Community Air Monitoring Project

Summary Report – Minneapolis Lyndale Neighborhood

Project overview

In 2013, the Minnesota Legislature funded a two-year air monitoring study to measure air quality in Minnesota communities where low income or communities of color might be disproportionately impacted by pollution from highway traffic, air traffic, and industrial sources. This legislation funds one monitor to be moved to seven locations in a two-year period.

The project began on October 1, 2013 with monitoring in the Minneapolis East Phillips Neighborhood. The community monitor was moved to several communities and then moved into the Minneapolis Lyndale Neighborhood. This area is a mix of residential and business. Monitoring ran from January 1 to March 31, 2015.

Lyndale Neighborhood air monitoring site

What we monitored

Air was monitored for specific chemicals that are associated with adverse public health effects (**Attachment A**). These chemicals are classified as fine particles ($PM_{2.5}$) or air toxic pollutants (carbonyls, metals or volatile organic compounds). Although only a three-month study, for comparison purposes, we compared the average daily $PM_{2.5}$ monitored data to the daily fine particle standard and the air toxic pollutants to the available long-term health benchmarks. These comparisons are used for informational purposes only and should not be used to determine compliance with standards or health risks. The data were also compared with other data collected in the same time period at other monitors in Minnesota.

Findings at a glance:

- All average daily $PM_{2.5}$ values except one were below the daily $PM_{2.5}$ standard of 35 micrograms per cubic meter ($\mu g/m^3$). On February 7, 2015 the average daily $PM_{2.5}$ value was 38 $\mu g/m^3$ at the Lyndale monitor. On this day, the average daily $PM_{2.5}$ value was high at multiple monitors due to a local winter time stagnation event.
- Of the 70 air toxic chemicals measured for this project, the levels of 39 chemicals were so low that they were not detected by the monitor.
- All average air toxics values measured at the Lyndale monitor were below any associated health benchmarks.
- In general, average air toxics values and trends over the three-month monitoring period were similar between the Lyndale monitoring site and other MPCA air monitors.

Summary of results

Fine particles ($PM_{2.5}$)

Fine particles are a complex mixture of extremely small particles and liquid droplets that are created during combustion when coal, gasoline, diesel, wood and other fuels are burned, and are also created in the air by chemical reactions among other pollutants. Because of their small size, fine particles can be inhaled deeply into the lungs and can enter the blood stream. Exposure to fine particle pollution can contribute to respiratory and cardiovascular health effects.

Fine particles are regulated on an annual and daily basis to guard against long-term and short-term health effects linked to fine particle exposure. To test compliance with these standards, a minimum of three-years of monitoring data is required. The monitoring period for this project is too short to determine whether the project sites meet the fine particle standards. However, as an informal comparison, we have compared daily fine particle results to the short term fine particle standards of 35 micrograms per cubic meter ($\mu g/m^3$).

U.S. Environmental Protection Agency (EPA) regulations state that a monitored site meets daily $PM_{2.5}$ regulatory requirements if the 98th percentile of the 24-hour $PM_{2.5}$ concentrations in a year, **averaged over three years**, is less than or equal to 35 $\mu g/m^3$. For more information: http://www.epa.gov/ttn/naaqs/standards/pm/s_pm_index.html

The average daily trends (**Figure 1**) over the three month period were similar between the Lyndale monitor and other Minneapolis monitoring sites (locations shown in **Figure 2**)**.** All average daily $PM_{2.5}$ values were below the daily $PM_{2.5}$ standard of 35 $\mu g/m^3$ except for that seen on February 7, 2015**.** On this day, the average daily $PM_{2.5}$ value was high at all Twin Cities' monitors due to a local winter time stagnation event**.** Average daily values measured at the Lyndale community monitor were slightly higher than those seen at most other sites for a majority of the monitoring days (**Table 1**) but followed a similar daily trend as other sites**.**

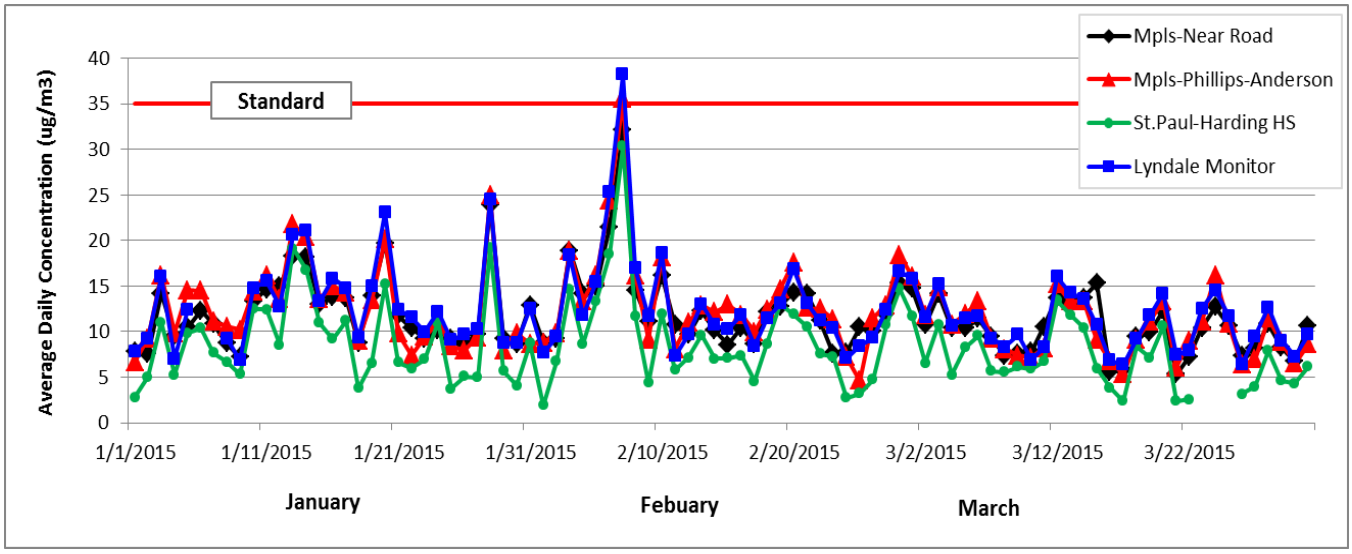

Figure 1. Average daily $PM_{2.5}$ values at St. Paul-Minneapolis sites from January 1 to March 31, 2015.

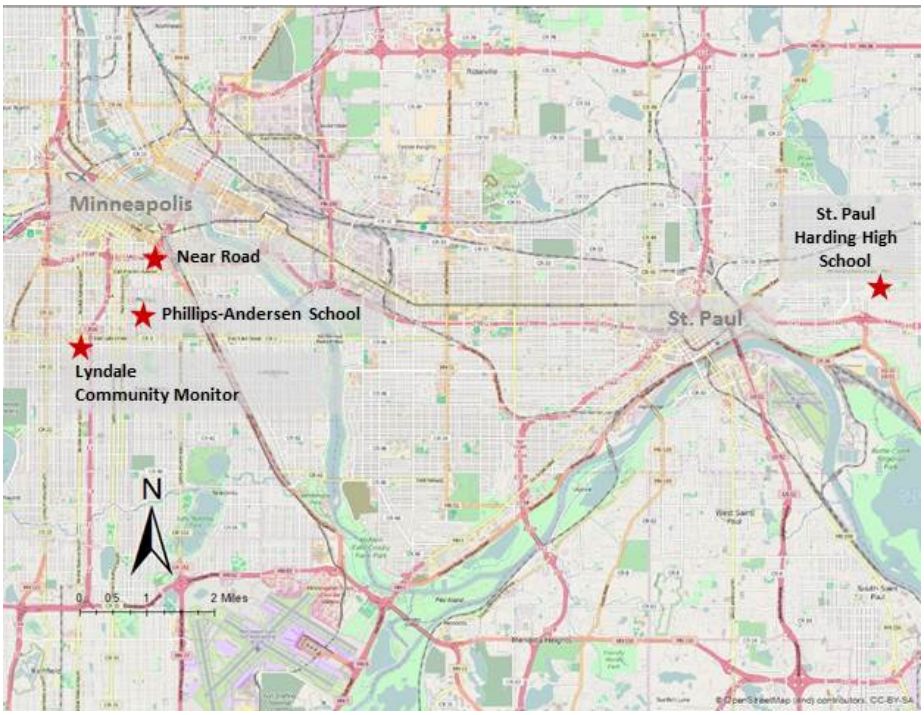

Figure 2. Location of the Lyndale community air monitor in relation to other $PM_{2.5}$ air monitors in the St. Paul-Minneapolis metro area. For more information about the individual sites, please visit the MPCA Air Monitoring Network Plan website (https://www.pca.state.mn.us/air/air-monitoring-network-plan).

Table 1. Summary information describing average daily $PM_{2.5}$ values found at MPCA monitors during the monitoring period of January 1-March 31, 2015.

Site	Min $\mu g/m^3$	Max $\mu g/m^3$	Mean[1] $\mu g/m^3$	Median[2] $\mu g/m^3$	Standard Deviation* $\mu g/m^3$	Number of days that concentration values at Lyndale were higher	Number of days that concentration values at Lyndale were lower	Total Number of Monitoring Days[+]
Lyndale Community Monitor	6.4	38.2	12.3	11.6	4.9			
Mpls-Phillips-Anderson School	4.6	35.5	12.1	11.3	4.8	48	40	88
Mpls NearRoad	5.3	32.1	11.6	10.7	4.1	63	25	88
St. Paul Harding High School	2.0	30.3	8.4	7.2	4.6	85	0	85
Anoka Airport	2.2	28.3	8.2	7.4	4.2	85	1	86
Apple Valley	2.0	30.2	8.0	7.1	4.5	88	0	88
Virgina	3.7	16.6	7.5	7.1	2.3	84	3	87
Rochester	2.8	27.6	9.0	7.9	4.3	79	9	88
Talahi School	2.6	29.1	7.0	6.4	4.1	88	0	88
St. Michael	2.3	29.7	7.3	6.8	4.2	84	0	84
Detroit Lakes	3.7	22.8	8.1	7.2	3.3	79	4	83
Marshall	0.7	23.6	5.8	5.0	3.8	87	1	88
Duluth-Laura McA School	2.1	15.6	5.8	5.4	2.7	88	0	88
Ely	3.0	12.1	5.8	5.4	1.8	87	0	87
Brainerd Airport	3.9	19.4	8.2	7.6	2.9	87	1	88
Near Road Lakeville	1.8	30.3	7.9	6.4	4.7	87	1	88
Cloquet - Red Lake Band	1.7	12.2	5.7	5.4	2.4	88	0	88

[1]Mean value is the arithmetic average value of all of the average daily $PM_{2.5}$ measurements
[2]Median value is the middle value of the set of average daily $PM_{2.5}$ measurements
*Standard Deviation of the mean values reported in this table
[+]Not all days had complete data available for analysis

Summary of results (cont'd)

Air toxics

Air toxic pollutants are those chemicals known or suspected to cause serious human health effects or adverse environmental effects. Example pollutants include *methylene chloride*, used as a solvent and paint stripper, *perchloroethylene*, emitted by some dry cleaning facilities and *benzene*, which is found in gasoline. Some air toxic pollutants are metals such as *cadmium*, *chromium*, or *lead* compounds.

Air toxics health benchmarks

Existing air quality standards and health benchmarks come from a variety of sources. However, these are not available for all chemicals. For air toxics, the MPCA uses available published health benchmarks. Specific information about standards and health benchmarks can be found at: https://www.pca.state.mn.us/air/air-toxics-minnesota.

Of the 70 air toxic pollutants measured (**Attachment A**), there were 31 pollutants detected at the Lyndale community monitor. Compared to values at other fixed monitoring sites (sites shown in **Figure 3**), the majority of these chemicals did not significantly* differ in measured values (**Figure 4**).

*Kaplan-Meier non-parametric non-detects data analysis

MDH

Minnesota Public Health Data can be found at https://apps.health.state.mn.us/mndata/home

This data can be searched by county to help you find public health information relevant to your local area.

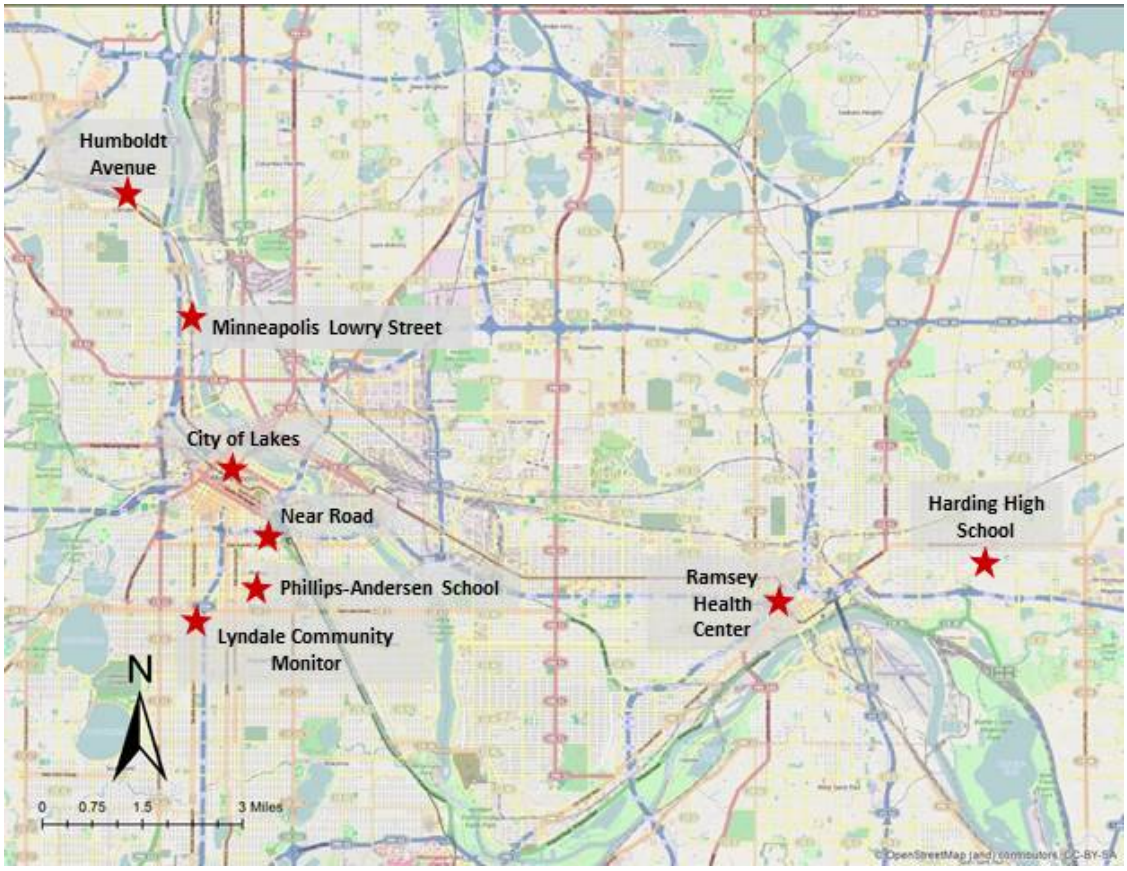

Figure 3. Location of the community air monitor in relation to other fixed site air toxics monitors in the St. Paul-Minneapolis metropolitan area.

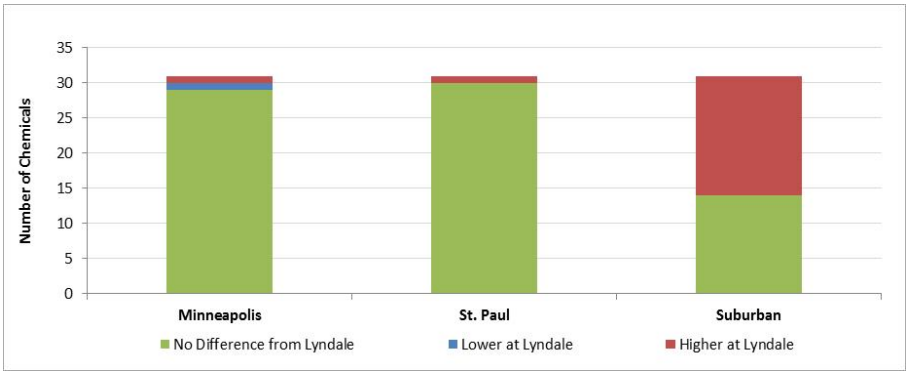

Figure 4. The number of air toxic pollutants that differed* between the Lyndale monitor and averaged values at other monitors around the Twin Cities.

*Kaplan-Meier non-parametric non-detects data analysis

Compared to measurements in Minneapolis, St. Paul, and suburban monitors, most of the pollutants that were higher at the community monitor were volatile organic compounds (VOCs – **Attachment A**).

All average air toxics values measured at the Lyndale monitor were below any associated standard or health benchmark value.

What you can do to reduce your exposure to air pollutants

To reduce your risk of developing bad health from exposures to air pollution:

- Avoid exposure to tobacco smoke, wood smoke, vehicle exhaust, and other sources of airborne particles.
- Avoid prolonged outdoor exertion near high-traffic areas.
- Stay informed about air pollution alerts and advisories in your area by visiting the MPCA Air Quality Index (AQI) website (https://www.pca.state.mn.us/air/current-air-quality-index), calling the AQI Information Line (651-297-1630) or subscribing to the MPCA Air Quality Forecast Alert system (http://mn.enviroflash.info/).
- If you experience respiratory or cardiovascular symptoms (e.g., persistent cough, burning eyes, wheezing, shortness of breath, tightness of chest, or chest pain) on air quality alert days, consult with a health care professional, as needed. Pay particular attention if you are an athlete, or if you or your children have a respiratory or cardiovascular condition.
- Work together with others in your community to improve air quality (see website links below for more information).

Links to other information

For more information about commonly found air pollutants and their sources, please visit https://www.epa.gov/learn-issues/learn-about-air.

Be Air Aware is a website resource available for individuals, communities, and employers concerned about how air pollution affects health. The site offers information about air pollution in Minnesota, both outdoor and indoor, and steps that people can take to protect their health. https://www.beairawaremn.org/

For more information on the air monitoring results from air quality monitoring studies, please call 651-296-6300 or 1-800-657-3864 and ask for air data analysis staff. For more information and to view updates about the Community Air Monitoring Project, please visit https://www.pca.state.mn.us/air/community-air-monitoring-project.

More information about the MPCA's air monitoring program is available on the web at https://www.pca.state.mn.us/air/air-pollution-monitoring.

Attachment A. Community Air Monitoring Project - Monitored Air Quality Pollutants

Note: All average air toxics values measured at the Lyndale monitor were below any associated standard or health benchmark value.

Carbonyls
Acetaldehyde[C]
Benzaldehyde[C]
Butyraldehyde[C]
Formaldehyde[C]
Propionaldehyde
Trans-Crotonaldehyde[2]

Metals
Antimony
Arsenic[1]
Barium
Beryllium[1]
Cadmium[1]
Chromium[2]
Cobalt[1]
Iron[C]
Lead
Manganese[C]
Nickel[2]
Selenium[2]
Zinc[C,T]

$PM_{2.5}$ Continuous
$PM_{2.5}$ Concentration

Volatile Organic Compounds
1,1,2,2-Tetrachloroethane[1]
1,1,2-Trichloroethane[1]
1,1-Dichloroethane[1]
1,1-Dichloroethylene[1]
1,2,4-Trichlorobenzene[1]
1,2,4-Trimethylbenzene[C]
1,2-Dichlorobenzene[1]
1,2-Dichloropropane[1]
1,3,5-Trimethylbenzene[1]
1,3-Butadiene[2]
1,3-Dichlorobenzene[1]
1,4-Dichlorobenzene[1]
Benzene[A,B,C]
Benzene, 1-Ethenyl-4-Methyl[2]
Benzyl Chloride[1]
Bromodichloromethane[1]
Bromoform[1]
Bromomethane[1]
Carbon Tetrachloride
Chlorobenzene[2]
Chloroethane[1]
Chloroform
Chloromethane
Cis-1,2-Dichloroethene[1]
Cis-1,3-Dichloropropene[1]
Cyclohexane
Dibromochloromethane[1]
Dichlorodifluoromethane
Dichloromethane
Ethylbenzene[C]
Ethylene Dibromide[1]
Ethylene Dichloride[C]
Freon 113
Freon 114[2]
Hexachlorobutadiene
M/P Xylene[C]
Methyl Butyl Ketone
Methyl Chloroform[2]
Methyl Tert-Butyl Ether[1]
N-Heptane[C]
N-Hexane[C]
O-Xylene[C]
Styrene[2]
Tetrachloroethylene[2]
Toluene[C]
Trans-1,2-Dichloroethylene[1]
Trans-1,3-Dichloropropene[1]
Trichloroethylene[2]
Trichlorofluoromethane
Vinyl Acetate[C]
Vinyl Chloride[1]

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[1]Indicates chemicals that were below detection limits at all monitors in Minnesota, including the Lyndale monitor, for this three month monitoring time.
[2]Indicates chemicals that were below the detection limit at the Lyndale monitor, but were detected at one or more monitoring sites in Minnesota.

[A]Indicates chemicals that were higher* at the Lyndale monitor than at St. Paul fixed monitors.
(1 chemical higher: 1 VOCs)
[B]Indicates chemicals that were higher* at the Lyndale monitor than at Minneapolis fixed monitors.
(1 chemical higher: 1 VOCs)
[C]Indicates chemicals that were higher* at the Lyndale monitor than at suburban fixed monitors.
(17 chemicals higher: 3 metals, 10 VOCs, 4 carbonyls)

[T]Indicates chemicals that were lower* at the Lyndale monitor than at Minneapolis fixed monitors.
(1 chemical lower: 1 metal)

*Kaplan-Meier non-parametric NADA averaged values