# Environmental Effects of the HelloFresh/Factor_75 Facility on the Greenfield Subdivision and Surrounding Communities.

The Greenfield subdivision In Aurora, IL has been experiencing disruption on account of the HelloFresh/Factor_75 facility on the corner of W Indian Trail and N Orchard Rd. This facility is directly adjacent to the subdivision. Air pollution is one of the main concerns of the neighbors and is affecting the daily life of many residents.

In order to quantify these experiences, air quality testing was conducted at various locations throughout the neighborhood as well as other locations across Aurora. Readings were taken between November 2022 and January 2023. This report will provide a summary of the data collected as well as an interpretation of the data.

The raw data and a summary report is publicly available online through GitHub. Links are provided at the end of this report.

# Background

The HelloFresh/Factor_75 facility regularly has multiple diesel-powered refrigerated trailers running in their loading dock area for extended periods of time. During these times, nearby residents have claimed to experience poor air quality, noise pollution, and excessive vibrations; all of which affect their daily lives. Bright lights in the loading dock area have also been reported as a disturbance to adjacent residents. One resident has reported having to confine their family to the second story of their home, as the ground floor is too polluted and severely affects their breathing. This report will focus on the air quality, particularly PM1, PM2.5, and PM10 particulate matter. These represent air particulate matter at sizes of 1, 2.5, and 10 microns (micrometers) respectively. According to the California Air Resources Board, over 90% of particulates from diesel exhaust falls within the PM2.5 category.

High concentrations of diesel exhaust particulate matter in the environment is known to have adverse health effects; diesel exhaust is a known carcinogen. One study referenced at the end of this report found that diesel exhaust particulate harmed the mitochondrial function of mice and induced cardiotoxicity. Another study looked at the patterns in the concentrations of diesel particulate matter in dense urban areas of New York City. Finally, the California Air Resources Board has summarized the effects and hazards of diesel exhaust to humans.

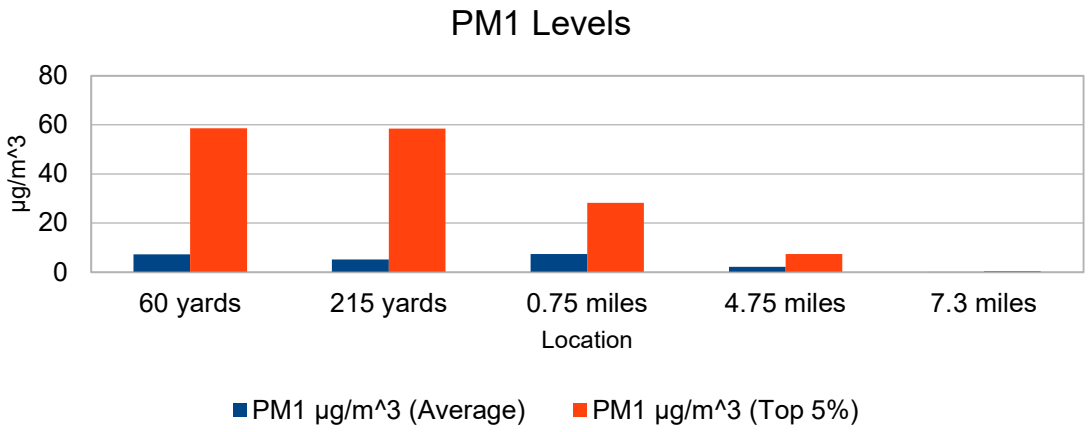
# Methods

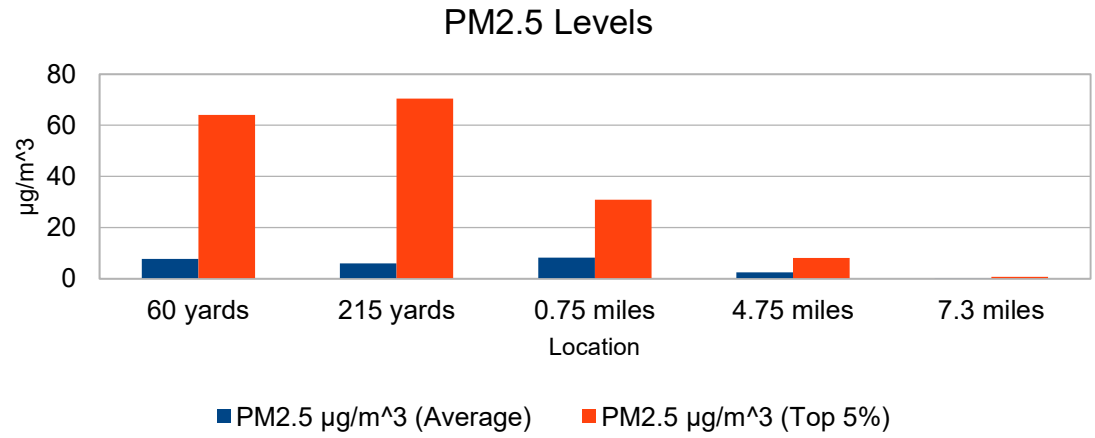
The air quality monitors used Include an AirThings View Plus and an AirBeam 3. The AirThings View Plus uses a PM2105-M sensor, while the Airbeam 3 uses a PMS7003 sensor. Links to the data sheets for these sensors are at the end of this report.

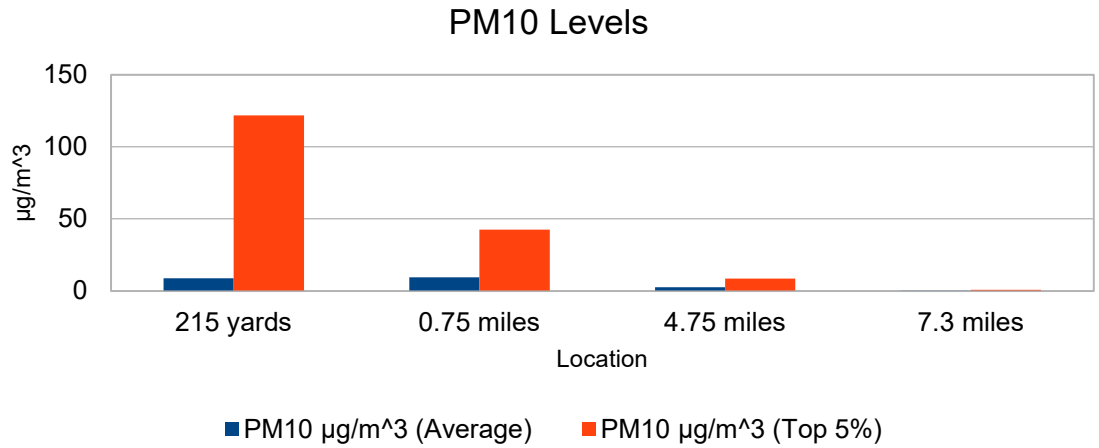
In each location, the sensors collected data for a minimum of 3 days continuously. The data collected includes PM1, PM2.5, and PM10. The AirThings View Plus records PM1 and PM2.5, while the Airbeam 3 records PM1, PM2.5 and PM10.

Each location is designated by its distance from the HelloFresh/Factor_75 facility. The “60 Yards” and “125 Yards” locations are homes located within the Greenfield subdivision, the neighborhood directly adjacent to the facility. The “0.75 Miles” location is a home in the Orchard Valley subdivision, the next neighborhood to the west. The “4.75 Miles” location is on the ground floor of an office building on N Farnsworth Ave. The “7.3 Miles” location is a home in the Fox Valley Villages subdivision on the east side of Aurora. The “60 Yards” location used the AirThings View Plus, while all other locations used the Airbeam 3.

# Data


PM1 Levels
80
60
40
20
0
µg/m^3
60 yards
215 yards
0.75 miles
4.75 miles
7.3 miles
Location
PM1 µg/m^3 (Average)
PM1 µg/m^3 (Top 5%)


PM2.5 Levels
80
60
40
20
0
µg/m^3
60 yards
215 yards
0.75 miles
4.75 miles
7.3 miles
Location
PM2.5 µg/m^3 (Average)
PM2.5 µg/m^3 (Top 5%)


PM10 Levels
150
100
50
0
µg/m^3
215 yards
0.75 miles
4.75 miles
7.3 miles
Location
PM10 µg/m^3 (Average)
PM10 µg/m^3 (Top 5%)

# Discussion

The average and top 5% readings are consistent with what we could expect to see in each location. The three closest locations, “60 Yards”, “125 Yards”, and “0.75 Miles” have significantly higher concentrations of 1, 2.5, and 10 micron particles, dropping off slightly as the distance increases.

The “4.75 Miles” location is only 50 yards from N Farnsworth Ave, a major 4 lane road. This location is close to an expressway, and therefore sees considerable truck traffic. This could explain the slightly elevated readings of particles associated with diesel exhaust. The last location, “7.3 miles”, has the lowest readings of all the locations. This location is at a minimum 0.5 miles from the nearest busy roads, Route 34 and Eola Road. This location is not near an expressway and sees far less truck traffic than the 4.75 Miles location, and therefore less diesel emissions particulate.

According to the Environmental Protection Agency (EPA), the 24 hour exposure limit of PM2.5 particles is 35 μg/m. Both locations in the Greenfield subdivisions far exceeded that limit during the course of testing, measuring 64 μg/m and 70 μg/m at their maximum. The “0.75 Miles” location, in the next neighborhood over, reached a maximum of 32 μg/m, just under this limit. It is worth noting that the readings at these three locations are inadvisably high for a residential area.

The EPA 24 hour exposure limit of PM10 particles is 150 μg/m. The one location in the Greenfield subdivision which had PM10 data came close to this value, while the others stayed comfortably below. Given that 90% of diesel emissions particulate is 2.5 microns or smaller, this comparatively lower reading is expected. The EPA has no official limits or guidelines for PM1 particulate concentrations.

# Conclusion

This data validates the concerns voiced by the neighbors in the Greenfield subdivision and the surrounding neighborhoods in regard to air quality and the HelloFresh/Factor_75 facility. The levels observed are cause for concern for the health of these residents. Based on the levels of PM2.5 and PM10 particulate across the various locations, and given their locations in the environment, it is reasonable to conclude that the HelloFresh/Factor_75 facility is causing the elevated levels of particulate matter in the Greenfield subdivision and surrounding neighborhoods.

Therefore, the City of Aurora should conduct an official investigation of the practices of this facility, in tandem with an official environmental study of the area. Given the potential detriment this facility is causing to residents, this matter calls for serious and prompt response by the city.

# References


Airbeam 3 and PMS7003 Particulate Sensor Datasheet
https://www.habitatmap.org/airbeam
https://github.com/waggle-sensor/sensors/blob/master/sensors/datasheets/pms7003.pdf
AirThings View Plus and PM2105-M Particulate Sensor Datasheet
https://www.airthings.com/view-plus
https://pdf.directindustry.com/pdf/cubic-sensor-instrument-co-ltd/laser-particle-sensor-pm2105-m/54752-905598-_3.html
Environmental and Health Resources
https://ww2.arb.ca.gov/resources/overview-diesel-exhaust-and-health
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1637978/
https://www.tandfonline.com/doi/abs/10.1080/08958378.2022.2049931?journalCode=iiht20
https://www.epa.gov/sites/default/files/2020-04/documents/fact_sheet_pm_naaqs_proposal.pdf
https://www.epa.gov/sites/default/files/2014-08/documents/refguide_appendix_e.pdf
https://ncceh.ca/documents/field-inquiry/carbon-dioxide-indoor-air
Data
https://github.com/natepichler/HelloFresh_Air_Quality