

# Airports: Monitoring & Improving Indoor Air

Indoor Air Purification and Monitoring at Richmond Airport Using AtmosSmart IAQ

## BACKGROUND

Richmond Airport initiated a continuous and real time air quality improvement & ng system to positively impact the Indoor Air Quality (IAQ) within its facilities. Using two AtmosSmart IAQ monitors, the airport aimed to clean and disinfect the air circulated through the Return Air Path of two Rooftop Units (RTUs) serving densely populated security check points. These units service vital areas of the airport, crucial for the well-being of both the staff and the public. The supply air in these RTUs is being treated with AtmosAir DBD BPI technology.

## OBJECTIVE

The primary objective of this case study was to evaluate the IAQ against established guidelines and standards to ensure the health and safety of the occupants.

## APPROACH

No alterations were made to accommodate the IAQ monitors. Consequently, the readings reflect typical operational conditions. A variety of air constituents were tracked including temperature, relative humidity (RH), carbon dioxide (CO<sub>2</sub>), Total Volatile Organic Compounds (TVOCs), carbon monoxide (CO), ozone, and particle matter (PM<sub>1</sub>, PM<sub>2.5</sub>, and PM<sub>10</sub>).

## FINDINGS

Over the data collection periods (spanning from April 20, 2023, to January 16, 2024), the results consistently indicated average values:

- Temperature: 72°F - 75°F
- RH: 46% - 52%
- CO<sub>2</sub>: 509 ppm - 595 ppm
- TVOC: 49 ppb - 76 ppb
- Ozone: 0.05 ppm - 0.07 ppm
- CO: 0.0 ppm - 0.02 ppm
- PM<sub>1</sub>: 1.29 ug/m<sup>3</sup> - 11.3 ug/m<sup>3</sup>
- PM<sub>2.5</sub>: 1.41 ug/m<sup>3</sup> - 12.3 ug/m<sup>3</sup>
- PM<sub>10</sub>: 1.41 ug/m<sup>3</sup> - 12.7 ug/m<sup>3</sup>
- Formaldehyde (HCHO): 101 ppb - 155 ppb



## Fast Facts

Reduction of PM<sub>2.5</sub>  
FROM OUTDOOR AIR

68%

Reduction of PM<sub>2.5</sub>  
FROM OUTDOOR AIR  
DURING WILDFIRES

64%

These numbers were well within the acceptable range when compared to the guidelines:

- CO<sub>2</sub>: Up to 5000 ppm
- TVOC: Up to 500 ppb
- Ozone: Up to 0.10 ppm
- CO: Up to 9 ppm
- PM<sub>2.5</sub>: Up to 35 ug/m<sup>3</sup>
- PM<sub>10</sub>: Up to 150 ug/m<sup>3</sup>
- HCHO: Up to 750 ppb



Date Range	Outdoor (PM 2.5)	Indoor (PM 2.5)	% Difference	
06.04 - 06.09.23	33 ug/m <sup>3</sup>	11.9 ug/m <sup>3</sup>	-64%	<i>Wildfire Period</i>
06.15.23 - 01.16.24	9.13 ug/m <sup>3</sup>	2.97 ug/m <sup>3</sup>	-68%	

## NOTABLE OBSERVATIONS

A significant observation was the air quality during the wildfire period from June 4 to 9, 2023. Despite unhealthy outdoor air quality levels from wildfire smoke, the indoor PM 2.5 levels were markedly lower than the outdoor levels (11.9 ug/m<sup>3</sup> vs. 33 ug/m<sup>3</sup>), indicating an impressive -64% difference. This trend of superior indoor air quality continued beyond the wildfire period with a -68% difference compared to the outdoors from June 15, 2023, to January 16, 2024

## CONCLUSIONS

Overall, the AtmosSmart IAQ monitors reported that the IAQ at Richmond Airport was well within the safe limits outlined by EPA, OSHA, and NIOSH. None of the monitored elements exceeded the concern limits, showing that the facilities maintained very good indoor air quality. The HVAC systems, air filtration and bi-polar air ionization measures in place handled even the high-particle conditions brought on by external wildfire smoke efficiently, ensuring the health and safety of airport occupants.

## LIMITATIONS

The service scope was limited to only air quality monitoring. Any implications on health or operational conditions of the building systems based on this data were not within the purview of Clean Air Group/AtmosAir.

## FINDINGS

Continued monitoring is recommended to ensure ongoing compliance with air quality standards and to assess the performance of the air handling systems. It would also be beneficial to consider an evaluation of system efficiency during peak usage times and adverse environmental conditions to provide comprehensive insights into the resilience of the airport's IAQ controls.