Southeast-Rio Vista YMCA

AirAware
Air Quality Monitoring
Quarterly Report
(10/2025 – 12/2025)

Photo of the Southeast-Rio Vista YMCA

Prepared by the
AirAware Team

Southeast-Rio Vista YMCA

AirAware Air Quality Monitoring Quarterly Report - # 4

October 2025 - December 2025

Prepared by the AirAware team

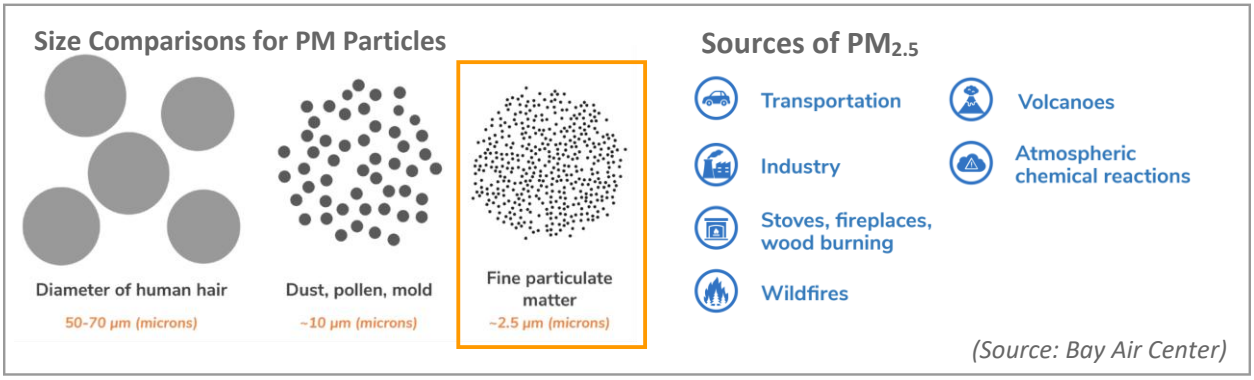
This report summarizes the recent air quality trends observed at the Southeast-Rio Vista YMCA, focusing on the differences between indoor and outdoor fine particulate matter ($PM_{2.5}$).

Key Takeaways

- $PM_{2.5}$ levels varied across time with the majority of indoor levels in the Good and Moderate AQI range, while outdoor levels rose into Unhealthy for Sensitive Groups and Unhealthy AQI levels.
- Indoor and outdoor pollution levels were exacerbated by the inversion layer, which is a meteorological phenomenon that occurs in the LA basin during winter months from wood-burning sources and stagnant air and increased smog conditions. Lower winter temperatures also tend to result in increased use of wood burning sources of heat, the PM from this burning gets trapped in the inversion layer causing higher pollution levels.
- Gym 2 had the highest indoor average during higher pollution days than other indoor spaces, but no longer exceeded outdoor levels like in previous reports (i.e., minimal impact from indoor pollution sources). Further investigation by this YMCA will be needed to determine the cause of the $PM_{2.5}$ levels in this space.

Background

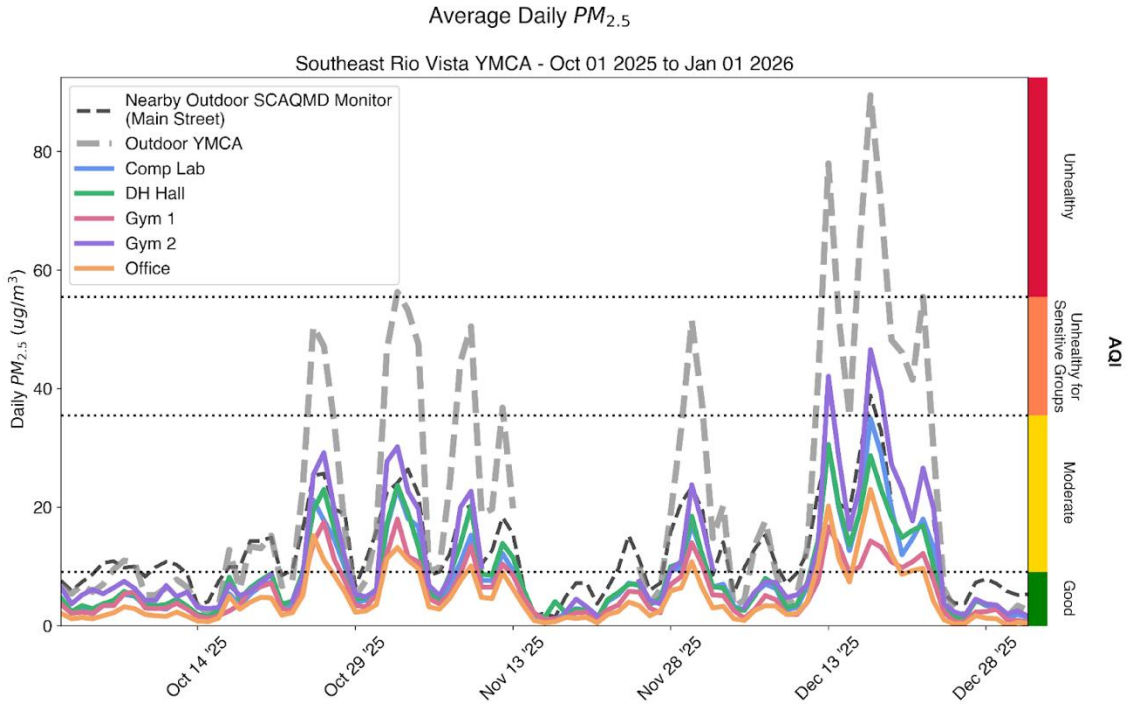
Particulate matter is an air pollutant made of tiny liquid and solid airborne particles that vary in size. Fine particulate matter ($PM_{2.5}$), which is the focus of the AirAware project, describes an important subset of particulate matter that is 2.5 microns and smaller in size (~30x smaller than the diameter of a human hair) and predominantly come from sources of combustion (burning of fuels), such as wildfires, residential wood burning, transportation, and industry.



Exposure to $PM_{2.5}$ has various detrimental health effects, such as aggravated asthma, decrease in lung function, increase in respiratory symptoms, and nonfatal heart attacks or premature deaths in people with heart and lung disease. It also impacts the environment through reduced visibility, damaged vegetation, and reduced soil nutrients, among many other impacts.

Trends in Fine Particulate Matter ($PM_{2.5}$)

Indoor and outdoor air quality monitoring at the Southeast Rio Vista YMCA has been underway since late Fall 2024. This section explores the trends across time and space during fall and early winter of 2025 (October-December).



This plot shows average daily $PM_{2.5}$ levels across time for both the indoor (solid color lines) and outdoor (dashed grey line) AirAware monitors from the beginning of May 2025 to the end of July 2025. Data from a nearby regulatory monitor from the South Coast Air Quality Management District (SCAQMD) is also included (dashed black line). The Air Quality Index (AQI) categories coinciding with $PM_{2.5}$ concentrations are shown on the right with bounds shown across the plot in dashed black lines, helping to provide health context. The YMCA-wide data gap in late May/early June was due to routine project maintenance (6-month collocation The outdoor monitor also experienced a data gap in mid November due to power/solar battery charging issues caused by lack of sun during winter rains.

What does this plot tell us?

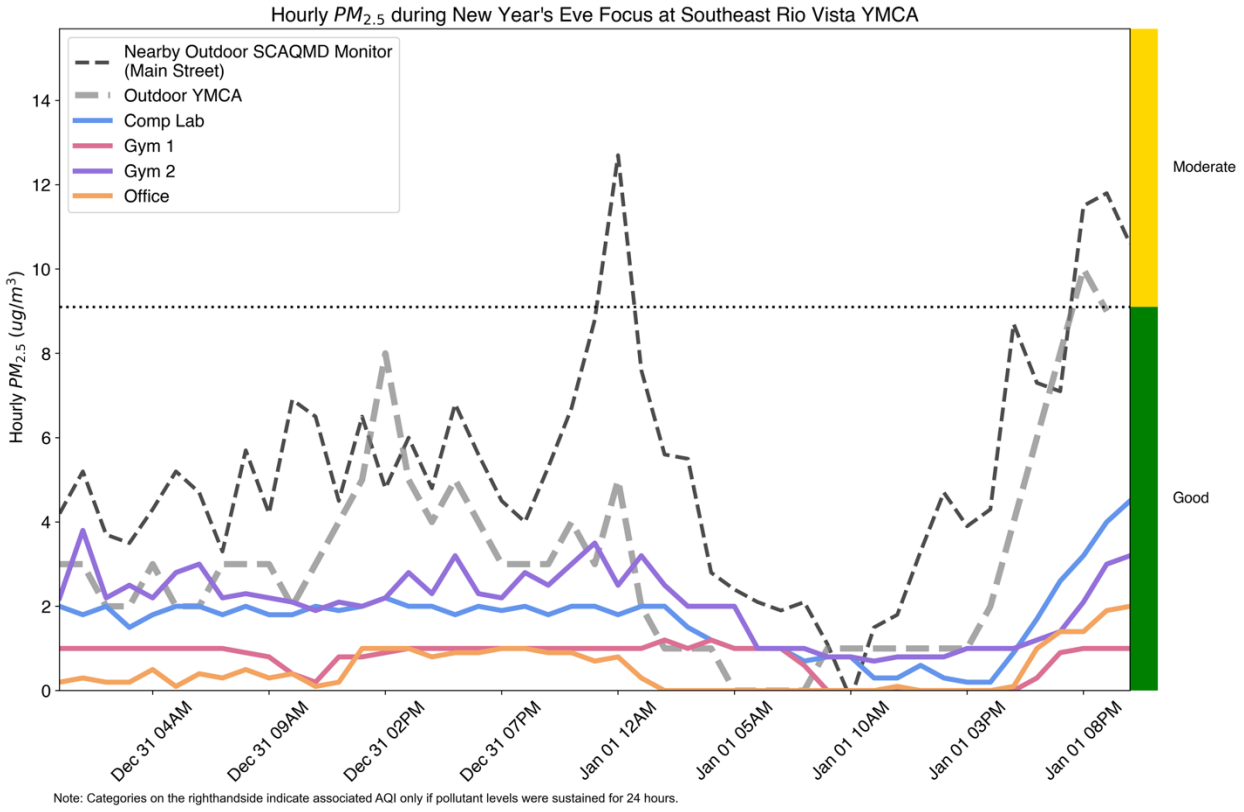
- From October 2025 to December 2025, outdoor $PM_{2.5}$ levels varied across time, and largely stayed within the Moderate AQI range. Indoor levels followed the rise and fall in outdoor air pollution, but at lower concentrations often an AQI level lower.

- Higher outdoor $PM_{2.5}$ outdoor concentrations in the Unhealthy AQI occurred briefly in mid December and in the Unhealthy for Sensitive Groups AQI in late October and November. These poor outdoor air quality days were likely due to pollution from stagnant winter weather, not wildfires, and highlight the importance of sustained and effective air filtration in maintaining healthy indoor air quality conditions year round. Additionally, the higher spikes in outdoor $PM_{2.5}$ were likely exacerbated by local sources, as levels measured at the nearest SCAQMD regulatory station (6 miles northwest of this YMCA) occurred but were lower. Local sources could be soot from wood burning fireplaces

trapped by stagnant winter weather, or pollution from the industrial areas surrounding Maywood.[1]

Impacts of Fourth of July Fireworks

The plot below zooms in on the hourly data and further shows how fireworks impacted air quality both outdoors and indoors.



This plot shows average hourly $PM_{2.5}$ levels across time for both the indoor (solid color lines) and outdoor (dashed grey line) AirAware monitors from December 31st 2025 to January 1st 2026. Data from a nearby regulatory monitor from the South Coast Air Quality Management District (SCAQMD) is also included (dashed black line). The Air Quality Index (AQI) categories coinciding with $PM_{2.5}$ concentrations are shown on the right with bounds shown across the plot in dashed black lines, to provide health context, with the caveat that levels would need to be sustained for 24 hours to translate to the shown AQI. Times are shown in Standard Time (i.e. one hour behind Daylight Savings Time).

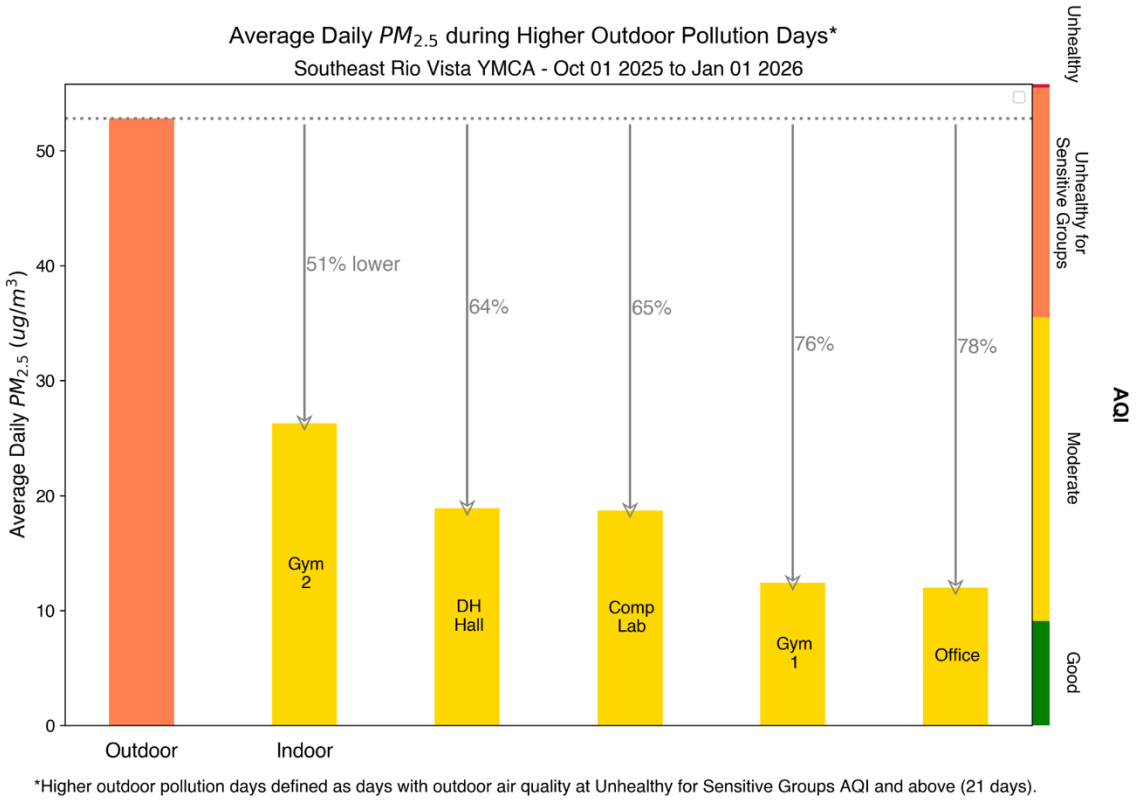
- Outdoor and indoor $PM_{2.5}$ was minimally impacted by firework-related emissions during New Year's Eve celebrations, remaining in the Good AQI category for the majority of the December 31, 2025 evening to January 1, 2026 morning. Outdoor levels at the nearest regulatory monitor rose into the Moderate AQI at midnight on January 1, 2026, while outdoor and indoor levels at the YMCA stayed lower in the Good AQI.

[1] The outdoor YMCA monitor has not been directly evaluated against the SCAQMD monitor, so we cannot draw conclusions about differences between the two.

- These cleaner air quality conditions were likely caused by rainfall during New Years through both the particle removal from precipitation, as well as its impact on planned celebrations (e.g., reduced fireworks)[2]. Many firework celebrations in the surrounding areas were also canceled this year as a response to the January 2025 Eaton and Palisades wildfires.
- These hourly levels were significantly lower compared to the previous year, where outdoor levels rose over 90 ug/m^3 with indoor levels ranging from 40-60 ug/m^3. Other pollution conditions apart from New Year's Eve fireworks were occurring last year at the same time that likely impacted these levels as well (stagnant air, woodsmoke).

Comparison of Indoor and Outdoor $PM_{2.5}$

The relationship between indoor and outdoor $PM_{2.5}$ is important to explore as it can tell us how effective your YMCA's HVAC system is currently at filtering out particulate matter from outdoor sources and can help highlight indoor air quality concerns and any needs for HVAC improvement.



The bar chart above compares average daily outdoor (left) and indoor (right) $PM_{2.5}$ levels during higher outdoor pollution days. The color of each bar chart coincides with an AQI category, and the arrows from the grey dashed line and coinciding percentages indicate how much lower average indoor levels are per room compared to outdoor. The indoor spaces are ordered from most to least similar to outdoor levels.

[2] National Weather Service Climatological Data for Los Angeles Downtown Area, CA - December 2025 showed 0.43 inches of rain.

What does this chart tell us?

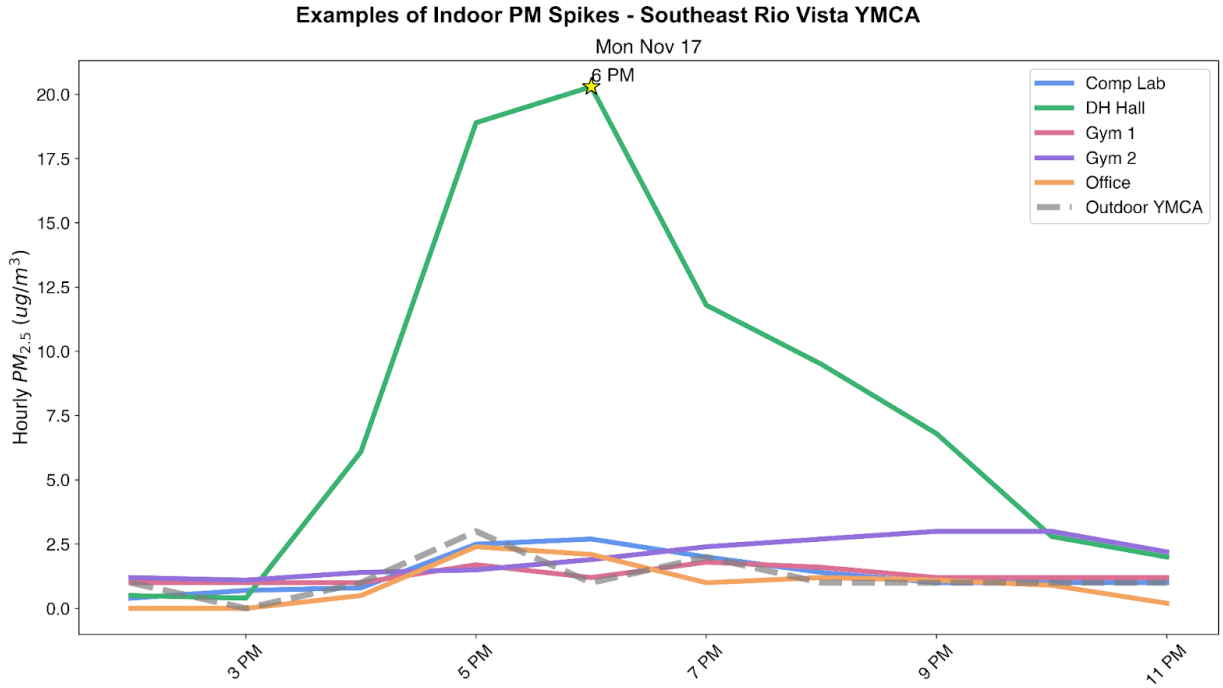
- On average, we would expect indoor levels to be between 30% and 80% lower than outdoor levels, depending on the type of filter installed in the HVAC systems, how frequently the filters are changed, and how often the HVAC is run. During this period, average indoor levels during higher pollution days were within this expected range indicating the HVAC filtration system is generally working as expected. Levels would be expected to reduce by at least 80% if an indoor air quality improvement intervention was introduced (e.g., enhanced HVAC filters or indoor air purifiers).

- Not all indoor spaces experience the same $PM_{2.5}$ conditions. When outdoor air quality was in the Unhealthy for Sensitive Groups AQI level, Gym 2 had the highest indoor average. Gym 2 is a large two-story open basketball gymnasium with 3 emergency exit doors. It is possible that outdoor air could be seeping in through these emergency exits. This space also appears to only be used during sporting events. If Gym 2 was not in use during these higher pollution days, its ventilation system may not have been turned on which would further explain the higher measured levels.

- The Office and Gym 1 continue to measure the cleanest on average air (76-78% lower than outdoors). Many factors may be causing these differences, such as building and HVAC design. Statistical analysis showed that the DH Hall and the Comp Lab were similar to each other and that Gym 1 and the Office were also comparable.

Questions about Indoor $PM_{2.5}$

Indoor sources and activities can also contribute to higher indoor air quality levels, and exploring these trends can help identify contributing indoor activities or behaviors and provide insight on possible changes to improve indoor air quality.



This plot shows examples of hourly indoor (solid color lines) and outdoor (dashed grey lines) $PM_{2.5}$ levels at the YMCA that are characteristic of indoor sources or activities that contribute to higher indoor air quality. All times are shown in Standard Time (i.e. one hour behind Daylight Savings Time).

What does this chart tell us?

- High indoor spike in the DH Hall on November 17, 2025 from 3PM - 10PM, when outdoor and other indoor levels were low.
- This prolonged spike in DH Hall was likely caused by a specific activity taking place inside the space. Further investigation by YMCA staff into what, if any, activities were scheduled for DH Hall during the late afternoon, and evening of Monday November 17 is needed to determine the cause of the $PM_{2.5}$ levels in this space.
- In previous reports, Gym 2 $PM_{2.5}$ was often highlighted as spiking above outdoor levels, but this behavior was not observed for this period. Further investigation is needed by YMCA staff to determine whether there was a change in the activities that took place in Gym 2.