



COTTONWOOD

AIR QUALITY MONITORING REPORT

September 2024



Clean Air, Safe Water,
Healthy Land for Everyone

Cottonwood Air Quality Monitoring Report 2024

EXECUTIVE SUMMARY

Goal

The study aimed to conduct an air quality screening test in Cottonwood, focusing on particulate matter with a diameter of 10 micrometers or less (PM₁₀). Additionally, metals concentration data were collected for analysis and a health consultation with the Arizona Department of Health Services (ADHS). The objective was to evaluate PM₁₀ (dust) and metals concentrations in the Cottonwood area and determine if further investigation is needed.

What We Did

The Arizona Department of Environmental Quality (ADEQ):

- Assessed monitoring sites in the area to ensure they would capture representative ambient PM₁₀ and metals concentrations
- Deployed instrumentation at the VFW Post 7400 (705 E. Aspen St. Cottonwood, AZ 86326) and the Cottonwood Kid's Park (350 S. 12th St. Cottonwood, AZ 86326) to monitor ambient PM₁₀ and metals concentrations during the study period of February 15, 2024, to June 9, 2024
- Analyzed the data to identify any potential U.S. Environmental Protection Agency (EPA) National Ambient Air Quality Standards (NAAQS) exceedances

What We Learned

- During the study period, the average 24-hour PM₁₀ concentration at the VFW Post was 42 µg/m³ (micrograms per cubic meter), which is well below the NAAQS limit of 150 µg/m³. For Cottonwood Kid's Park, the average 24-hour concentration during the study period was 14 µg/m³.
- The maximum 24-hour PM₁₀ concentration at the VFW Post was 150 µg/m³ on April 23, 2024. This concentration exceeded 85% of the PM₁₀ NAAQS.
- On April 23, 2024, strong wind gusts over 25 mph likely contributed to the elevated PM₁₀ concentration.
- The maximum 24-hour PM₁₀ concentration for Cottonwood Kid's Park was 37 µg/m³.
- The maximum rolling 3-month average concentration for lead at the VFW Post was 0.10 µg/m³. The Cottonwood Kid's Park monitor reported very low concentrations, with only 4 samples above the Method Detection Limit (MDL). The average concentration of those samples was 0.002 µg/m³.

Principle Study Question

During the study period, do any of the PM₁₀ average daily (24-hour) concentrations exceed 85% of the PM₁₀ NAAQS?

Alternative Study Question

Do ambient airborne metals pose a health risk for the area including the VFW Post and Cottonwood Kid's Park? *This question will be addressed in a subsequent health consultation that will be conducted by ADHS.*

Dust & Metals Monitoring

We conducted PM₁₀ monitoring, as dust was identified as the primary pollutant of concern based on reports from the Cottonwood community. A lab was contracted to extract metals data from the PM₁₀ samples. That data will be provided to ADHS for use in its planned health consultation.

Data Quality Indicators

- **Completeness:** The Quality Assurance Project Plan (QAPP) for this study incorrectly stated the data completeness requirement as 90%. We aimed to follow the EPA's requirement of 75% data completeness of the hourly concentrations in the 24-hour period. Due to unforeseen events, including solar panel failure and external lab analysis and sample retention errors, the Cottonwood Kid's Park metals monitor achieved a data completeness of 69%, below the 75% goal.
- **Representativeness:** The monitoring locations are representative of the community at large and the study period included typical weather conditions.
- **Instrument requirements:** Accuracy within 10% for hourly measurements. Sensitivity is 1 µg/m³. The lower detectable level is less than 1 µg/m³.
- **Instrument precision:** Instrument flow rate is within 4% of indicated value. The instrument was calibrated and passed on verifications.

BACKGROUND

The Cottonwood community expressed concerns about potential poor ambient air quality due to dust from nearby sources, including a slag pile. In response, ADEQ deployed two study monitors in the area (see Figure 1), one north of the slag pile at the VFW Post, and one east of the slag pile at the Cottonwood Kid's Park, to assess the potential impact of dust and metals from Feb. 15, 2024, to June 9, 2024. According to the NAAQS, ambient levels of PM₁₀ should not exceed a 24-hour average of 150 µg/m³ while the NAAQS for lead is 0.15 µg/m³ in Total Suspended Particles (TSP) over a 3-month rolling average. We utilize these NAAQS as guidance for the PM₁₀ and lead monitoring to evaluate potential areas within Arizona that may exceed the NAAQS. We designed the monitoring plan to collect data for PM₁₀, which could then be analyzed for a range of metals to best investigate the concerns of the community. The methodology and equipment used for PM₁₀ and metals monitoring in this study differ from those used in NAAQS compliance monitoring specifically for lead, which relies on TSP. As a result, the lead values obtained from the PM₁₀ samples may not be directly comparable to those from NAAQS compliance monitoring.

Dust particles are of concern, as they can penetrate the lungs and cause tissue damage. Lead exposure is associated with various adverse health effects, particularly neurocognitive and neurobehavioral effects in children. The PM₁₀ data collected during the study was analyzed for multiple metals beyond lead, including aluminum, copper, zinc and others. These additional metals do not have a NAAQS for comparison, therefore, we cannot make an assessment about that data. Any potential health impacts from lead or other metals will be included in a health consultation being conducted by ADHS, which is expected to be available around the end of 2024 or early 2025.

Figure 1



RESULTS

The study period for PM₁₀ and metals in the Cottonwood community lasted 115 days from Feb. 15, 2024, to June 9, 2024. During this period, the average 24-hour PM₁₀ concentration for the VFW Post was 42 µg/m³, while at the Cottonwood Kid’s Park the average 24-hour PM₁₀ concentration was 14 µg/m³. Both averages were well below the NAAQS of 150 µg/m³. The maximum 24-hour PM₁₀ concentration at the VFW Post was 150 µg/m³ on April 23, which exceeded 85% of the PM₁₀ NAAQS, however, wind gusts over 25 mph from the south likely contributed to the higher PM₁₀ concentrations that day.

The lead data collected at the VFW Post had a maximum rolling 3-month average (April-June) of 0.10 µg/m³ (67% of the NAAQS (0.15 µg/m³)). The maximum rolling 3-month average at the Cottonwood Kid’s Park was determined to be 0.002 µg/m³, which is less than 2% of the NAAQS. Due to the elevated lead readings observed at the VFW Post during the monitoring study, and considering the differences between lead measurements from PM₁₀ and TSP-based sampling methods, which could result in an underestimation of lead concentrations, we plan to conduct additional lead sampling at the VFW Post using the TSP methodology. This second phase of monitoring, and updated monitoring approach specifically for lead, will ensure that the collected data is more accurately comparable to the lead NAAQS.

All monitors met the completeness criteria of 75%, except for the Cottonwood Kid’s Park metals monitor, which achieved a data completeness of 69% due to unforeseen issues, including solar panel battery failures and external contractor lab analysis and sample retention errors. See Table 1 for a breakdown of the completeness percentages for each monitoring site.

Table 1

Monitor	Valid Samples Out of 36 Total	Completeness Percentage
VFW Post (PM ₁₀ Filter)	35	97.2%
VFW Post (Metals)	31	86.1%
Cottonwood Kid’s Park (PM ₁₀ Filter)	29	80.6%
Cottonwood Kid’s Park (Metals)	25	69.4%*

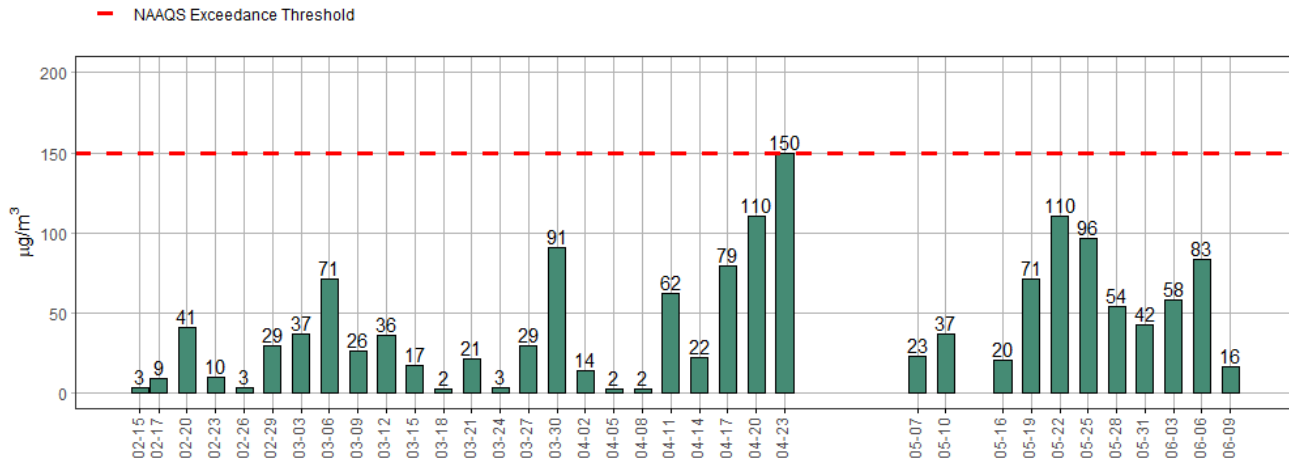
*Completeness is below the targeted criteria of 75%



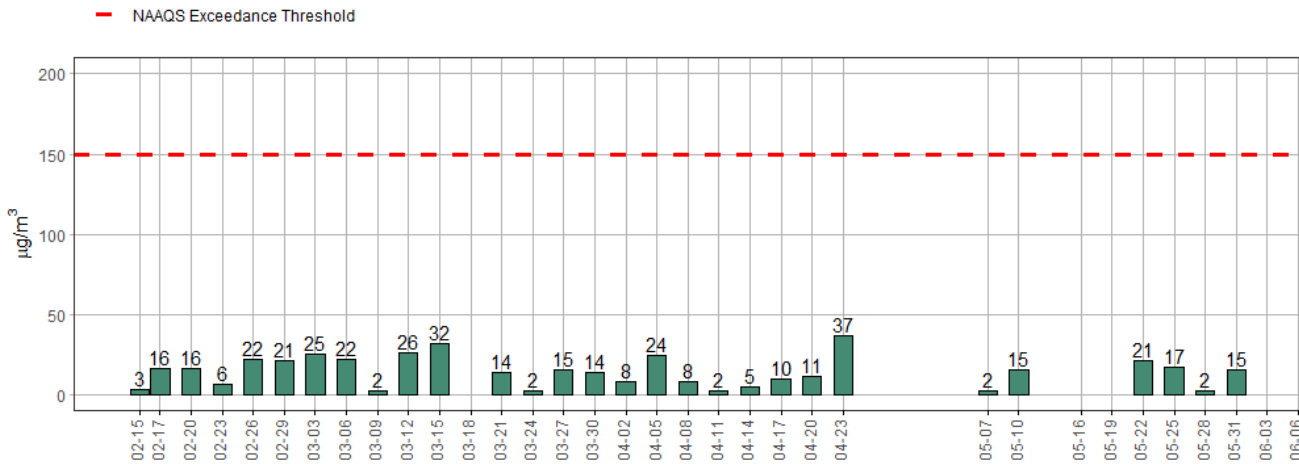
See Figure 2 for PM₁₀ 24-hour concentrations during the study period.

Figure 2

VFW Post 24-Hour PM₁₀ Concentrations



Cottonwood Kid's Park 24-Hour PM₁₀ Concentrations



The VFW Post and Cottonwood Kid's Park PM₁₀ both met the 75% data completeness for the period.



Figure 3

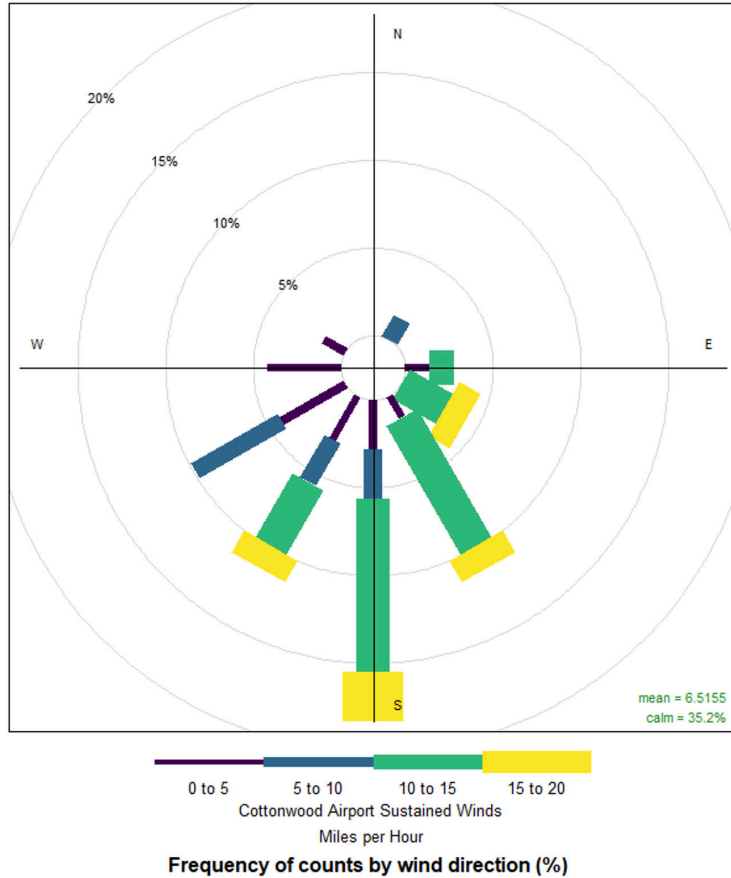


Figure 3 shows that winds were generally out of southerly directions, blowing towards the north, during the study period. On April 23, 2024, the Cottonwood Airport reported sustained winds of around 20 mph, with wind gusts above 25 mph, from the south. These wind gusts likely caused elevated PM₁₀ concentrations at the VFW Post, which is north of the slag pile. If wind speeds were below these thresholds or from a different direction, then PM₁₀ concentrations were lower.

Figure 4



Map view of Cottonwood Airport in relation to location of the VFW Post and Cottonwood Kid's Park sites.

CONCLUSION

All data quality indicators were met for the VFW Post PM₁₀ and metals data. The data quality indicators for data-completeness were met for PM₁₀ at the Cottonwood Kid’s Park. However, due to the aforementioned solar power and laboratory issues, the data completeness was not met for metals. Nevertheless, the collected data for both PM₁₀ and metals indicate that the Cottonwood Kid’s Park site experienced significantly lower levels of particulates and metals compared to the VFW Post site, with most samples at the Cottonwood Kid’s Park showing metal concentrations below detectable limits.

Given that all data quality indicators were met for PM₁₀ at both monitoring locations, ADEQ determined that the data could be used for understanding air quality conditions in the Cottonwood study area. Data indicate that ambient conditions were below the threshold for air quality concerns for PM₁₀ at both sites. PM₁₀ data at the VFW Post from the air quality monitor indicate that the most significant dust concentrations are driven by high wind events from the south, as shown during the April 23rd wind event that resulted in the 24-hour PM₁₀ concentration of 150 µg/m³. All other values collected for PM₁₀ at VFW Post were below 85% of the NAAQS. The PM₁₀ data collected from the Cottonwood Kid’s Park, which is located east of the slag pile, showed no concentrations near the NAAQS exceedance level with all values well below 85% of the NAAQS.

The average 24-hour PM₁₀ concentration during the study period for the VFW Post was 42 µg/m³, while at the Cottonwood Kid’s Park the average 24-hour PM₁₀ was 14 µg/m³, both well below the NAAQS of 150 µg/m³. ADEQ concludes that no further PM₁₀ monitoring is necessary at this time based on these study results.

The rolling 3-month average for Lead from PM₁₀ filter data collected at the VFW Post was 0.10 µg/m³, which is 67% of the Lead NAAQS (0.15 µg/m³). The rolling 3-month average of Lead from the PM₁₀ filter data collected at the Cottonwood Kid’s Park site was 0.002 µg/m³, which is less than 2% of the Lead NAAQS.

Given that the Lead samples collected at the VFW Post during this monitoring study showed significantly higher values than those at the Cottonwood Kid’s Park (0.10 µg/m³ vs. 0.002 µg/m³ respectively), and considering the methodological differences between PM₁₀ and TSP lead sampling, which could result in underestimated Lead concentrations, ADEQ plans to conduct an additional three months of Lead sampling at the VFW Post in the near future. This additional sampling will use the TSP methodology to ensure that the collected data are more comparable to the Lead NAAQS.

ADHS will conduct a health consultation utilizing the data that were collected at both sites during this study, including all metals data. Results from the ADHS health consultation are expected in late 2024 or early 2025. In addition to the plans for additional lead sampling described above, ADEQ will evaluate whether any additional metals monitoring is warranted, or if any other actions are needed, once results from the ADHS health consultation are available.



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