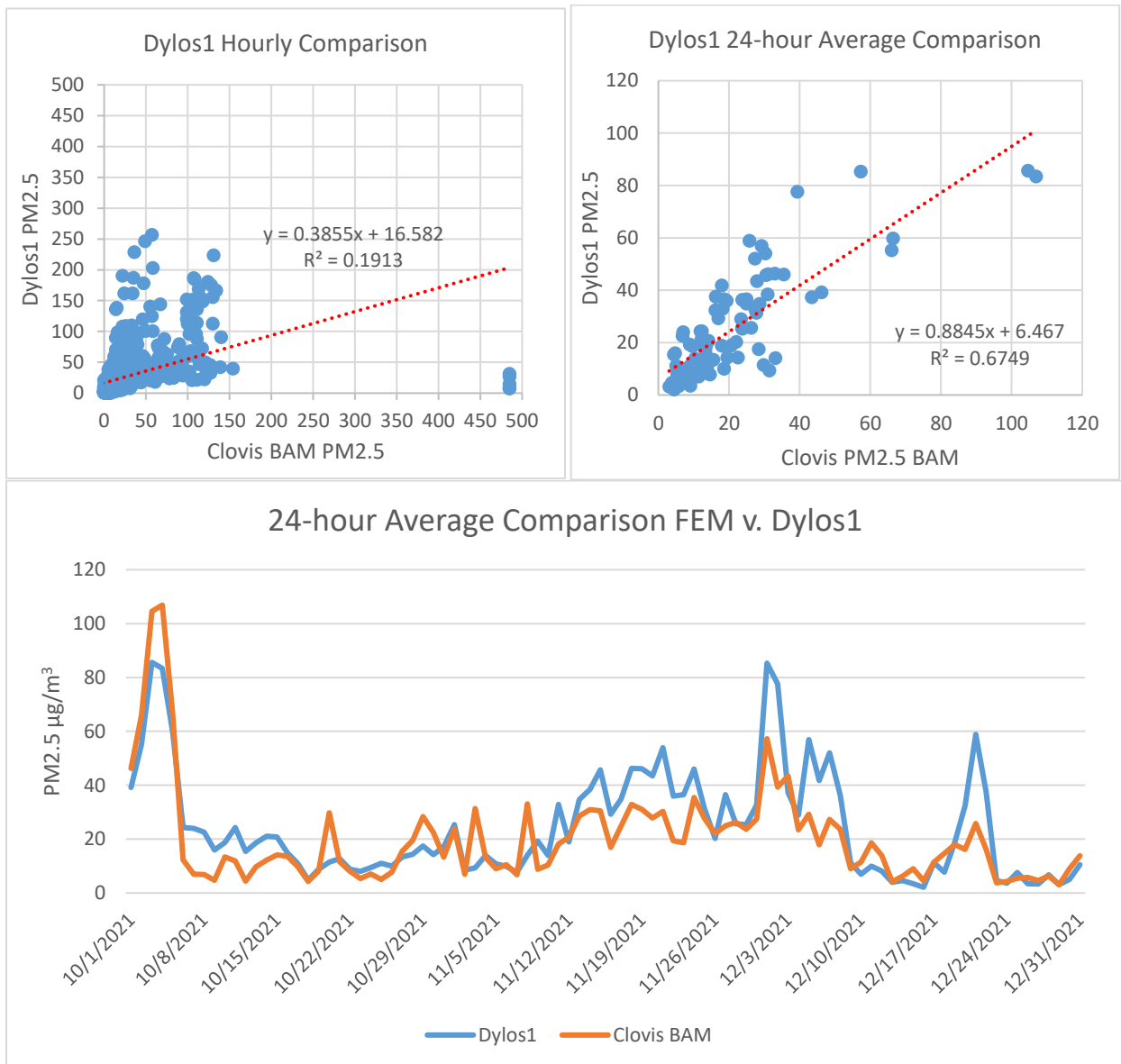
Seasonally, PM<sub>2.5</sub> is typically highest during the winter months and lowest during the summer months. Weather systems can influence PM<sub>2.5</sub> levels by either trapping pollutants near the surface or dispersing them. Generally, California's weather pattern is characterized by high pressure systems and low pressure systems that move through the region every two to four days in alternating fashion. This pattern essentially held true during October and PM<sub>2.5</sub> concentrations decreased or increased in response to dispersion or lack thereof. During early October, the presence of high pressure systems over the region exacerbated wildfire smoke impacts and kept the Valley's PM<sub>2.5</sub> concentrations elevated as a result. In contrast, the low pressure systems that moved through the region thereafter were dispersive enough to help scour pollution out of the Valley. The one exception occurred on October 11 when a low pressure system generated high winds that caused blowing dust across the Valley. November proved to be a more stable month due to the dominance of high pressure systems and poor dispersion. As such, only two dispersive low pressure systems helped improve the Valley's air quality during November. December on the other hand was a much more dispersive month governed by low pressure systems that scoured pollution out of the Valley and helped keep PM<sub>2.5</sub> concentrations low. The 4<sup>th</sup> quarter ended with much improved air quality and good dispersion conditions through the Valley.

Overall, the Dylos sensors operating during this period had high results compared to the regulatory monitor. The Dylos 1 had a 24-hour bias at  $4.13 \mu\text{g}/\text{m}^3$ , while Dylos 2 had a 24-Hr bias of  $9.5 \mu\text{g}/\text{m}^3$ .

### Analysis of Dylos Sensor Performance

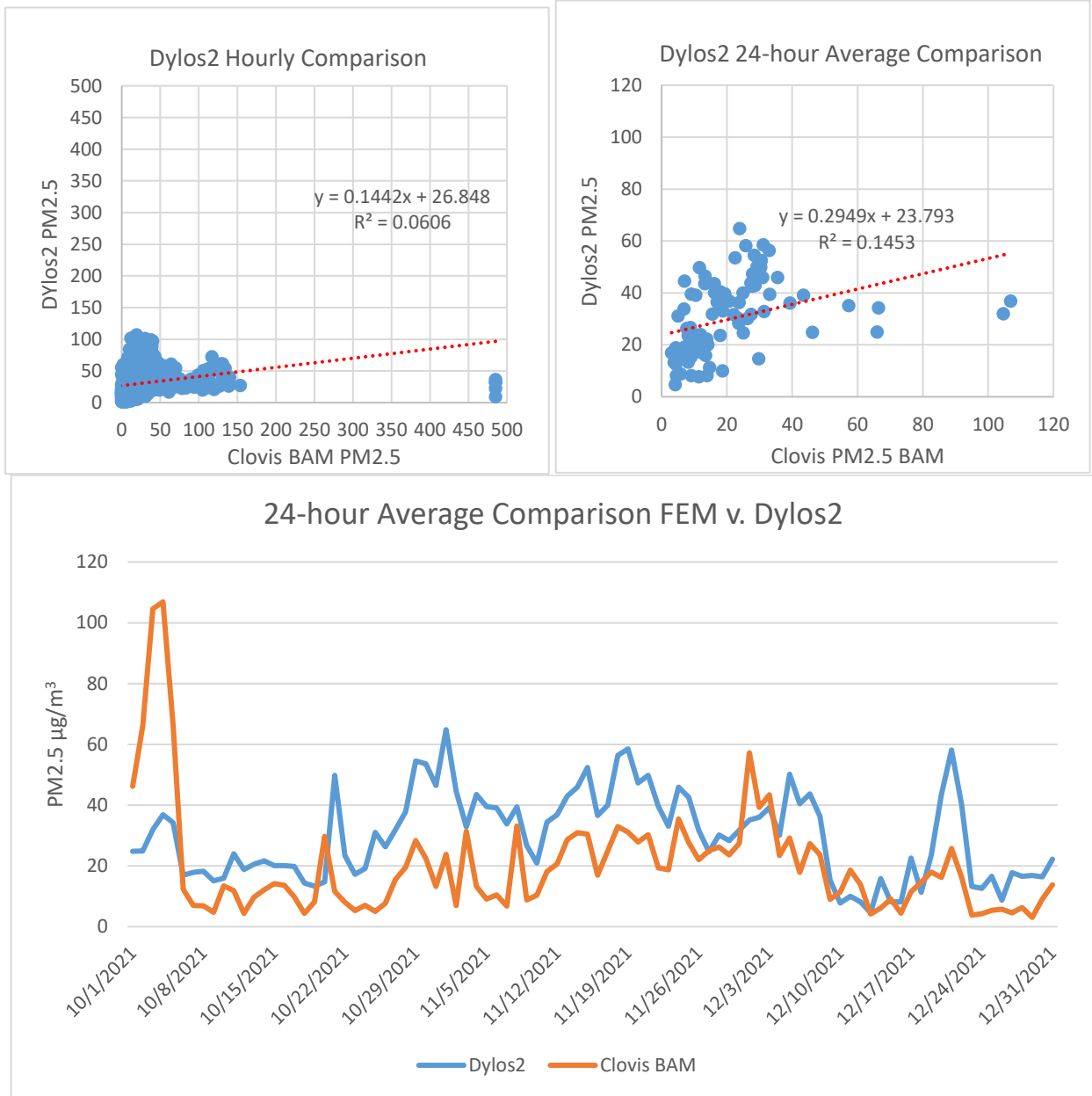
#### Dylos 1

For the hourly and 24-hour averages, Dylos data had a  $4.13 \mu\text{g}/\text{m}^3$  high bias during the October 2021 through December 2021 period.



## Dylos 2

For the hourly and 24-hour averages, Dylos data had a 9.50  $\mu\text{g}/\text{m}^3$  high bias during October 2021 through December 2021 period.



### **Non-Reporting Sites**

#### **Dylos 3**

Data from this sensors was not available for the October 1, 2022 through December 31, 2022, period. The sensor stopped reporting data on July 20<sup>th</sup>, 2021.

### **Statistical Summary**

The following table provides a statistical summary of the PM2.5 data collected during the analysis period of this report.

Clovis-Villa	Average 24-hr	Max 1-hr	Max 24-hr	1-hr R2	1-hr Slope	1-hr Intercept	24-hr R2	24-hr Slope	24-hr Intercept
Dylos 1	24.40	256.76	85.60	0.19	0.39	16.58	0.67	0.88	6.47
Dylos 2	29.77	106.77	64.83	0.06	0.14	26.85	0.15	0.29	23.79
FEM	20.27	485.00	106.88						