Southeast Chicago
Ambient Air Quality Analysis

U.S. EPA, Region 5
Air and Radiation Division
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Photo: Washington High School Air Monitors

Table of Contents

Introduction 1
Air Monitoring Network Overview 4
Types of Air Monitoring Networks 5
Area of Focus 8
Southeast Chicago Pollutant Measurements and Trends 8
- Particulate Matter 8
- Fine Particulate Matter ($PM_{2.5}$) 8
- Particulate Matter (PM_{10}) 12
- Ozone 14
- Lead 15
- Metals 18

Source-Oriented Monitoring 23
Conclusions 24

Introduction

In response to community concerns about air quality, EPA analyzed available air monitoring data for Southeast Chicago. The city of Chicago also requested that EPA provide this analysis after deciding to undertake a health impact assessment (HIA) to inform its future decision-making on the RMG permit application.[1] This report is just one input into the HIA. The HIA will assess other environmental impacts and information on population vulnerability, including public health data. This report is neither a full evaluation of impacts in this community nor a disparate impact analysis. It only covers air pollution, not other pollution indicators, and even within air it only covers a subset of possible air pollutants.

The results of EPA's analysis are included in this report. The report begins with background information about monitoring requirements under the Clean Air Act and an explanation of how monitoring data are used generally. We then turn to an analysis of existing air monitoring data collected at George Washington High School (3535 East 114th Street) and the nearby South Water Filtration Plant (3300 East Cheltenham Place). EPA evaluated ten- and three-year trends to understand how monitoring data has changed over time and compared these trends against standards and other available health benchmarks. Finally, for the purpose of providing the community with information about how its air quality compares to that of other neighborhoods, we compared available monitoring data from sites in and around Chicago. (See map of locations on page 6.)

EPA intends for this report to help answer the Southeast Chicago community's questions about air quality where they live, work, learn and play. EPA also developed the report to be a useful input into the city of Chicago's HIA. However, it is important to recognize the limitations of ambient air quality monitoring, and therefore of the data in this report. In particular:

- The analysis was made possible by the fact that there is a longstanding monitoring site at Washington High School, which provides a historical record of air quality trends over time in this community. The next closest monitor is six miles away. In other areas with environmental justice concerns, the closest monitors can be several miles away. EPA continues to work with state and local agencies to improve monitoring networks across the country. One recent example is the funding in the American Rescue Plan for monitoring in environmental justice areas.
- Comparisons of air quality in Southeast Chicago to other parts of Chicago or elsewhere are limited by available data and monitoring locations. By design, the majority of Illinois' ambient air monitoring sites are located in areas with environmental justice concerns (where the level of industrial activity indicates a potential for disproportionately high and adverse impacts). This limits the range of geographic areas that can be compared to Southeast Chicago.
- The scope of the ambient air quality analysis is limited to certain pollutants. As discussed below, the Washington High School site collects samples of certain metals in total

[1] The National Research Council defines a health impact assessment as "a systematic process that uses an array of data sources and analytic methods, and considers input from stakeholders to determine the potential effects of a proposed policy, plan, program, or project on the health of a population and the distribution of those effects within the population."

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suspended particulate (TSP), which are regulated as hazardous air pollutants (HAPs). However, other HAPs are not included in this analysis.

- Air quality issues in parts of the urban area likely exist and are not reflected in this report since there are a limited number of monitoring locations. Air quality is affected by a variety of factors like distance from pollution sources, weather conditions and land-use patterns. Therefore, meeting air quality standards and monitored values below health benchmarks at all monitoring sites in an area does not preclude air pollution "hotspots" – areas with levels of air pollution higher than shown at monitoring sites. These hotspots may exist in areas with unique circumstances that are not reflected in the ambient data from the air quality monitoring networks. For example, increased truck traffic may cause localized increases in air pollution that are not reflected in the air monitoring network.

With these important caveats, the existing data indicate that, with the exception of ozone, the Chicago area is in attainment with all of the National Ambient Air Quality Standards (NAAQS). Over the past 10 years, concentrations of all pollutants measured at the Washington High School site have either decreased or remained flat. While still meeting the fine particulate matter standard, daily values, when calculated for comparison to the national standard for this pollutant, are one of the two highest in the Chicago area. Concentrations of coarse particulate matter have increased over the past three years. (See page 25 for all of EPA's conclusions.)

While much progress has been made, EPA recognizes that there is still more work to be done. EPA is committed to advancing environmental justice and incorporating equity considerations into all aspects of our work. This commitment includes improving our assessment and consideration of the impacts of permits on communities already overburdened by pollution.

Due to the density of industrial sources and their close proximity to residences, as well as available monitoring data and community involvement, Southeast Chicago has been a focus of federal, state and local efforts for many years. Due to this increased scrutiny, including enforcement efforts, the area has seen environmental improvements. To maintain this progress, Southeast Chicago will continue to receive focused attention to advance environmental justice and equity.

EJSCREEN is a mapping and screening tool that provides EPA with a nationally consistent dataset and approach for combining environmental and demographic indicators. It is a useful first step in understanding or highlighting locations that may have potential environmental justice concerns.

The EJ Index for all eleven EJSCREEN indicators in the three-mile area around the proposed RMG site exceeds the 80th percentile in the State of Illinois, including indices for $PM_{2.5}$, ozone, diesel PM, air toxics cancer risk, respiratory hazard, lead paint, and Superfund proximity.[2] The population of the people who live in the area around the proposed RMG plant is disproportionately low income, people of color, and includes persons with limited English

[2] Each of the eleven EJ Indexes combines an environmental indicator (to indicate potential pollution burden) with demographic information (to indicate potential population vulnerability). The resulting EJ Index for a given environmental indicator provides a screening-level analysis of the relative potential for disproportionate impacts compared to other areas in the state. A higher percentile does not necessarily mean a greater level of environmental exposure.

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proficiency and less than high school education. The proposed RMG site is in an area that is already heavily populated by industrial facilities and is in close proximity to residential housing and community centers.

Going forward, EPA will continue to analyze available air monitoring data for Southeast Chicago as part of its regular review of monitoring data. EPA will follow through to investigate any potential issues raised by the data. This may include analyzing available wind data, evaluating nearby sources, and making referrals to the enforcement program, as appropriate. EPA commits to making air quality data easily available and understandable to the public. As we work to protect human health and the environment, we will continue to engage with the community on improving air quality.

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Air Monitoring Network Overview

The Clean Air Act requires EPA to set NAAQS for six pollutants, called "criteria" pollutants. These pollutants are common in outdoor air, can be harmful to public health and the environment, and come from numerous and diverse sources. The six criteria pollutants are carbon monoxide (CO), ozone (O_3), lead (Pb), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), coarse particulate matter with a diameter less than or equal to 10 micrometers (PM_{10}), and fine particulate matter with a diameter less than or equal to 2.5 micrometers ($PM_{2.5}$).

The NAAQS provide public health protection, including protecting the health of "sensitive" populations such as asthmatics, children, and the elderly. The Clean Air Act does not require the EPA to establish a primary NAAQS at a zero-risk level or at background concentration levels, but rather at a level that reduces risk sufficiently so as to protect public health with an adequate margin of safety. However, pollutant concentrations that are lower than the levels of the standards are not necessarily without risk for all individuals. No risk-free level of exposure has been determined for any of the criteria pollutants. EPA periodically reviews the science upon which the NAAQS are based, as well as the NAAQS themselves, to protect public health and the environment.

To compare an area's air pollution levels with the NAAQS, EPA requires every state to establish a network of air monitoring stations for criteria pollutants. Air monitoring data from this network are used to calculate a design value. In this context, a design value is a statistic that indicates the air quality status of a given location relative to the level of the NAAQS. With the exception of ozone, the Chicago area is in attainment with all of the NAAQS.

In the Chicago area, the Illinois Environmental Protection Agency (IEPA) and the Cook County Department of Environment and Sustainability (CCDES) operate all non-industrial monitors in the air quality monitoring network. They collect, review, validate the ambient air quality data collected at sites—following EPA's regulations, policies, and guidance—and submit the data to EPA. Each year, the State of Illinois must submit its air monitoring plan to EPA for approval after posting the monitoring plan for public inspection and comment. EPA approved the 2021 Illinois Annual Network Plan on October 22, 2020. It meets and exceeds the monitoring network requirements that are described in Clean Air Act regulations (40 CFR Part 58).

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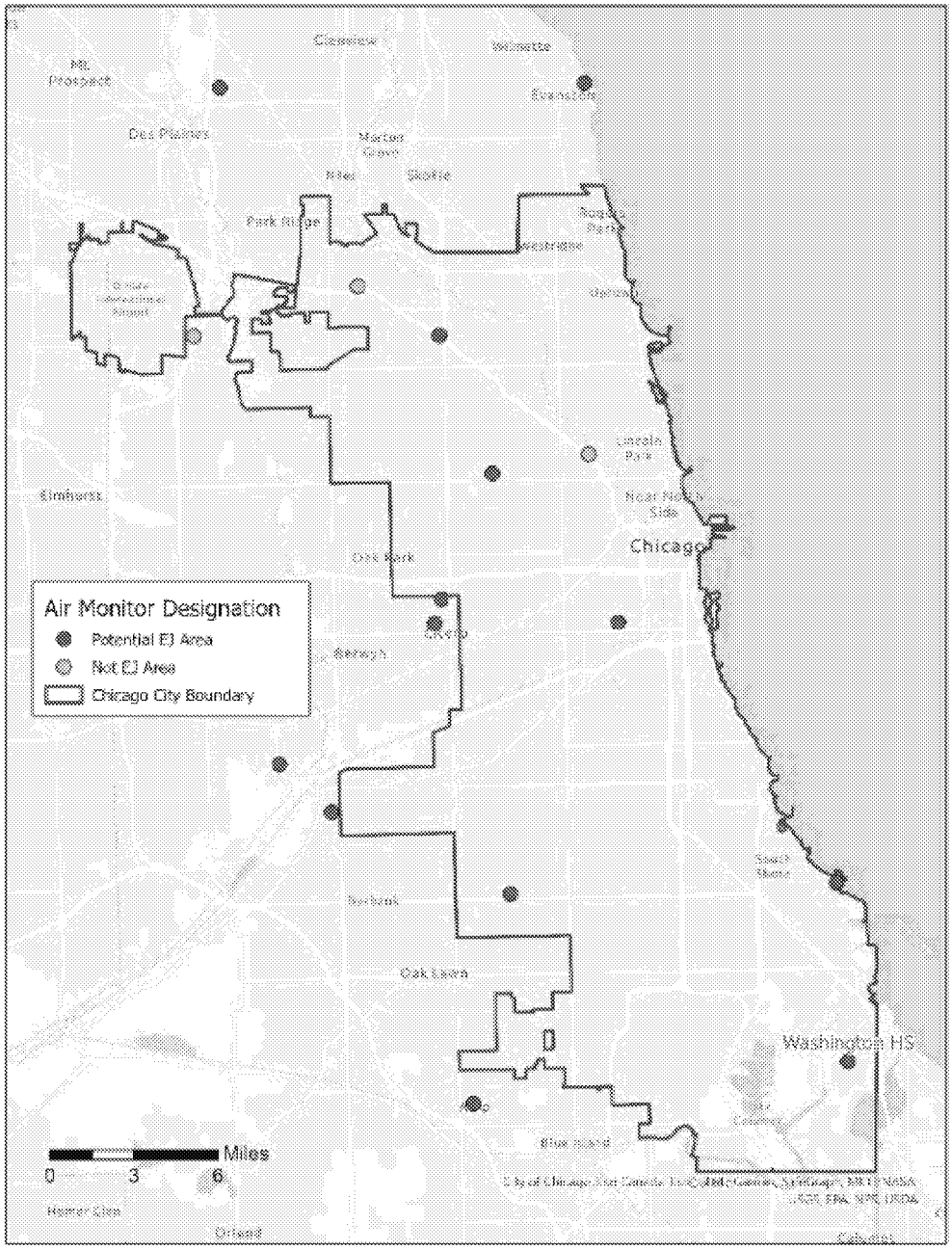

Types of Air Monitoring Networks

Ambient air monitoring networks are designed to meet three basic monitoring objectives:

- provide air pollution data to the general public in a timely manner;
- support determinations of whether air pollution levels are meeting the health-based NAAQS, as well as emissions reduction strategy development; and
- support air pollution research studies.

To meet these objectives, networks of air quality monitors are designed with a variety of types of sites, and the networks may include monitors located to measure one or more of the following:

- highest concentrations expected to occur in the area covered by the network;
- typical concentrations in areas of high population density;
- impacts of significant sources or source categories on air quality;
- general background concentration levels;
- extent of regional pollutant transport among populated areas and in support of secondary air quality standards; or
- air pollution impacts on visibility, vegetation damage, or other welfare-based impacts.

In addition to each monitoring site having one or more objectives, each site is also characterized to represent a spatial scale. The goal in locating monitors is to correctly match the spatial scale represented by the sample of monitored air with the spatial scale most appropriate for the monitoring site type, air pollutant to be measured, and the monitoring objective. The scales of representativeness are as follows:

- Microscale - Defines the concentrations in air volumes associated with area dimensions ranging from several meters up to about 100 meters.
- Middle scale - Defines the concentration typical of areas up to several city blocks in size with dimensions ranging from about 100 meters to 0.5 kilometer.
- Neighborhood scale - Defines concentrations within some extended area of the city that has relatively uniform land use with dimensions in the 0.5 to 4.0 kilometers range.
- Urban scale - Defines concentrations within an area of city-like dimensions, on the order of 4 to 50 kilometers. Within a city, the geographic placement of sources may result in there being no single site that can be said to represent air quality on an urban scale.
- Regional scale - Defines usually a rural area of reasonably homogeneous geography without large sources, and extends from tens to hundreds of kilometers.

Ambient air monitoring networks cannot characterize all of the spatial variability that may exist across an urban area. This is due to a number of factors, such as land-use patterns, non-uniform emissions across urban areas, geography and localized weather patterns. Therefore, meeting the NAAQS at all monitoring sites does not preclude air pollution hotspots. These hotspots may exist in areas with unique circumstances that are not reflected in the ambient data from the air quality monitoring networks.

Table 1 below describes the network of air monitors in Cook County and the greater Chicago area. Rows are shaded to indicate monitors in the network that are located in areas of environmental justice concern, identified using EPA's EJSCREEN tool with one or more environmental indicators at or above the 80% level. The monitor located at Washington High School (which measures $PM_{2.5}$ and PM_{10}, lead, and metals) is located in Southeast Chicago. The South Water Filtration Plant monitor (which measures ozone) is located a few miles north of

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Southeast Chicago. Both monitors are representative of air quality in Southeast Chicago. They are bold in the table and graphics below.

Site ID	Site Name	Location	Pollutants (monitoring scale)
17-031-0001	Village Garage	Alsip	Ozone (Urban Scale), $PM_{2.5}$ (Neighborhood)
17-031-0022	**Washington High School**	**Chicago - SE Chicago**	**Lead, TSP Metals, $PM_{2.5}$, PM_{10} (Neighborhood)**
17-031-0032	**South Water Filtration Plant**	**Chicago - South Shore**	**Ozone (Neighborhood)**
17-031-0052	Mayfair Pump Station	Chicago - Albany Park	$PM_{2.5}$ (Neighborhood)
17-031-0057	Springfield Pump Station	Chicago - Humbolt Park	$PM_{2.5}$ (Neighborhood)
17-031-0076	Com Ed Maintenance Bldg	Chicago - Ashburn	NO2, $PM_{2.5}$ (Neighborhood), Ozone, SO_2 (Urban Scale)
17-031-0110	Perez Elementary School	Chicago - Pilsen	Lead, TSP Metals (Middle Scale)
17-031-0119	Kingery Near Road #1	Lansing	CO, NO_2, $PM_{2.5}$ (Microscale)
17-031-0219	Kennedy Near Road 2	Chicago - Wicker Park	NO_2 (Microscale)
17-031-1003	Taft HS	Chicago - Norwood Park	Ozone (Urban Scale)
17-031-1016	Village Hall	McCook	$PM_{2.5}$, PM_{10} (Middle Scale)
17-031-1601	Cook County Trailer	Lemont	Ozone (Urban Scale), SO_2 (Neighborhood)
17-031-3103	IEPA Trailer	Schiller Park	NO_2, $PM_{2.5}$ (Middle Scale), Ozone (Neighborhood)
17-031-3301	Graves ES	Summit	$PM_{2.5}$ (Neighborhood)
17-031-4002	Cook County Trailer	Cicero	NO_2, Ozone (Neighborhood)
17-031-4007	Regional Office Building	Des Plaines	Ozone, $PM_{2.5}$ (Urban Scale)
17-031-4201	Northbrook Water Plant	Northbrook	CO (Neighborhood), Ozone, $PM_{2.5}$, PM_{10}, PM_{10} Metals, SO_2 (Urban Scale)
17-031-6005	Liberty School	Cicero	$PM_{2.5}$ (Neighborhood)
17-031-7002	Evanston Water Plant	Evanston	Ozone (Neighborhood)
17-043-4002	City Hall	Naperville	$PM_{2.5}$ (Urban Scale)
17-043-6001	Morton Arboretum	Lisle	Ozone (Urban Scale)
17-197-1002	Pershing School	Joliet	$PM_{2.5}$ (Neighborhood)
17-197-1011	Com Ed Training Center	Braidwood	Ozone, $PM_{2.5}$ (Regional Scale)

Table 1: Air monitoring sites in Cook County and the surrounding Greater Chicago area.

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Area of Focus

Southeast Chicago is located 13 miles southeast of downtown Chicago and includes the neighborhoods of Riverdale, East Side, South Deering, Pullman, West Pullman, Hegewisch, Roseland, and Calumet Heights. As of the 2010 Census, the approximate population of the area is 406,000 and 92% minority (77% Black and 14% Hispanic) and 48% low income.

Southeast Chicago Pollutant Measurements and Trends

Particulate Matter

Limiting particle pollution in the air protects human health and the environment. EPA has set NAAQS for two sizes of particulate matter pollution: (1) coarse particles with diameters that are 10 micrometers and smaller; and (2) fine particulate matter with diameters that are 2.5 micrometers and smaller. Some particulates are emitted directly from sources, such as construction sites, unpaved roads, fields, smokestacks, or fires. Most particles form in the atmosphere as a result of complex reactions of chemicals such as sulfur dioxide and nitrogen oxides, which are pollutants emitted from power plants, other industry, and automobiles.

EPA recently announced that it will reconsider the previous administration's decision not to strengthen the PM NAAQS, which were last strengthened in 2012. EPA is reconsidering the December 2020 decision because available scientific evidence and technical information[3] indicate that the current standards may not be adequate to protect public health and welfare, as required by the Clean Air Act. The strong body of scientific evidence shows that long- and short-term exposures to $PM_{2.5}$ can harm people's health, leading to heart attacks, asthma attacks, and premature death. Large segments of the U.S. population, including children, people with heart or lung conditions, and people of color, are at risk of health effects from $PM_{2.5}$. In addition, a number of recent studies have examined relationships between COVID and air pollutants, including PM, and potential health implications.

Fine Particulate Matter ($PM_{2.5}$)

For $PM_{2.5}$, there is a long-term annual NAAQS and a short-term daily NAAQS. The design value for the annual standard is calculated as an annual mean, averaged over three years. The level is 12 micrograms per cubic meter ($\mu g/m^3$). The design value for the daily standard is calculated as the annual 98th percentile, averaged over three years. The level is 35 $\mu g/m^3$.

$PM_{2.5}$ concentrations measured across the greater Chicago area are summarized below. The first figure shows annual 2018-2020 design values as compared against the annual $PM_{2.5}$ NAAQS at all Chicago area monitors. The second figure shows daily 2018-2020 design values as compared against the daily $PM_{2.5}$ NAAQS at all Chicago area monitors. In both figures, the orange line is the level of the NAAQS. The darker bars identify which monitors are located in areas of environmental justice concern.

[3] As discussed in EPA's 2019 Integrated Science Assessment for Particulate Matter, some studies about the relationship between short- and long-term PM exposure and health effects provide evidence of a linear, no-threshold relationship between both short- and long-term fine PM exposure and several respiratory and cardiovascular effects, and mortality.

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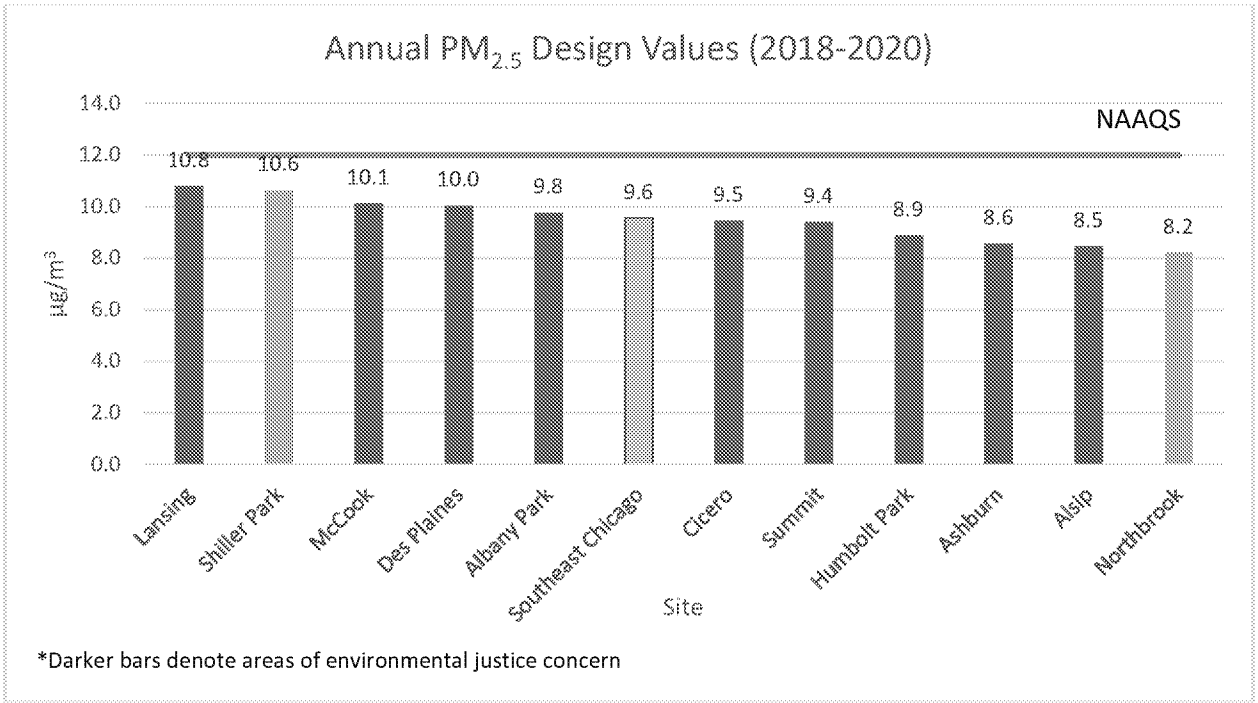
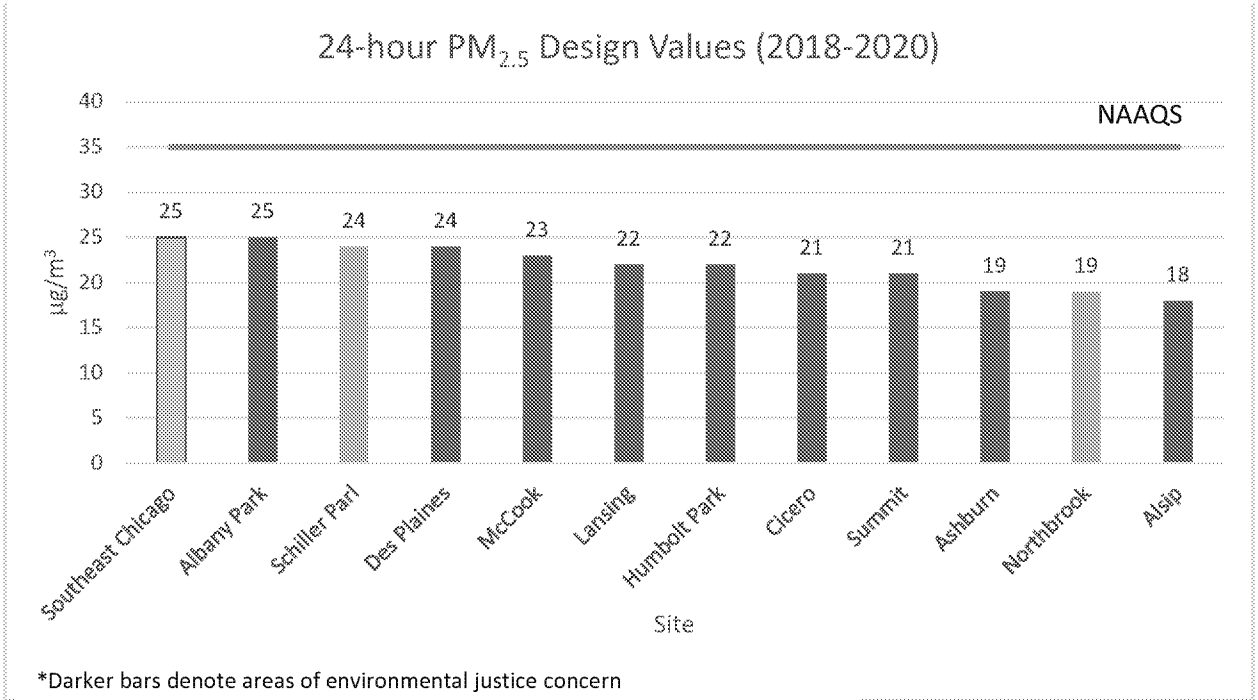
All monitors in the Chicago area are in attainment with the annual and daily $PM_{2.5}$ NAAQS. The most recent annual design values range from 10.8 µg/m^3 to 8.2 µg/m^3. The Washington High School site ranks 6 of 12 at 9.6 µg/m3. The most recent daily design values range from 25 µg/m^3 to 18 µg/m^3. The Washington High School site has the highest 24-hour design value in the area, along with the Mayfield Pumping Station site in Albany Park.





To demonstrate how $PM_{2.5}$ concentrations in Southeast Chicago have changed over time, the graphs below show each $PM_{2.5}$ measurement collected at the Washington High School site. The

first graph displays data from the last 10 years (2010-2020), and the second graph focuses on data from the last three years (2018-2020). In both figures, the green line is the level of the daily NAAQS. The orange line is the trendline.

Over the last decade, concentrations of $PM_{2.5}$ have decreased at the Washington High School site, as well as at the other $PM_{2.5}$ sites in the Chicago area. Over the last three years, concentrations of $PM_{2.5}$ have remained flat.[4] With two exceptions, on July 5, 2015 and on December 11, 2018, each measurement during this period is below the daily $PM_{2.5}$ NAAQS.

[4] Throughout this report, trends may be described as "flat." However, in some of these instances, it may look like the trend line has a slight slope upward. Here, the term "flat" means that values are not substantially increasing or decreasing. EPA examines data points that are above the trendline as part of its regular review of monitoring data. This may include analyzing available wind data, evaluating nearby sources, and referrals to the enforcement program, as appropriate.

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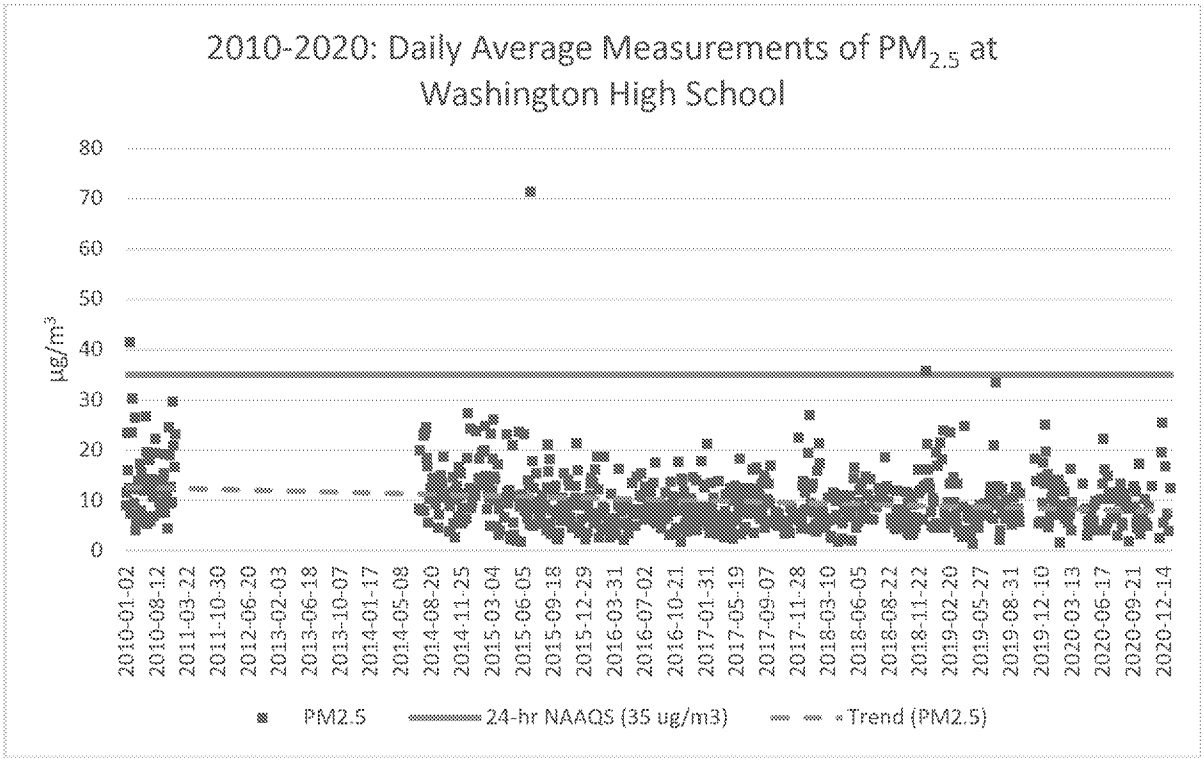
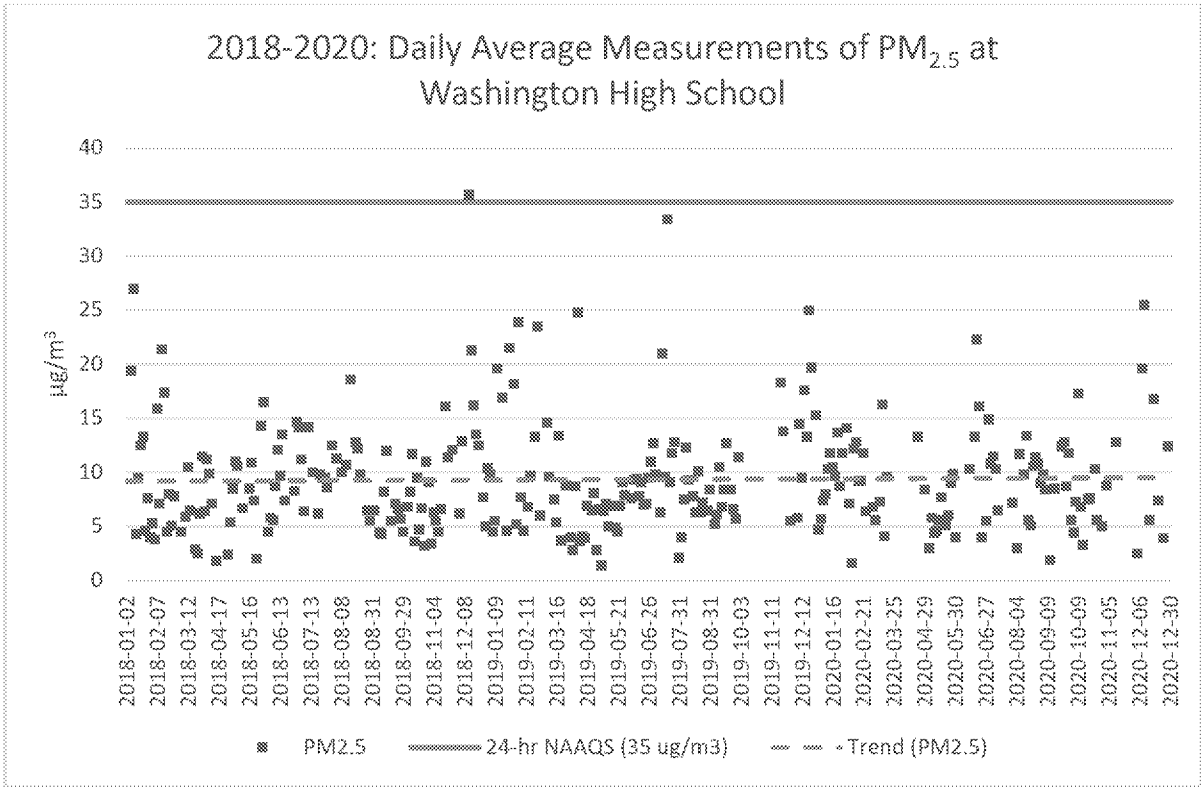

2010-2020: Daily Average Measurements of PM2.5 at Washington High School
µg/m³
PM2.5
24-hr NAAQS (35 ug/m3)
Trend (PM2.5)

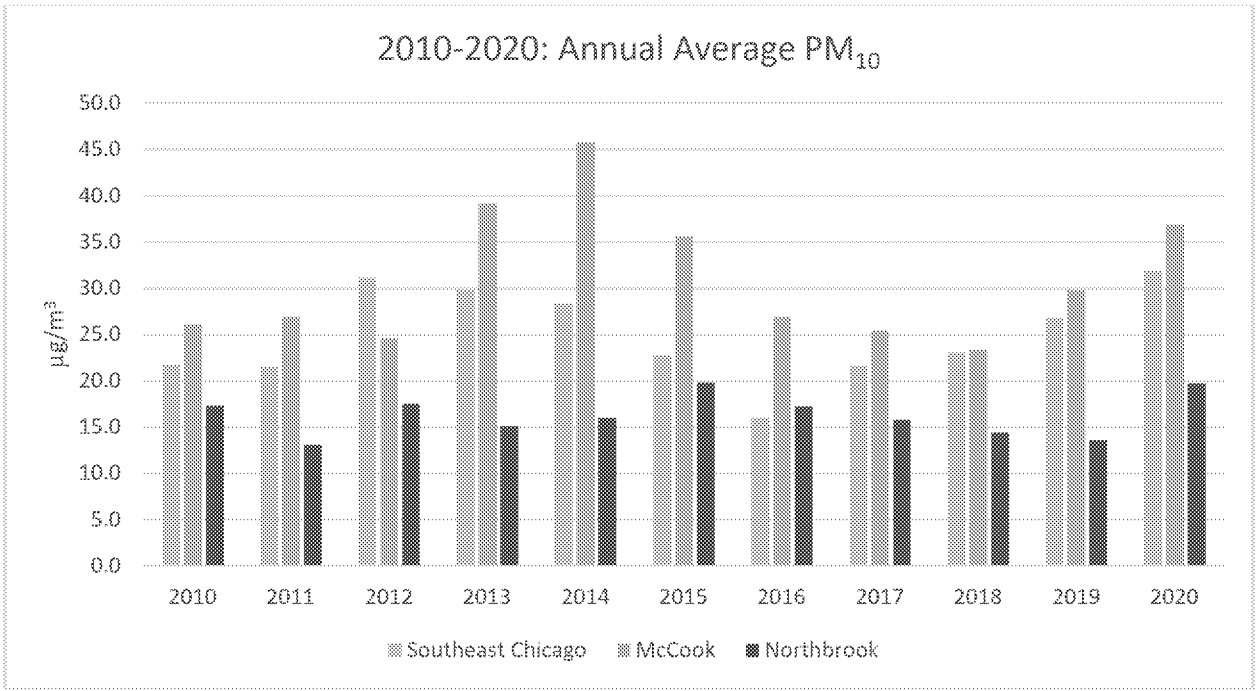

2018-2020: Daily Average Measurements of PM2.5 at Washington High School
µg/m³
PM2.5
24-hr NAAQS (35 ug/m3)
Trend (PM2.5)

Particulate Matter (PM_{10})

For PM_{10}, the design value is measured by the number of days the standard has been exceeded. It is not to be exceeded more than once per year on average over three years. The level is 150 $\mu g/m^3$.

To demonstrate how PM_{10} concentrations in Southeast Chicago compare to other parts of the Chicago area, we analyzed data from the other two sites that measure PM_{10}—Water Plant in Northbrook and Village Hall in McCook. Of the three sites, the Village Hall site measured the only exceedance of the PM_{10} standard during the last three years.

Although EPA's PM_{10} standard is exceedance based, rather than an annual average, the graph below shows the annual average PM_{10} concentration at the three PM_{10} monitors operated in Chicago for the last 10 years. As shown, average annual concentrations at the Northbrook monitor are less than concentrations measured at Village Hall and Washington High School. Annual average PM_{10} concentrations have been variable at Washington High School. The lowest annual average PM_{10} concentration was in 2016, and annual concentrations have increased over the last few years. Current annual average PM_{10} concentrations are similar to annual average concentrations observed in 2012 and 2013.



To demonstrate how PM_{10} concentrations in Southeast Chicago have changed over time, the graphs below show each PM_{10} measurement collected at the Washington High School site. The first graph displays data from the last 10 years (2010-2020), and the second graph focuses on data from the last three years (2018-2020). In both figures, the green line is the level of the NAAQS. The orange line is the trendline.

Over the last decade, concentrations of PM_{10} have remained flat at the Washington High School site. Over the last three years, concentrations of PM_{10} have increased. Each measurement during the last 10 years is below the PM_{10} NAAQS. The highest value overall is 139 $\mu g/m^3$, measured

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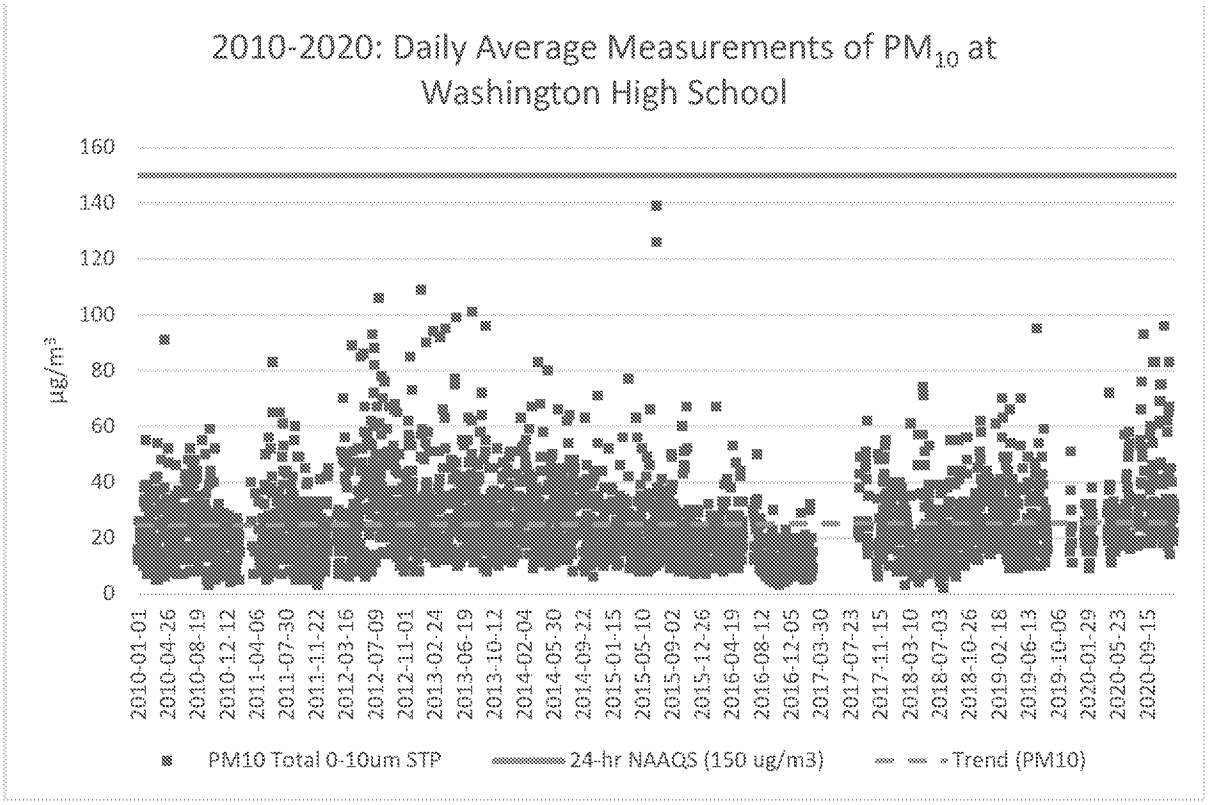
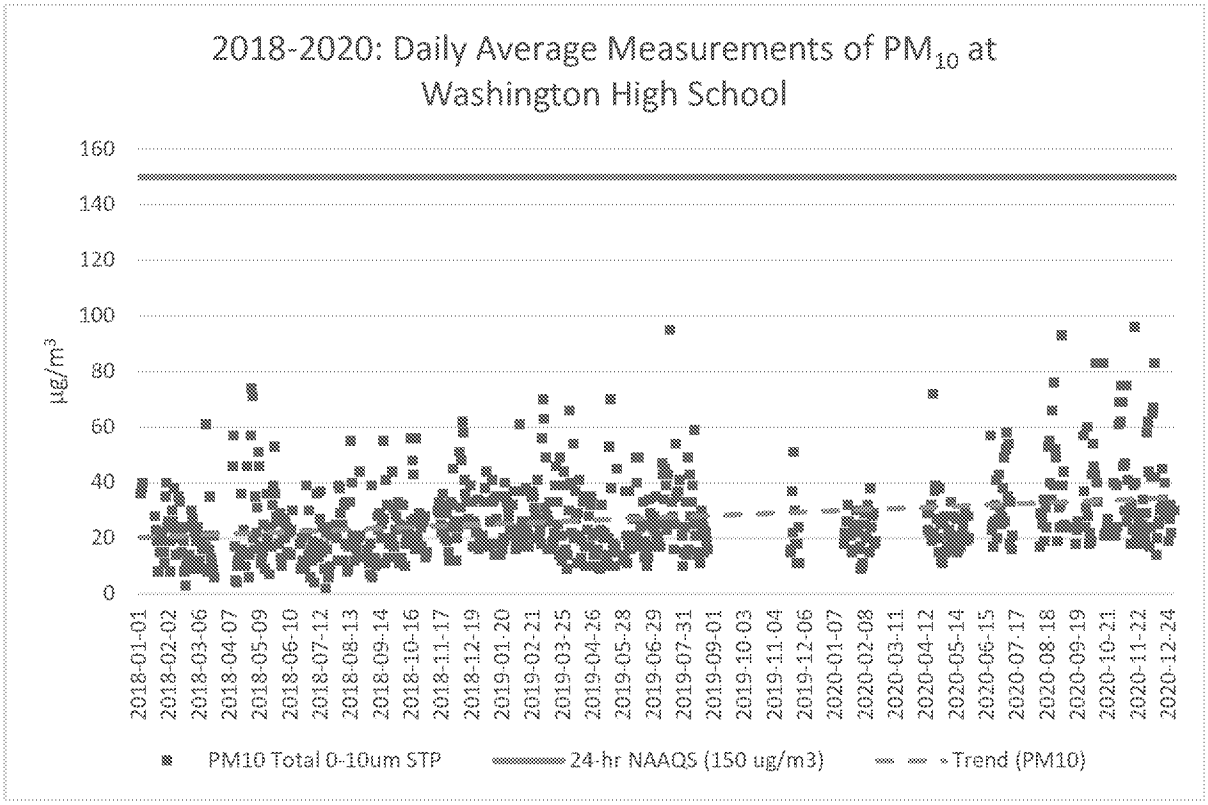
on July 5, 2015. The highest value over the last three years is 96 µg/m^3, measured on November 19, 2020.





Ozone

Tropospheric, or ground level ozone, is not emitted directly into the air, but is created by chemical reactions between oxides of nitrogen and volatile organic compound precursors. This happens when pollutants emitted by cars, power plants, industrial boilers, refineries, chemical plants, and other sources chemically react in the presence of sunlight. Ozone is most likely to reach unhealthy levels on hot sunny days in urban environments. Because this reaction occurs after the emissions of precursors, ozone concentrations are typically the highest in areas that are downwind of urban areas where ozone precursor emissions are produced. Proximity to Lake Michigan also has an effect on ozone concentrations due to unique photochemistry and lake/land breezes that contribute to formation and affect the transport of ozone in the Chicago area.

People most at risk from breathing air containing ozone include people with asthma, children, older adults, and people who are active outdoors, especially outdoor workers. Depending on the level of exposure, ozone can:

- cause coughing and sore or scratchy throat;
- make it more difficult to breathe deeply and vigorously and cause pain when taking a deep breath;
- inflame and damage the airways;
- make the lungs more susceptible to infection;
- aggravate lung diseases such as asthma, emphysema, and chronic bronchitis; and
- increase the frequency of asthma attacks.

Some of these effects have been found even in healthy people, but effects can be more serious in people with lung diseases such as asthma. They may lead to increased school absences, medication use, visits to doctors and emergency rooms, and hospital admissions. Long-term exposure to ozone is linked to aggravation of asthma, and is likely to be one of many causes of asthma development. Studies in locations with elevated concentrations also report associations of ozone with deaths from respiratory causes.

For ozone, the design value is measured as the annual fourth-highest daily maximum 8-hour concentration, averaged over three years. The 2008 level is 75 ppb. The more recent and more protective 2015 level is 70 ppb.

To better demonstrate how ozone concentrations near Southeast Chicago compare to concentrations in other parts of the Chicago area, the figure below shows the 2018-2020 design values at all monitor locations. One ozone monitor remains above the 2008 ozone NAAQS, and most of the ozone monitors are measuring levels above the 2015 revision to the ozone NAAQS. The design values range from 77 to 68 ppb. The highest ozone concentrations are measured at monitoring sites that are further from Chicago's urban core, in places like the Water Plant site in Northbrook and the Village Hall site in Alsip, as well as monitoring sites that are in close proximity to Lake Michigan, such as the Water Plant site in Evanston and the South Water Filtration Plant site—the closest ozone site to Southeast Chicago. The South Water Filtration Plant site ranks 4th of 10 at 74 ppb.

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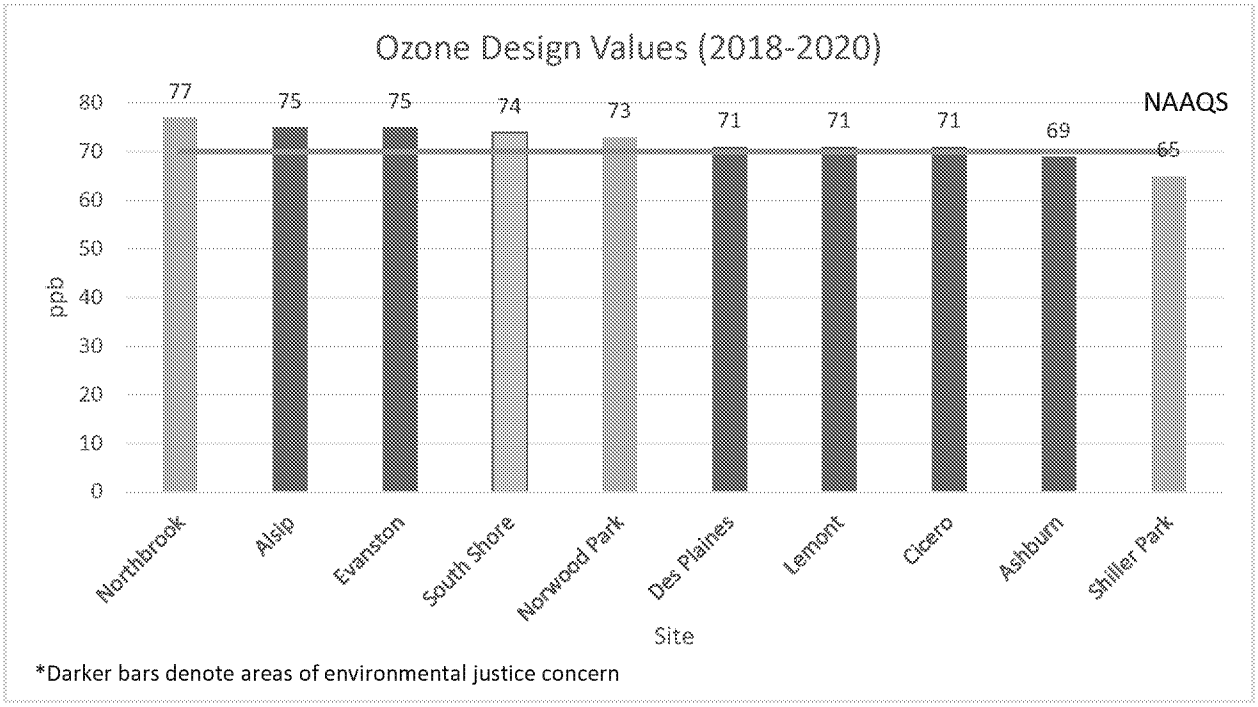
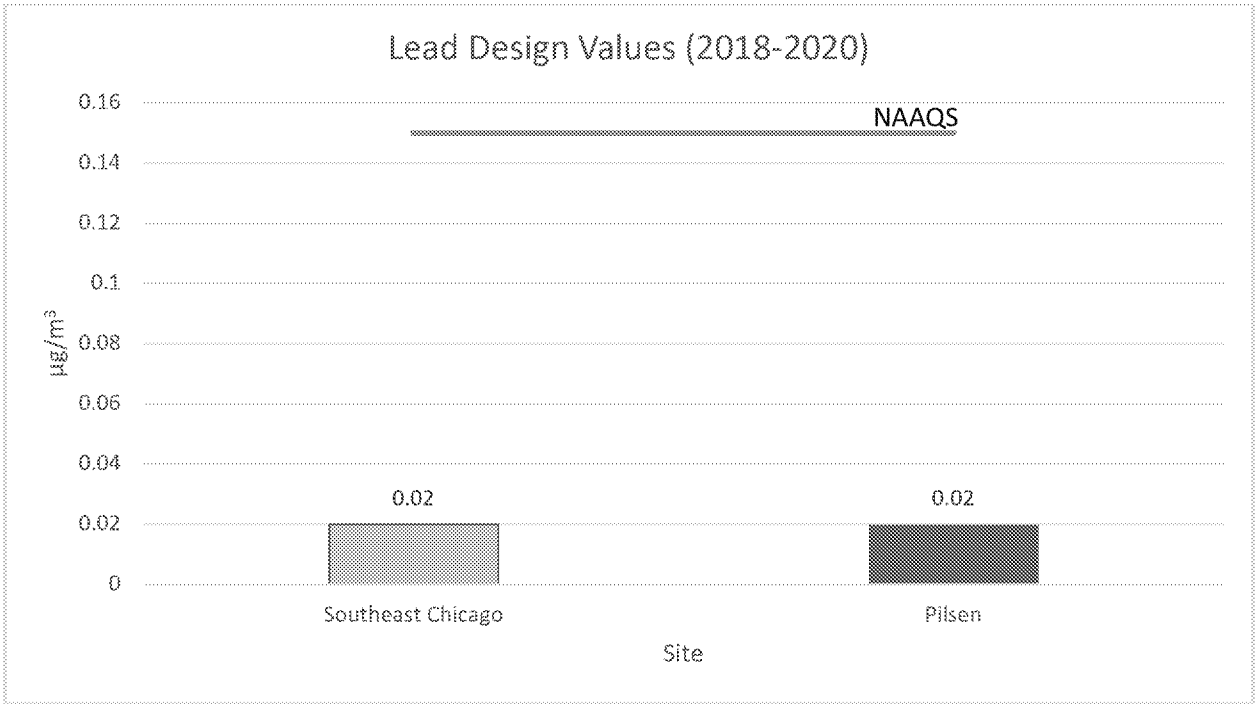


Lead

As a result of EPA's regulatory efforts including the removal of lead from motor vehicle gasoline, levels of lead in the air decreased by 98 percent between 1980 and 2014. Therefore, monitoring efforts are generally limited to areas where there are permitted industrial facilities. Industrial operations that may result in lead emissions include ore and metals processing, smelting, waste incineration, and lead-acid battery manufacturing.

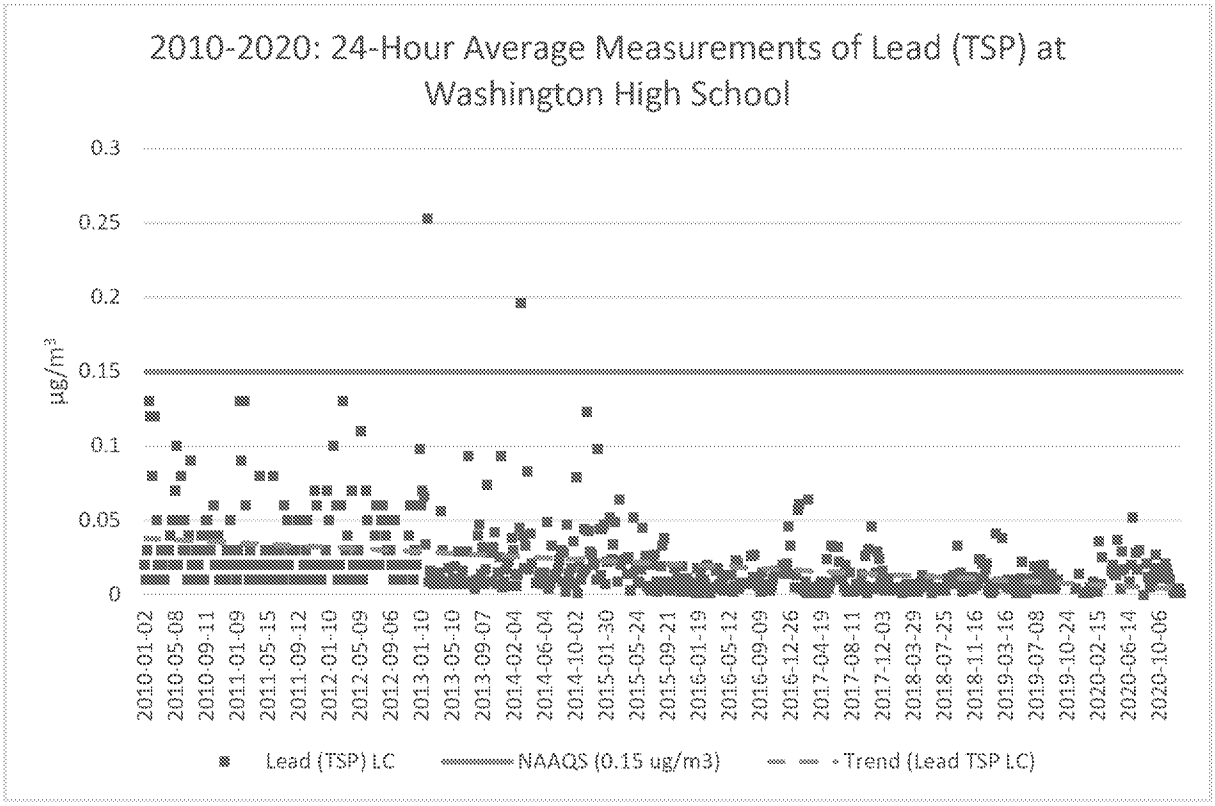
The scientific evidence shows that lead exposure can cause cognitive function decrements in children as measured by reduced IQ, decreased academic performance, and poorer performance on tests of executive function. There is no evidence of a threshold for cognitive effects in children, which means there does not appear to be a level of exposure below which this health effect is not observed.

For lead, the design value is measured as the maximum arithmetic 3-month mean concentration for a 3-year period that is not to be exceeded. The level is 0.15 $\mu g/m^3$. To demonstrate how lead concentrations in Southeast Chicago compare to those in other parts of the Chicago area, we analyzed data from the one other site that measures lead—the Perez Elementary site in Pilsen. The most recent design value for both sites is 0.02 $\mu g/m^3$. In 2020, the national average maximum 3-month average of lead from all monitors was 0.032 $\mu g/m^3$.



To demonstrate how lead concentrations in Southeast Chicago have changed over time, the graphs below show each lead measurement collected at the Washington High School site. The first graph displays data from the last 10 years (2010-2020), and the second graph focuses on data from the last three years (2018-2020). In both figures, the green line is the level of the NAAQS. The orange line is the trendline.

Over the last decade, concentrations of lead have decreased at the Washington High School site. Over the last three years, concentrations of lead have remained flat. The highest value overall is 0.196 µg/m^3, measured on March 6, 2014. Each measurement during the last three years is below the lead NAAQS. The highest value during this period is 0.052 µg/m^3, measured on June 26, 2020.


2010-2020: 24-Hour Average Measurements of Lead (TSP) at Washington High School
µg/m³
0.3
0.25
0.2
0.15
0.1
0.05
0
2010-01-02
2010-05-08
2010-09-11
2011-01-09
2011-05-15
2011-09-12
2012-01-10
2012-05-09
2012-09-06
2013-01-10
2013-05-10
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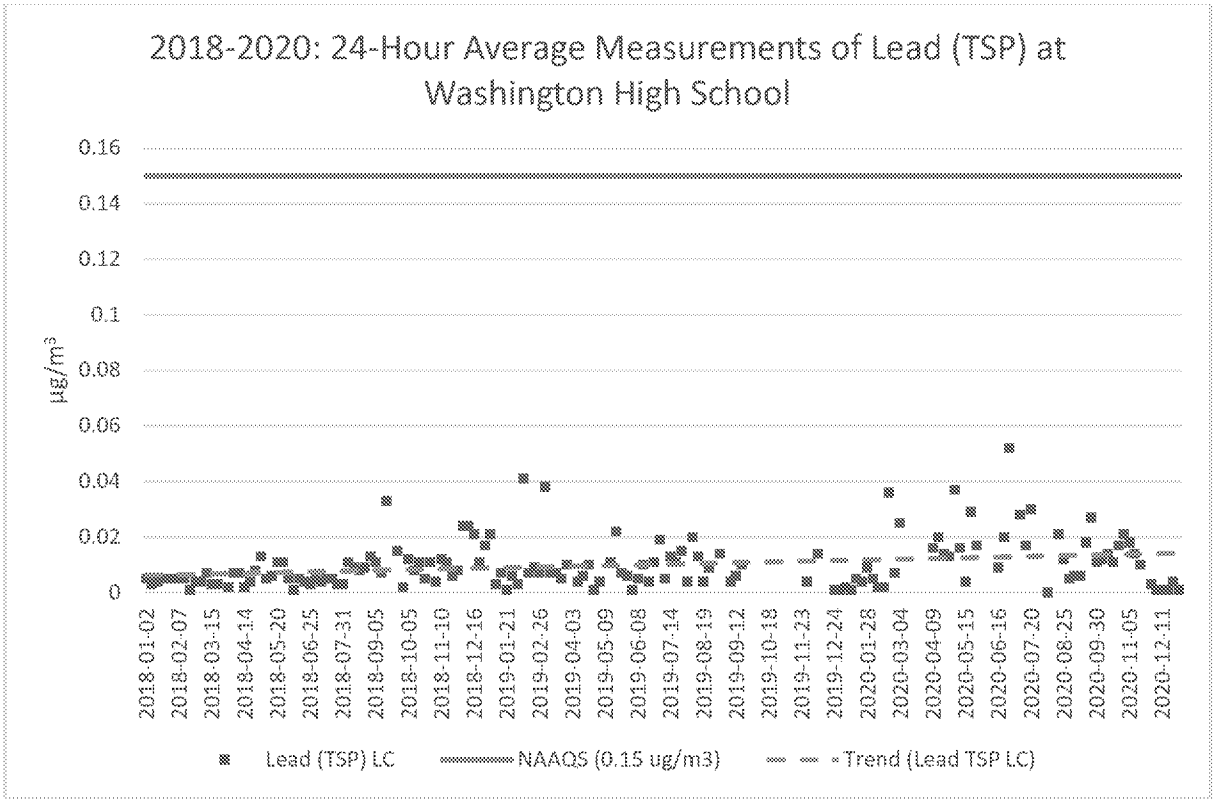
2014-06-04
2014-10-02
2015-01-30
2015-05-24
2015-09-21
2016-01-19
2016-05-12
2016-09-09
2016-12-26
2017-04-19
2017-08-11
2017-12-03
2018-03-29
2018-07-25
2018-11-16
2019-03-16
2019-07-08
2019-10-24
2020-02-15
2020-06-14
2020-10-06
Lead (TSP) LC
NAAQS (0.15 ug/m3)
Trend (Lead TSP LC)


2018-2020: 24-Hour Average Measurements of Lead (TSP) at Washington High School
µg/m³
0.16
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
2018-01-02
2018-02-07
2018-03-15
2018-04-14
2018-05-20
2018-06-25
2018-07-31
2018-09-05
2018-10-05
2018-11-10
2018-12-16
2019-01-21
2019-02-26
2019-04-03
2019-05-09
2019-06-08
2019-07-14
2019-08-19
2019-09-12
2019-10-18
2019-11-23
2019-12-24
2020-01-28
2020-03-04
2020-04-09
2020-05-15
2020-06-16
2020-07-20
2020-08-25
2020-09-30
2020-11-05
2020-12-11
Lead (TSP) LC
NAAQS (0.15 ug/m3)
Trend (Lead TSP LC)

Metals

HAPs are pollutants that are known or suspected to cause cancer or other serious health impacts. NAAQS have not been set for pollutants in this category. Rather, the Clean Air Act requires EPA to regulate air toxics by setting limits on the amount of pollution that industrial sources can emit to the air. There are no ambient standards—limits on the amount of a pollutant that is allowed in the outdoor air—for HAPs.[5]

The Washington High School site collects and analyses samples of certain metals in total suspended particulate (TSP), which are regulated as HAPs. Metals monitored include cadmium, manganese, nickel, and chromium. It is difficult to meaningfully compare how concentrations of metals in Southeast Chicago compare to other parts of the Chicago area because there is only one other site that measures TSP metals—the Perez Elementary site in Pilsen, which is also an environmental justice area of concern.

Because of limited monitoring sites, EPA's metals analysis has focused on how concentrations of metals in Southeast Chicago have changed over time and how they compare to available health benchmarks, known as Minimal Risk Levels (MRLs). For each metal, the first graph displays data from the last 10 years (2010-2020), and the second graph focuses on data from the last three years (2018-2020). The orange line is the trendline. The green line is the level of the chronic MRL—continuous exposure for more than 364 days at that concentration—for that pollutant.

The U.S. Department of Health and Human Services' Agency for Toxic Substances and Disease Registry (ATSDR) sets MRLs below levels that, based on current science, may cause adverse health effects. Exposure to a level above the MRL does not mean that adverse health effects will occur. MRLs are not standards, like the NAAQS, and, if they are exceeded, it is not a Clean Air Act violation. Rather, MRLs are screening tools that, if measurements are routinely above them, indicate that public health agencies may want to take a closer look. EPA works closely with ATSDR when monitored concentrations regularly exceed MRLs.

Concentrations of metals have either decreased or remained flat at the Washington High School site during the last decade. Over the last three years, concentrations have remained flat. Each measurement during the last three years is below the chronic MRL for that metal, with the exception of two cadmium observations: 0.012 $\mu g/m^3$ on December 4, 2018 and 0.011 $\mu g/m^3$ on February 8, 2019—each above the chronic MRL of 0.01 $\mu g/m^3$. Because chronic MRLs are meant to be compared with long-term averages and are set below levels that may cause adverse health effects, two individual daily measurements above this level do not constitute a threat to public health. Even still, EPA is taking a closer look at these data points, as well as other recent measurements above each metal's trendline, as part of its regular review of monitoring data. This closer look may include analyzing available wind data, evaluating nearby sources, and referrals to the enforcement program, as appropriate.

[5] There are very few regulatory requirements for states to monitor HAPs. State agencies often use their discretion when deciding where to monitor HAPs.

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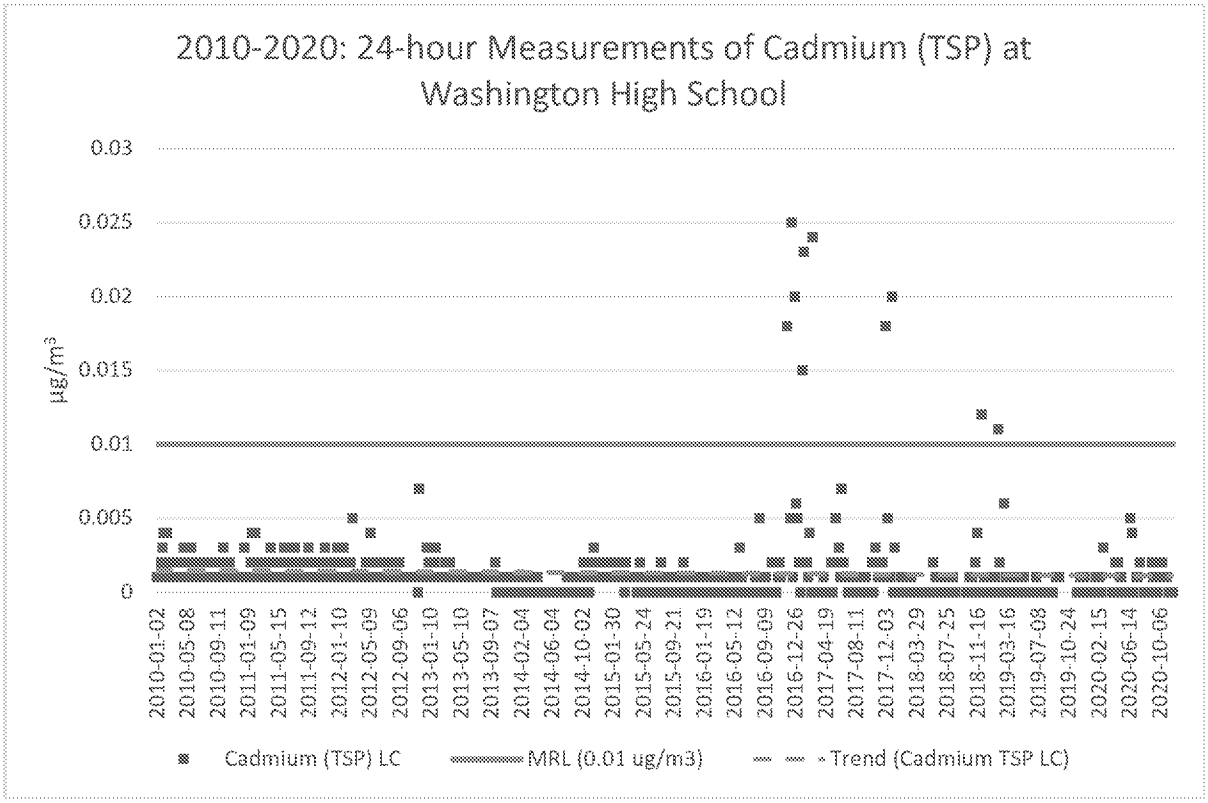
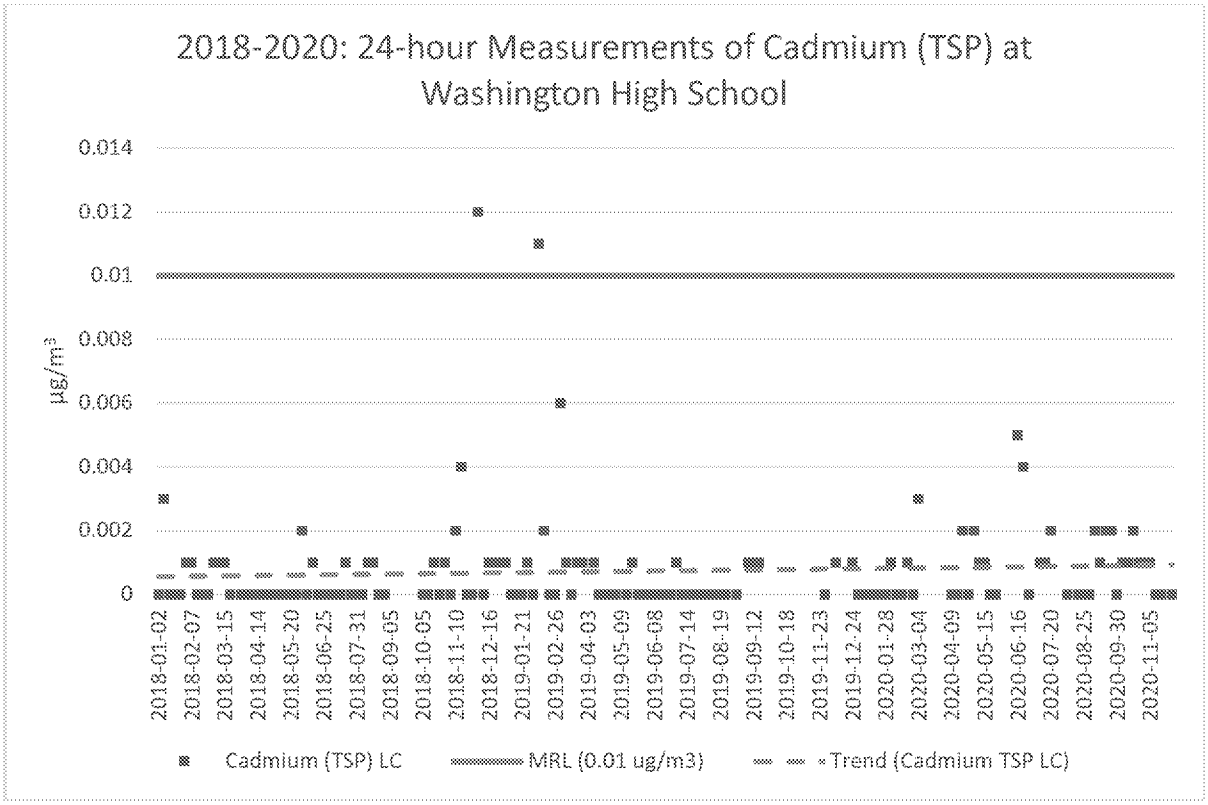
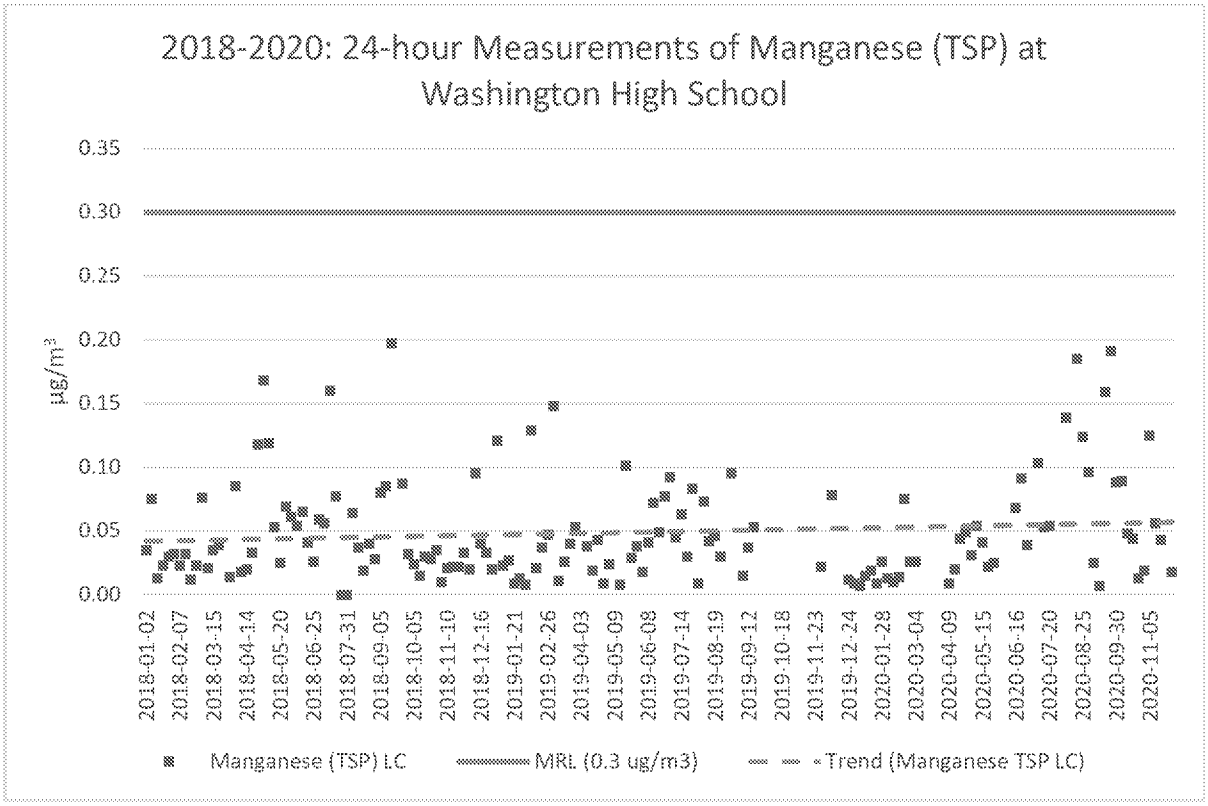
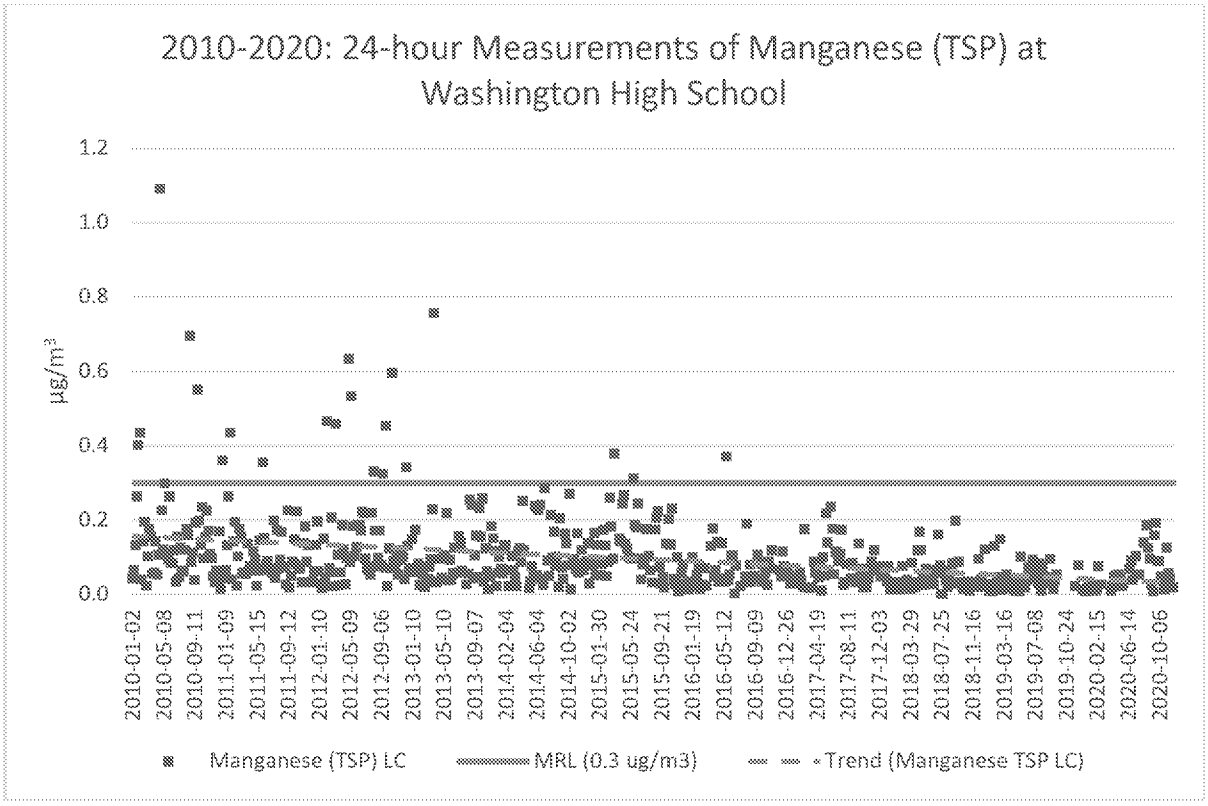
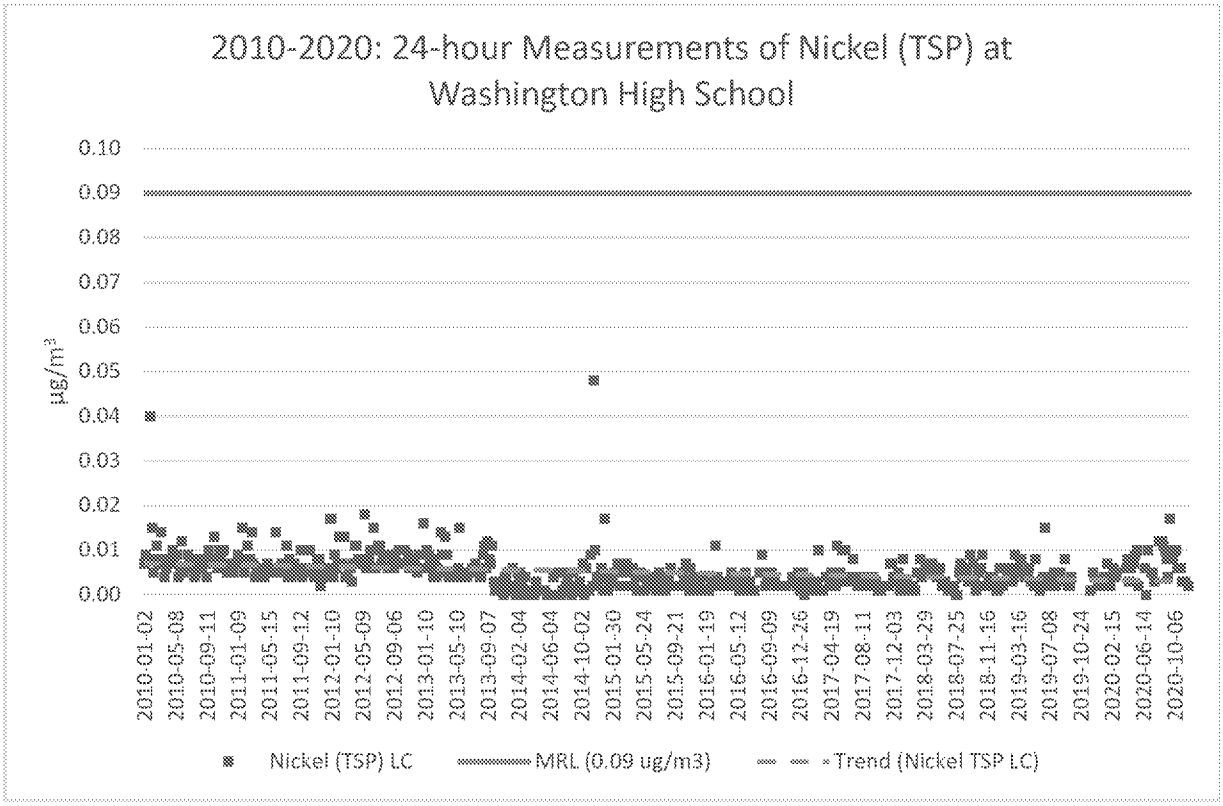
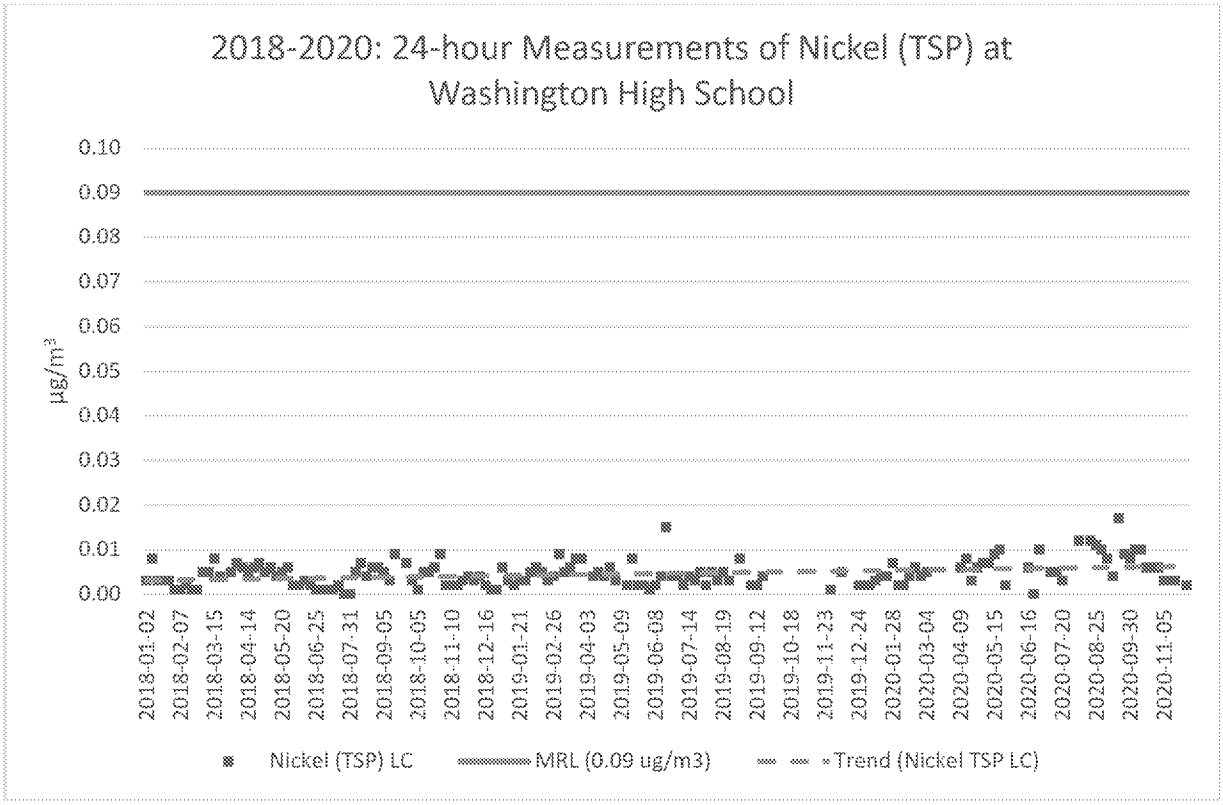

2010-2020: 24-hour Measurements of Cadmium (TSP) at Washington High School
µg/m³
0.03
0.025
0.02
0.015
0.01
0.005
0
2010-01-02
2010-05-08
2010-09-11
2011-01-09
2011-05-15
2011-09-12
2012-01-10
2012-05-09
2012-09-06
2013-01-10
2013-05-10
2013-09-07
2014-02-04
2014-06-04
2014-10-02
2015-01-30
2015-05-24
2015-09-21
2016-01-19
2016-05-12
2016-09-09
2016-12-26
2017-04-19
2017-08-11
2017-12-03
2018-03-29
2018-07-25
2018-11-16
2019-03-16
2019-07-08
2019-10-24
2020-02-15
2020-06-14
2020-10-06
Cadmium (TSP) LC
MRL (0.01 ug/m3)
Trend (Cadmium TSP LC)

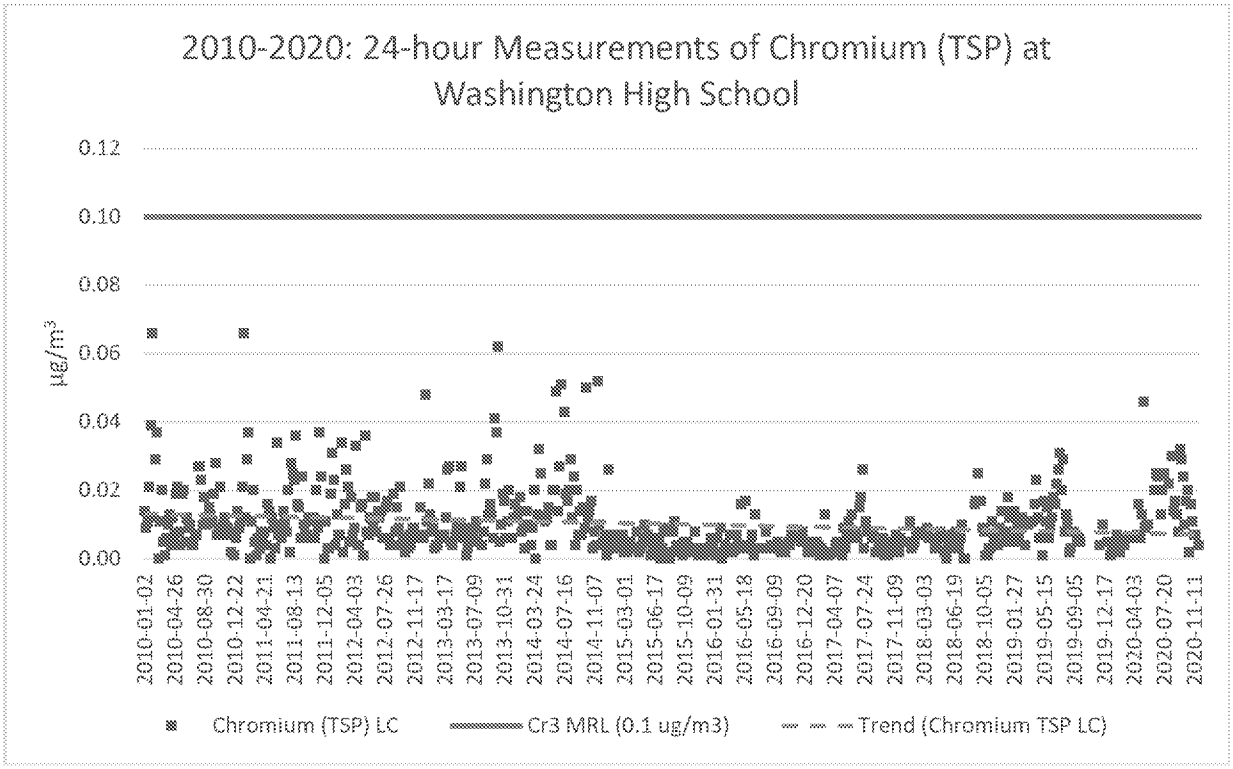

2018-2020: 24-hour Measurements of Cadmium (TSP) at Washington High School
µg/m³
0.014
0.012
0.01
0.008
0.006
0.004
0.002
0
2018-01-02
2018-02-07
2018-03-15
2018-04-14
2018-05-20
2018-06-25
2018-07-31
2018-09-05
2018-10-05
2018-11-10
2018-12-16
2019-01-21
2019-02-26
2019-04-03
2019-05-09
2019-06-08
2019-07-14
2019-08-19
2019-09-12
2019-10-18
2019-11-23
2019-12-24
2020-01-28
2020-03-04
2020-04-09
2020-05-15
2020-06-16
2020-07-20
2020-08-25
2020-09-30
2020-11-05
Cadmium (TSP) LC
MRL (0.01 ug/m3)
Trend (Cadmium TSP LC)

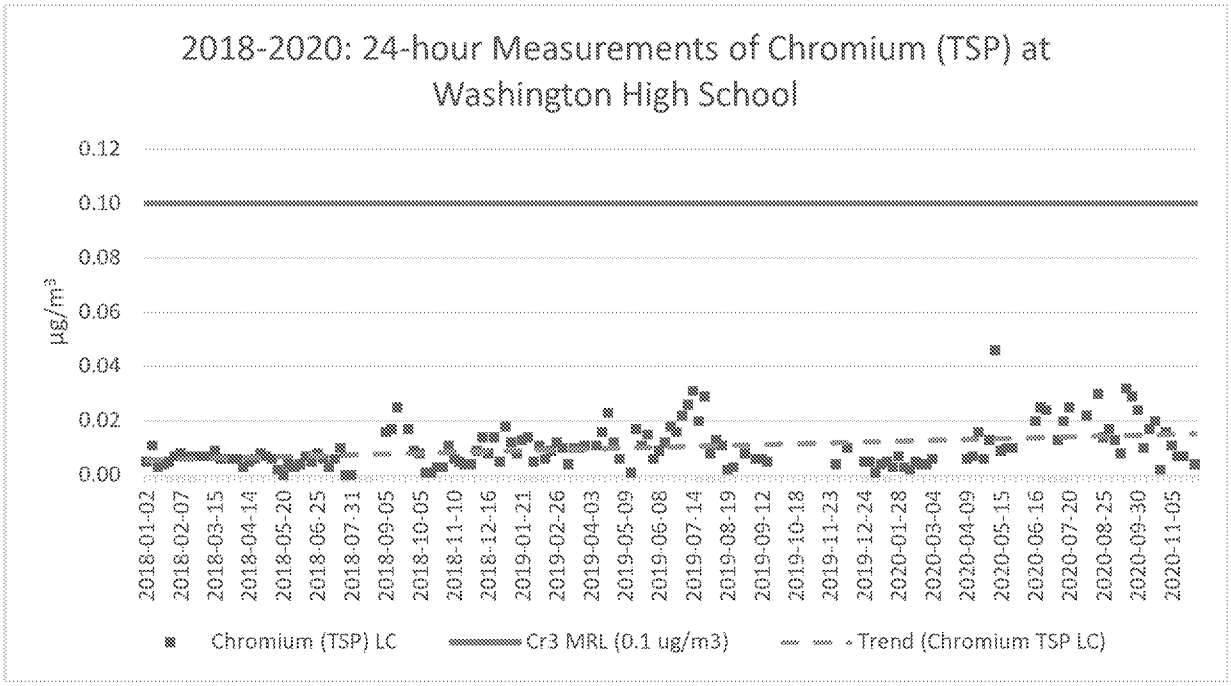

2018-2020: 24-hour Measurements of Manganese (TSP) at Washington High School
µg/m³
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
2018-01-02
2018-02-07
2018-03-15
2018-04-14
2018-05-20
2018-06-25
2018-07-31
2018-09-05
2018-10-05
2018-11-10
2018-12-16
2019-01-21
2019-02-26
2019-04-03
2019-05-09
2019-06-08
2019-07-14
2019-08-19
2019-09-12
2019-10-18
2019-11-23
2019-12-24
2020-01-28
2020-03-04
2020-04-09
2020-05-15
2020-06-16
2020-07-20
2020-08-25
2020-09-30
2020-11-05
Manganese (TSP) LC
MRL (0.3 ug/m3)
Trend (Manganese TSP LC)


2010-2020: 24-hour Measurements of Manganese (TSP) at Washington High School
µg/m³
1.2
1.0
0.8
0.6
0.4
0.2
0.0
2010-01-02
2010-05-08
2010-09-11
2011-01-09
2011-05-15
2011-09-12
2012-01-10
2012-05-09
2012-09-06
2013-01-10
2013-05-10
2013-09-07
2014-02-04
2014-06-04
2014-10-02
2015-01-30
2015-05-24
2015-09-21
2016-01-19
2016-05-12
2016-09-09
2016-12-26
2017-04-19
2017-08-11
2017-12-03
2018-03-29
2018-07-25
2018-11-16
2019-03-16
2019-07-08
2019-10-24
2020-02-15
2020-06-14
2020-10-06
Manganese (TSP) LC
MRL (0.3 ug/m3)
Trend (Manganese TSP LC)


2010-2020: 24-hour Measurements of Nickel (TSP) at Washington High School
µg/m³
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
2010-01-02
2010-05-08
2010-09-11
2011-01-09
2011-05-15
2011-09-12
2012-01-10
2012-05-09
2012-09-06
2013-01-10
2013-05-10
2013-09-07
2014-02-04
2014-06-04
2014-10-02
2015-01-30
2015-05-24
2015-09-21
2016-01-19
2016-05-12
2016-09-09
2016-12-26
2017-04-19
2017-08-11
2017-12-03
2018-03-29
2018-07-25
2018-11-16
2019-03-16
2019-07-08
2019-10-24
2020-02-15
2020-06-14
2020-10-06
Nickel (TSP) LC
MRL (0.09 ug/m3)
Trend (Nickel TSP LC)


2018-2020: 24-hour Measurements of Nickel (TSP) at Washington High School
µg/m³
0.10
0.09
0.08
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0.00
2018-01-02
2018-02-07
2018-03-15
2018-04-14
2018-05-20
2018-06-25
2018-07-31
2018-09-05
2018-10-05
2018-11-10
2018-12-16
2019-01-21
2019-02-26
2019-04-03
2019-05-09
2019-06-08
2019-07-14
2019-08-19
2019-09-12
2019-10-18
2019-11-23
2019-12-24
2020-01-28
2020-03-04
2020-04-09
2020-05-15
2020-06-16
2020-07-20
2020-08-25
2020-09-30
2020-11-05
Nickel (TSP) LC
MRL (0.09 ug/m3)
Trend (Nickel TSP LC)


2010-2020: 24-hour Measurements of Chromium (TSP) at Washington High School
µg/m³
0.12
0.10
0.08
0.06
0.04
0.02
0.00
2010-01-02
2010-04-26
2010-08-30
2010-12-22
2011-04-21
2011-08-13
2011-12-05
2012-04-03
2012-07-26
2012-11-17
2013-03-17
2013-07-09
2013-10-31
2014-03-24
2014-07-16
2014-11-07
2015-03-01
2015-06-17
2015-10-09
2016-01-31
2016-05-18
2016-09-09
2016-12-20
2017-04-07
2017-07-24
2017-11-09
2018-03-03
2018-06-19
2018-10-05
2019-01-27
2019-05-15
2019-09-05
2019-12-17
2020-04-03
2020-07-20
2020-11-11
Chromium (TSP) LC
Cr3 MRL (0.1 ug/m3)
Trend (Chromium TSP LC)


2018-2020: 24-hour Measurements of Chromium (TSP) at Washington High School
µg/m³
0.12
0.10
0.08
0.06
0.04
0.02
0.00
2018-01-02
2018-02-07
2018-03-15
2018-04-14
2018-05-20
2018-06-25
2018-07-31
2018-09-05
2018-10-05
2018-11-10
2018-12-16
2019-01-21
2019-02-26
2019-04-03
2019-05-09
2019-06-08
2019-07-14
2019-08-19
2019-09-12
2019-10-18
2019-11-23
2019-12-24
2020-01-28
2020-03-04
2020-04-09
2020-05-15
2020-06-16
2020-07-20
2020-08-25
2020-09-30
2020-11-05
Chromium (TSP) LC
Cr3 MRL (0.1 ug/m3)
Trend (Chromium TSP LC)

Source-Oriented Monitoring

EPA, IEPA, and the City of Chicago's Department of Public Health (CDPH) have been actively involved in numerous air monitoring activities in Southeast Chicago since 2012, mostly surrounding facilities that are along the Calumet River. Since 2014, in cooperation with IEPA and CDPH, over 75 companies have been investigated to determine if they are in compliance with the Clean Air Act. Notably, EPA inspected 30 of these facilities in direct response to community concerns about exposure to petroleum coke dust.

Since 2014, EPA has required four facilities to site and operate particulate monitors near onsite bulk handling operations using authorities under Section 114 of the Clean Air Act. EPA uses this authority to better assess emissions and impacts to identify potential violations. These four facilities are KCBX (2014-2015),[6] S.H. Bell (2017-present),[7] Watco Terminal and Port Services (2018-2020),[8] and North American Stevedoring Company (2019-2020).[9]

In addition, CDPH issued Rules for Control of Emissions from Handling and Storing Bulk Materials in March 2014 and a subsequent revision in April 2018. The first rule requires continuous PM_{10} and meteorological monitoring at facilities that process, handle, transfer, load, unload, stockpile, or store bulk solid materials. The 2018 revision requires any manganese-bearing bulk material facilities that do not enclose material to install and operate a filter-based sampler that measures ambient metals of the PM_{10} size fraction. These filters undergo gravimetric and metals concentration determinations for lead, arsenic, cadmium, chromium, manganese, nickel, and vanadium.

As a result of the required air monitoring, EPA, IEPA, and the City of Chicago have cited these facilities for numerous environmental violations, including an exceedance of the PM_{10} NAAQS. The enforcement and compliance assistance actions taken by EPA, IEPA, and the City of Chicago have resulted in various settlements and injunctive relief measures to reduce potential fugitive emissions from bulk handling facilities. As of the date of this report, KCBX Terminals had halted operations at its North Terminal, S.H. Bell implemented facility improvements, and Watco Terminal and Port Services no longer received manganese in bulk handling operations. As a result of these focused enforcement actions, the most recent 12-month rolling averages of manganese at the monitors near these facilities are all below the MRL.

[6] https://archive.epa.gov/epa/petroleum-coke-chicago/kcbx-fenceline-air-monitoring-data.html
[7] https://www.epa.gov/il/sh-bell-chicago-air-monitoring-data
[8] https://www.epa.gov/il/watco-terminal-and-port-services#data
[9] https://www.epa.gov/il/north-american-stevedoring-company#Air%20monitor%20Data

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Conclusions

The following trends were observed at the Washington High School site:

- Over the past 10 years, concentrations of all pollutants measured at the Washington High School site have either decreased or remained flat.
- Over the past three years, concentrations of all pollutants measured at the Washington High School site have either decreased or remained flat—with the exception of PM_{10}.
- Over the last 10 years, annual averages of all metals measured at the Washington High School site have been below the chronic MRL for that metal.
- When compared to similar data collected in the Chicago area, Southeast Chicago:
    - ranks 6 of 12 with an annual $PM_{2.5}$ design value of 9.6 $\mu g/m^3$;
    - is tied for the highest daily $PM_{2.5}$ design value of 25 $\mu g/m^3$;
    - ranks 2 of 3 for the highest annual average PM_{10};
    - ranks 4 of 10 with an annual ozone design value of 74 ppb; and
    - has a lead design value equivalent to the only other lead site in the Chicago area (Pilsen) (0.02 $\mu g/m^3$).
- It is difficult to meaningfully compare concentrations of metals in Southeast Chicago to other parts of the Chicago area because there is only one other site that measures TSP metals—the Perez Elementary site in Pilsen.
- The most recent 12-month rolling averages of manganese near facilities where EPA required monitoring under Section 114 of the Clean Air Act are all below the MRL for manganese.

EPA intends for this report to help answer the Southeast Chicago community's questions about air quality where they live, work, learn and play. While neither a full evaluation of impacts in this community nor a disparate impact analysis, this report will be a useful input to the HIA currently under development by the city of Chicago, as it assesses certain environmental impacts and includes information on population vulnerability. As EPA pursues its mission to protect human health and the environment, we will continue to engage with the community and partners on improving air quality.

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