

# Community Sensor Training: Best Practices and Lessons Learned



<sup>a</sup>



BAY AREA AIR QUALITY  
MANAGEMENT DISTRICT <sup>b</sup>

<sup>c</sup>

**STi**

Sonoma Technology, Inc.

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for

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# Project Background

- Environmental Protection Agency (EPA) Science to Achieve Results (STAR) Grant
- Awarded to South Coast AQMD, Sonoma Technology, and University of California, Los Angeles (UCLA)
- Work with California communities to increase awareness and address local air quality issues



## Main Objective

Provide communities across California with the knowledge necessary to appropriately select, use, and maintain “low-cost” sensors and to correctly interpret the collected data

# Community Deployments



# Community Toolkit

- Guidebook
  - Best practices
  - Issues to consider during planning and measurement stages
  - Data handling and interpretation
- Training Videos
- Data Collection Checklist
- Surveys

# Introductory Meetings

- Technical workshop on the sensors included discussion of health effects
- Found that allowing community group members to share their experiences and concerns about air pollution was very effective for engagement
- Meeting formats, presentations have evolved over time



# Evolution of the Installation Guide

**Measuring AIR QUALITY in your community**

South Coast AQMD, in collaboration with Seneca Technology and the UCLA Fielding School of Public Health will be forming partnerships with local communities to engage, educate, and empower California communities on the use and applications of "low cost" air monitoring sensors.

**Technology for Measuring Particulate Matter**  
PurpleAir PA-II Dual Laser Air Quality Sensor

- Dual PM sensors
- Measures PM<sub>2.5</sub>, PM<sub>10</sub>, and PM<sub>10.6</sub> along with Temperature, Relative Humidity, and Pressure
- Real-time monitoring
- Available power cycles
- Available real-time data to PurpleAir map
- Easy to install with a single screw or dip-into-WiFi data logging with open data access at [www.purpleair.com/map](http://www.purpleair.com/map)

**Configure the WiFi**

1. Ensure that the sensor is connected to power.
2. Using a Wi-Fi enabled device (cell phone, tablet, or laptop), connect to the Wi-Fi network labeled "PurpleAir\_####" where #### is specific to the sensor.
3. In your Wi-Fi settings, select the network and open the settings page to connect to the sensor.
4. Once Wi-Fi is connected to the "PurpleAir\_####" network, open an internet browser and type in "http://192.168.1.1" to connect directly to the sensor and access the sensor's status and configuration page.
5. Press on the "Configure WiFi" link and enter your personal Wi-Fi access name from the list. Enter the password, and press save.
6. Once the monitor successfully connects to your Wi-Fi, each user uploading data and the "PurpleAir\_####" network will no longer be available to connect to via Wi-Fi.

**Register your PurpleAir Device**

1. Visit [www.purpleair.com/register](http://www.purpleair.com/register) on an internet-enabled device.
2. Click on "SIGN UP" to create a new account for your sensor.
3. Enter your email address and create a password for your sensor.
4. Enter your name, city, state, and zip code.
5. Enter your phone number.
6. Select your sensor type.
7. Select your sensor location.
8. Add your name or community organization.
9. Add your personal email or community group email address.
10. Add your personal or community group phone number.

400  
Community  
Scientists  
Later

**Measuring AIR QUALITY in Your Community**

The South Coast AQMD, in collaboration with Seneca Technology and the UCLA Fielding School of Public Health, will be forming partnerships with local communities to engage, educate, and empower California communities on the use and applications of "low cost" air monitoring sensors.

**Technology for Measuring Particulate Matter (PM)**  
PurpleAir PA-II Dual Laser Air Quality Sensor

- PurpleAir PA-II Dual Laser Sensor
- Outdoor sensor power supply
- 17 Feet of Cable

**Two new sensors**

- Dual PM sensors
- Measures PM<sub>2.5</sub>, PM<sub>10</sub>, and PM<sub>10.6</sub> along with Temperature, Relative Humidity, and Pressure
- Real-time monitoring
- Available power cycles
- Available Wi-Fi log data to PurpleAir map
- Easy to install with a single screw or dip-into-WiFi data logging with open data access at [www.purpleair.com/map](http://www.purpleair.com/map)

**Configure the WiFi**

1. Ensure that the sensor is connected to power. When powered, you will see a red LED on the sensor.
2. Using a Wi-Fi enabled device (cell phone, tablet, or laptop), connect to the Wi-Fi network labeled "PurpleAir\_####" where #### is specific to the sensor. Then enter the monitor's name like "PurpleAir\_####". This is normal and you can proceed to the next step.

**Register your PurpleAir Device**

1. Visit [www.purpleair.com/register](http://www.purpleair.com/register) on an internet-enabled device and input the following information:

Using the interactive map, click and drag the marker for your sensor's location (see the zoom functions to change the scale).

**PurpleAir PA-II Air Quality Sensor Quick Start Guide**  
(Please, helpful information is available on page 6 of this guide)

**Configure the WiFi (continued)**

3. Once you have selected your device to the "PurpleAir\_####" network, open an internet browser, type "192.168.1.1" in the search bar, and search.
4. All throughout the "Wi-Fi Connect" page:
  - 1) Enter your personal Wi-Fi access name from the list, enter your password, and save.
  - 2) Your sensor will auto-configure the settings.

**Be sure to input the correct Wi-Fi password! Passwords are case-sensitive.**

5. Once the monitor successfully connects to your Wi-Fi, each user uploading data and the "PurpleAir\_####" network will no longer be available to connect to via Wi-Fi.

**Register your PurpleAir Device (continued)**

Leave the information in the sections on the left as-is, or edit as needed.

Your first and last name (required)

Your email address (required)

Your phone number (optional)

After reading and agreeing to the Terms of Use and Conditions, click the box then click "Register" to complete the registration.

The installation is now complete and your sensor is now visible on the PurpleAir Map!  
[www.purpleair.com/map](http://www.purpleair.com/map)

(Please, helpful information is available on page 6 of this guide)

**PurpleAir PA-II Air Quality Sensor Quick Start Guide**  
(Please, helpful information is available on page 6 of this guide)

**Register your PurpleAir Device (continued)**

Helpful Information:

- Your sensor does power, it will remain configured with the Wi-Fi information and automatically reattempt once the power comes back on as long as the SD card is present and connected to the sensor.
- If your sensor loses Wi-Fi connection, the data previously collected and uploaded to PurpleAir will still be available. However, the sensor will not collect data while the Wi-Fi connection is down, resulting in data gaps.
- The "PurpleAir\_####" network is only available to connect to while the sensor isn't configured to Wi-Fi.
- To change the information the sensor was registered with, simply repeat the registration process with the correct updated information and the original information will be replaced.
- The sensor will be replaced with the correct updated information and the original information will be replaced.
- It is the user's responsibility to ensure the sensor is placed in a safe location to collect data and is not exposed to the elements. Registering the sensor with the updated information will require the previously registered information. Contact the AQMD program at [SCAQMD@aqmd.com](mailto:SCAQMD@aqmd.com) before a replacement is ordered.
- Users can track their sensor on the PurpleAir Map. If possible, their sensor should be placed in a safe location to collect data and is not exposed to the elements. Registering the sensor with the updated information will require the previously registered information. Contact the AQMD program at [SCAQMD@aqmd.com](mailto:SCAQMD@aqmd.com) before a replacement is ordered.
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**Technical Support:**  
e-mail: [help@purpleair.com](mailto:help@purpleair.com)  
tel: +1-800-926-2713

- Version 1, Two pages
- Created prior to community group meetings
- Included brief sensor information and instructions for siting, installing, configuring, and registering

- Version 7, Six pages
- Input gathered from community group members and frequently asked questions contributed to the multiple version edits
- Added sensor information, images, simplified instructions, visual aids, and a "helpful information" section

# Further Customization

- Community version – Six pages
- Greatly increased use of images and reduced words
- Created by Oakland community partner, Asian Health Services, to better meet their community's needs

## Wi-Fi Setup and Registration



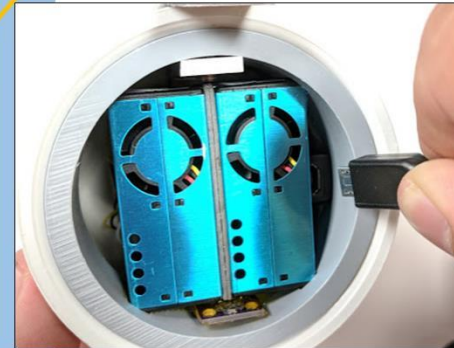
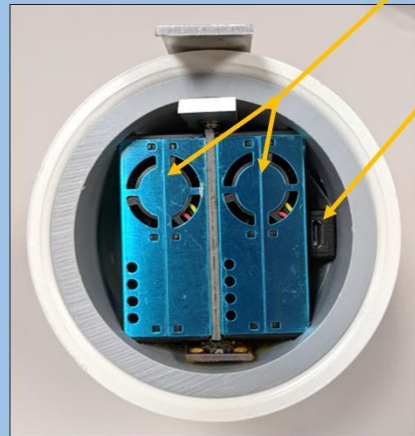
Get familiar with the PurpleAir PA-II Air Quality Sensor.

**"Location Name"** - It will be used during Registration (Take a photo or write it down)

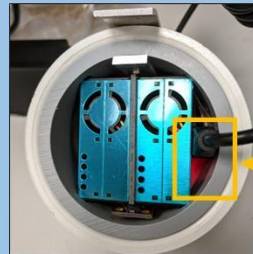
**"Device ID"** - It will be used during Registration (Take a photo or write it down)

**Two sensors**

**Micro USB** port to plug in the power chord.



# 1

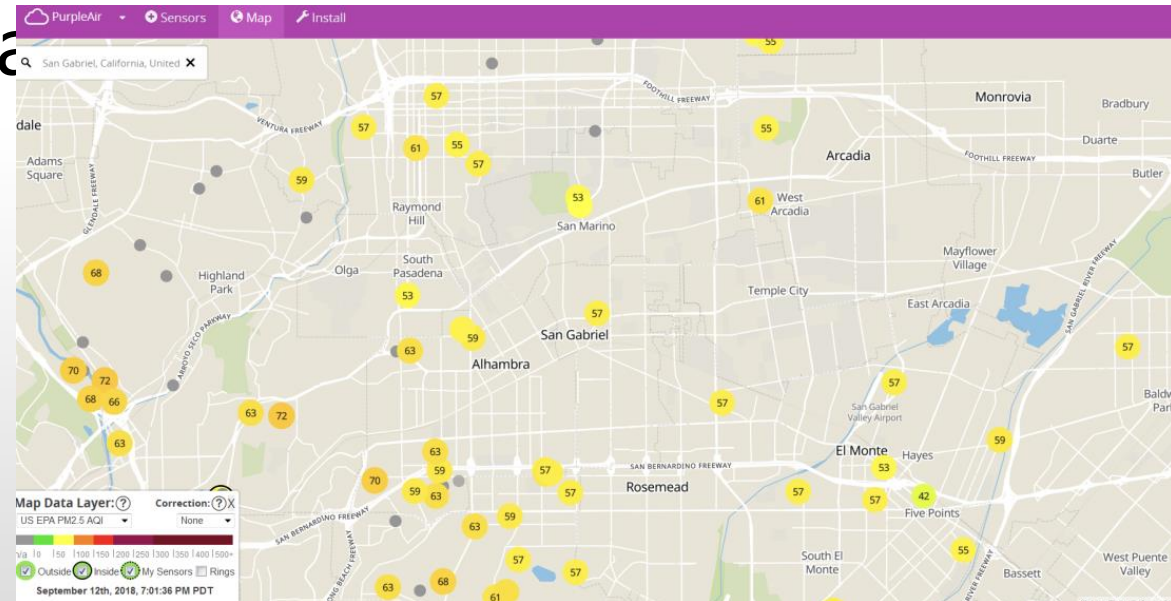


Plug in the power chord and ensure that the power is turned on.

You will see a red light if it is on.

# Deployment

- Range of locations – homes, apartments, schools
- Qualitatively “spreading out” locations (e.g., by zip code)
- Community engagement





# SCAQMD Sensor Installation Survey – Post Deployment

## English Version

The Science To Achieve Results (STAR) Grant team at the South Coast AQMD would like to thank you for your participation in the project entitled, "Engage, Educate and Empower California Communities on the Use and Applications of "Low-cost" Air Monitoring Sensors" and to invite you to participate in this very brief online survey about your sensor installation location. Completing this survey with a smart device with a camera will allow you to easily submit a picture.

### [Installation Survey](#)

Moving forward, please keep an eye out for upcoming community group meetings, an email containing the electronic log note entry form, and changes for end user data visualization and accessibility!



[Unsubscribe](#) [Forward to a friend](#)

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909-396-2000 • [www.aqmd.gov](http://www.aqmd.gov)

## Spanish Version

### EPA STAR Grant: La encuesta de instalación del sensor ahora disponible en Español

El equipo del programa otorgante/ la beca "la ciencia para lograr resultados (STAR, por sus siglas en inglés)" de la Administración de la calidad del aire de la costa sur, (South Coast AQMD, por sus siglas en inglés) le da las gracias por su participación en el proyecto llamado "Involver, educar y habilitar a comunidades en California en el uso y aplicación de sensores con monitoreo de aire a bajo costo" y le invita a participar en esta encuesta muy breve acerca del lugar de instalación de su sensor. Si completa esta encuesta con un dispositivo inteligente de cámara le permitirá fácilmente someter/enviar una foto.

### [Encuesta de instalación](#)

Una vez que haya oprimido el enlace de la encuesta, oprima el tabulador "Default Language", (idioma predeterminado), arriba en la esquina a la derecha de la encuesta y seleccione "Español" del menú desplegable.

Con miras al futuro, esté al pendiente de próximas reuniones en grupo, un correo electrónico con una forma llamada "electronic log note entry form", y cambios de datos finales para el usuario de visualización y accesibilidad!



[Remover su nombre](#) [Enviar a un amigo](#)

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**For BAAQMD, six languages are needed!**

# SCAQMD Sensor Installation Survey – Post Deployment

## Sensor Installation Survey

This survey is intended as a one-time survey to be completed when a community scientist installs a sensor as part of the South Coast Air Quality Management District's (SCAQMD) U.S. EPA Science to Achieve Results (STAR) grant project entitled "Engage, Educate and Empower California Communities on the Use and Applications of Low-Cost Air Monitoring Sensors."

### Name\*

Community Scientist Name

### Email Address

### Date of Installation\*

### Time of Installation


 Morning Afternoon Evening

### Community Group\*

Select from the following communities:

-Please Select-

- El Monte City School District
- Fresno, Central California Environmental Justice Network (CCEJN)
- Imperial County, Comite Civico del Valle, Inc. (CCV)
- Kern, Central California Environmental Justice Network (CCEJN)
- Nipomo, southern SLO County



Esri, Garmin, NGA, USGS Powered by Esri  
Lat: 0 Lon: 144.96552

### What best describes the type of dwelling where the sensor is installed?\*

 Single Family Home

### What best describes the location where the sensor is installed?\*

 Front Porch or Patio Rear Porch or Patio Eave of the Home External Wall of Home Balcony Other

### What direction is the installation location facing?\*

 North Facing South Facing

# Engagement: San Gabriel Valley Air Pollution Research Project – Asian Pacific Islander Forward Movement (APIFM)

APIFM created and maintains a Facebook Group for the sensor participants.

APIFM posts articles about air pollution that are in the news and uses it as a medium to discuss any air readings they find interesting and worth sharing.

SGV Air Pollution Research Project

Closed Group

Shortcuts

Harvard

+ Join Group

More

Join this group to see the discussion, post and comment.

About This Group

Description

This is a Facebook Group for those involved with the Purple Air Sensor project. Expect to see updates, analysis of air pollution, and more through here.

Members · 23

GROUP BY

API Forward Movement

867 like this

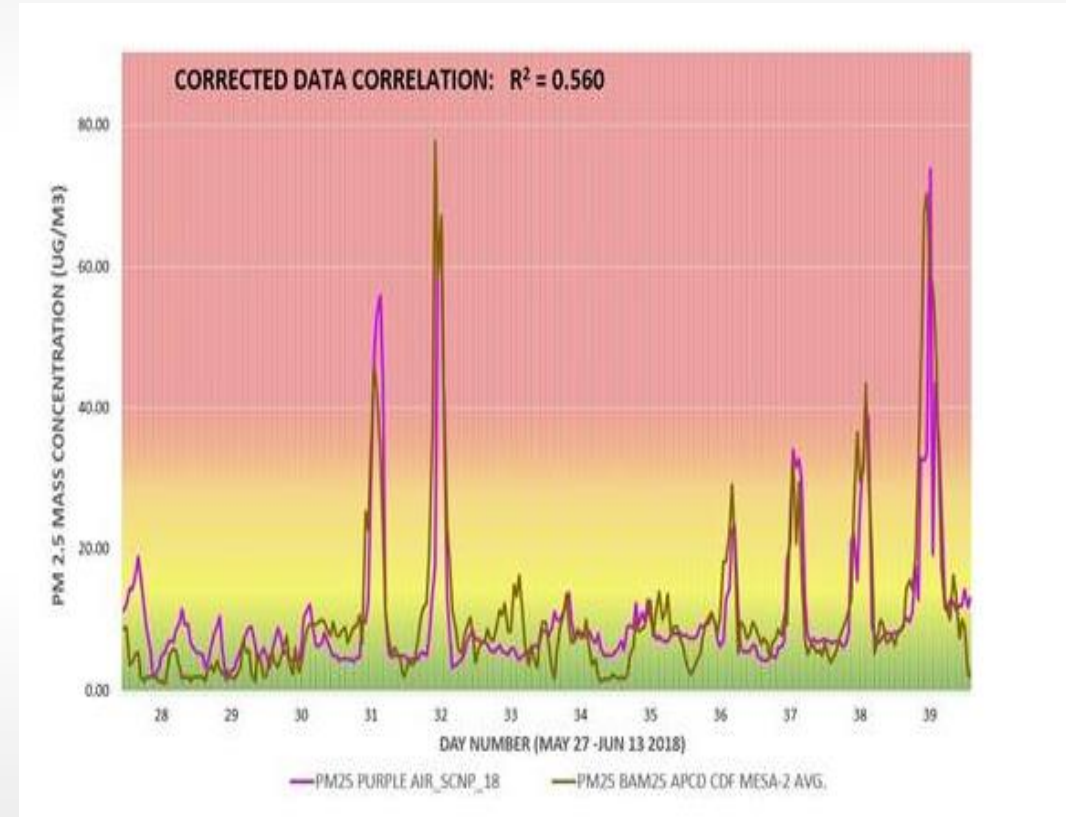
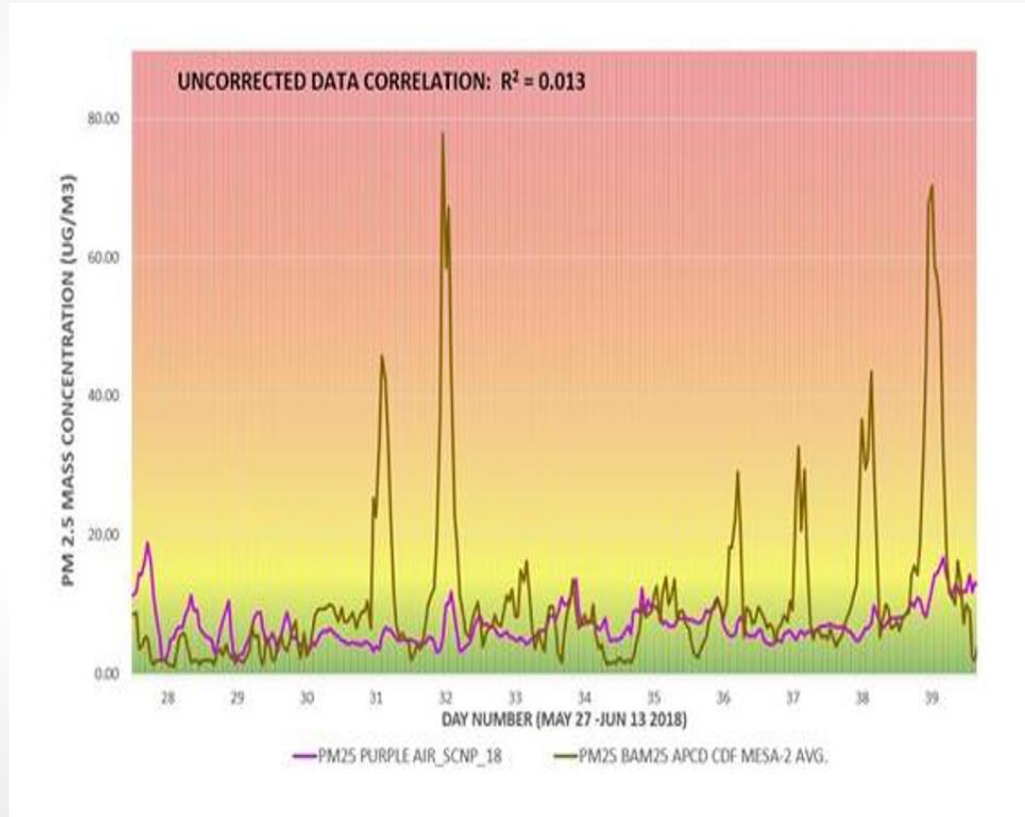
Learn More

CREATE NEW GROUPS

Groups make it easier than ever to share with friends, family and teammates.

Create Group

# Community Data Analysis



Some community members are very engaged in data analysis!

<https://www.purpleair.com/map>

On Wed Jun 13 2018 13:59:34 GMT-0700 (Pacific Daylight Time)

Real Time PM2.5 is LOW at 24µg/m3

Enjoy your activities

Real Time  
7

Good

51-100  
moderate  
sensitive

Trends

Channel

Real Time  
77  
24µg/m3

Channel B Running Averages

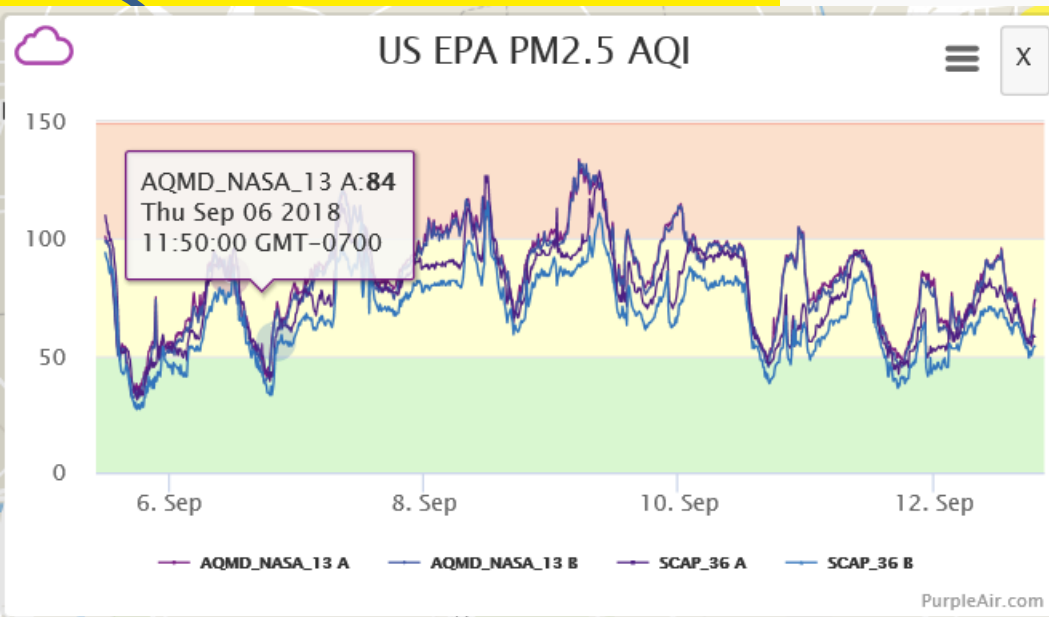
Real Time	Short-term	30 minute	1 hour	6 hour	24 hour	One week
75	82	85	89	80	63	59
24µg/m3	27µg/m3	28µg/m3	30µg/m3	26µg/m3	18µg/m3	16µg/m3

Excellent Confidence

100%

\* Laser Temperature: 86°F \* Laser Humidity: 37%

Approximate conditions the laser is exposed to. Readings are affected by the electronics, sunlight or wind. Temperature may be elevated and humidity under estimated.



On September 12th, 2018, 7:05:36 PM PDT

Real time US EPA  
PM2.5 AQI is now

57

51-100: Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people who are unusually sensitive to air pollution.

Now	10 Min	30 Min	1 hr	6 hr	1 Day	Week
57	55	55	55	61	66	72

Sensor: SCAP\_36

PA-II 2.49j RSSI: -69

San Gabriel

# Summary

- The team is learning and adjusting as we go
  - We especially are learning from our community partners
- Everything we are learning is informing the community toolkit