

SASY Environmental Community: Completion of neighborhood Air Quality Study summer 2021

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MADISON, WI. The *SASY Neighborhood Air Quality Study Summer 2021* in the Schenk-Atwood-Yahara-Starkweather (SASY) neighborhood in Madison has been completed by Javier Martinez, an engineering graduate of University of Wisconsin – Madison.

“This research initiative links the gap of knowledge between local and residential scale air quality monitoring, allowing us to assess the impact of point sources such as factories, building fires, and other pollution events not captured by the bigger scope of federal monitoring stations,” said Martinez.

Martinez reviewed measurements collected by neighborhood air quality sensors. These sensors have been measuring concentrations of particulate matter (PM) since 2018 at numerous locations throughout the SASY neighborhood. The recent availability of low-cost air quality sensors has allowed ordinary people to better understand air quality conditions inside their homes and in their neighborhoods.

The sensors were originally purchased by the SASY Environmental Committee using a grant from the SASY Neighborhood Association to buy ten sensors operating from 2018 to present. Mr. Martinez’s study was funded by neighborhood resident contributions to a GoFundMe Campaign. Sensors were located at neighborhood homes and the Goodman Community Center and continuously uploaded their measurements to the internet. The sensors used by the SASY neighborhood are manufactured by PurpleAir. When connected to an electrical outlet and home wireless internet signal, the sensors continuously upload measurements to the

website of PurpleAir (www.purpleair.com) which provides sensor measurements throughout the world.

The Air Quality study explains that the sensors were originally installed due to concerns about PM emissions released by the two Madison-Kipp Corporation (MKC) die casting factories in the SASY neighborhood and the approval of multi-story apartment buildings next to the Kipp factory on Fair Oaks Avenue. There is a long history of air quality health complaints from surrounding residents collected by the Wisconsin Department of Natural Resources and the City-County Health Department.

Steve Klafka has lived in the SASY neighborhood for over 25 years. He remembers when the odors and noise from the Kipp factories were daily concern from residents, and the struggle to get the city and state to clean up Kipp's air pollution. He used his skills as an environmental engineer to work with Heather Driscoll, former chair of SASY Environmental Committee, to purchase and install the SASY sensor network. He said, "It's great these low-cost sensors let neighborhood residents be involved in monitoring our air quality."

The sensors measure PM concentrations including particles less than 10 microns (PM10) and 2.5 microns (PM2.5). Exposure to these air pollutants is associated with numerous health effects and reduced life expectancy. The daily average National Ambient Air Quality Standard for PM10 is 150 $\mu\text{g}/\text{m}^3$ while the standard for PM2.5 is 35 $\mu\text{g}/\text{m}^3$.

In its annual emissions inventory report submitted to the WDNR, MKC reported that it released 39,783 lbs of PM10 in 2019 and 27,139 lbs of PM10 in 2020 into the surrounding neighborhood. The reduction in emissions is likely due to reduced production resulting from the COVID-19 pandemic. The WDNR does not yet require reporting of PM2.5 emissions.

The Air Quality Study found increased PM2.5 concentrations downwind of the two MKC factories. Concentrations were also found to increase due to other more common sources of air pollution including July 4th fireworks, building fires including at Stalzy's Deli on April 7, 2019, residential wood stoves, and backyard fire pits.

Both the WDNR and the US Environmental Protection Agency support the use of low-cost air quality sensors. These agencies have co-located Purple Air sensors next to their own regulatory-approved air quality monitoring stations. These agencies

developed correction factors so sensor measurements can be adjusted to better reflect the more accurate measurements of the agency monitors.

For the Air Quality Study, SASY sensor measurements were adjusted using the WDNR and USEPA correction factors. It was found that long-term measurements by the sensors closely matched those being measured at the WDNR air quality monitoring station near East High School, approximately 1 mile from the neighborhood.

For the Air Quality Study, long-term, monthly average PM2.5 concentrations and wind directions were evaluated. It was found that in 2019, concentrations south of the factories were 24% lower over the summer compared to the winter months. This was likely due to the change in prevailing wind directions from north during the winter versus southerly in the summer. **During the month of February there was a 39% decrease in PM2.5 concentrations from 2019 to 2020. This was likely due to a decrease in factory production air pollution during the pandemic, as well as reductions in regional emissions. Factory annual emissions were 32% lower in 2020 compared to 2019. The air quality study found that ambient conditions over the SASY neighborhood area were also found to be within the 'Good' and 'Moderate' categories as established by the Air Quality Index of the US EPA. These categories are based on the air quality-related health impacts to the public.**

Based on the results of the Air Quality Study, future evaluations will focus on short-term changes in PM2.5 concentrations looking at hourly and daily averages. To see the full report go to <https://bit.ly/sasyairquality21>.