Air Management Services
Annual Report for Calendar Year 2019

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Director

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Introduction

Air Management Services (AMS), a division of the Philadelphia Department of Public Health and the air pollution control agency for the City of Philadelphia, has made great strides over the past few years in protecting the people of our City from the adverse effects of air pollution. This report details our unit's goals, a summary of activities and revenues collected, and our progress in calendar year 2018 toward meeting our objectives set under the Clean Air Act.

Mission and Vision

Mission Statement: Air Management Services, a division of the Philadelphia Department of Public Health, is committed to protecting the health, well-being, and quality of life of the people who live, work and visit Philadelphia from the adverse effects of air pollution.

Vision Statement: To ensure all Philadelphia residents have access to safe, clean air.

Goals

Achieve and maintain the National Ambient Air Quality Standards (NAAQS) in Philadelphia by implementing all relevant federal, state, and local air regulations. These air quality standards may be further reduced based on updated scientific information. Among these are:

- Achieve the 2015 standard of 0.070 parts per million of ozone over eight hours by August 3, 2021.

Other agency goals include:

- The City should minimize risk to all residents from air toxics to less than one in a million risk of cancer (above what would normally be seen in the general population).
- AMS will also work with EPA and other stakeholders to seek alternative funding sources for the air program from the transportation sector such as emission fees for mobile sources and/or vehicle registration fees.
- Gathering the best information available to appropriately address the many factors involved in the regulation of air quality, including health, quality of life, equity, and economic impacts.
- Improve AMS' profile and its community services to Philadelphians and operate in accordance with the Pennsylvania's Department of Environmental Protection's *Environmental Justice Public Participation Policy*.
- To streamline communication within the agency and with outside groups such as researchers and educators in order to improve the profile and public perception of the agency and to raise awareness about the importance of clean air to public health and welfare.
- Educate the public about energy efficiency and sustainability.
- Plan and coordinate with other authorities to reduce the impact of air pollution from the transportation sector.

- Assist businesses to help them comply with environmental regulations while being sensitive to the economic implications of these regulations.
- Coordinate with the Mayor's Office of Sustainability to support their goal of making Philadelphia the greenest city in America.
- Maintain existing resources at AMS, particularly our high-caliber knowledge and skill base, by continuing to educate and train employees.
- Coordinate with the Philadelphia Port Authority to establish a detailed and robust annual emission inventory and establish an air toxics and particulate matter monitor near the Delaware River.
- Assist business owners by establishing a web-based system that allows the online submission of permit and license applications and fees.
- Work with the Air Pollution Control Board, the regulated community, and other stakeholders to develop or modify regulations to reduce or control emissions of criteria pollutants to help meet the NAAQS.
- Work with Other stakeholders and PA DEP on VW NO_x reductions calculations and cost effective analysis for the City of Philadelphia.
- Submit background document and propose update of regulation (draft AMR IX) for non road sources (construction equipment, diesel cranes at port) to APCB by December 31, 2019.
- Submit background document and propose update of regulation for mobile sources (diesel buses, diesel trucks in the center city) to APCB by December 31, 2020.
- Install Village Green type air monitoring device (EPA Office of Research and Development PM Monitor) to measure toxics at the Port and SEPTA depot.
- Risk Assessment for cancer and non-cancer risk and finalized and present to the APCB for final approval by December 2020.
- Generate air quality data from 50 locations in the Philadelphia Air Quality Survey, make analysis for all four seasons, compare data with NY air quality survey, produce written summary report by December 2020 (second round).
- Improve data quality at the Lab by automation and adopting good practices by December 2020.
- Issue Installation Permits (IPs) for minor sources and start analysis for emission controls for major sources (greater or equal to 10 tons of Methyl Bromide/year) of fumigation at the port by December 2020.
- Reduce and resolve all backlogs (NOVs, Conformance checking, and Permits), targeting 50% by December 2020.
- Reduce GHG emissions from PES or new owner/operator by 10% by December 2020:

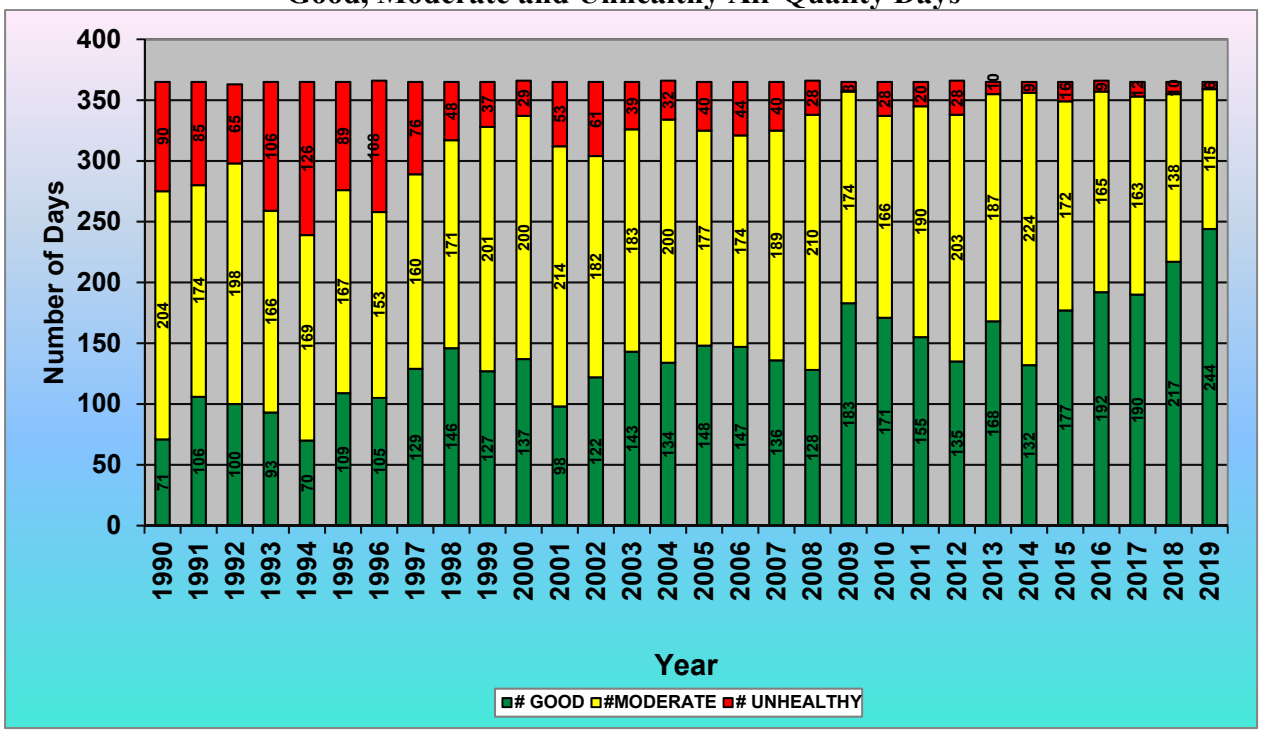
    1. Through continued energy efficiency initiatives in buildings and fleets, and through expanded use of renewable energy and cleaner fuels
    2. Processes efficiency (Heaters, Boilers, flare, FCCU, SRU, Leaks, Storage Tanks, Coking units, asphalt blowers)
    3. Emissions Control system

- Issue licenses to a minimum of 200 garages; inspect 200 garages that causes the emission of carbon monoxide, nitrogen dioxide, and other toxics to protect the public health by October 2020.
- Finalize all AMS Laboratory Renovation by Dec 31, 2020.

Air Quality Index

Air quality in Philadelphia has dramatically improved over the past few decades, as evidenced by the relatively fewer number of unhealthy air quality days (adjusted to the current standard) during the past several years, as shown in the graphic below. It is important to note that air pollution, especially ozone which forms in the presence of heat and sunlight, is weather dependent and varies significantly from year to year depending on meteorological trends. The decrease in the number of good days and the increase in the number of moderate days can be attributed to changes in the AQI breakpoints due to strengthening of the NAAQS for ozone and $PM_{2.5}$. In addition, changes to $PM_{2.5}$ sampling from a filter-based to a continuous monitor also affected the number of good and moderate days.

Good, Moderate and Unhealthy Air Quality Days[1]



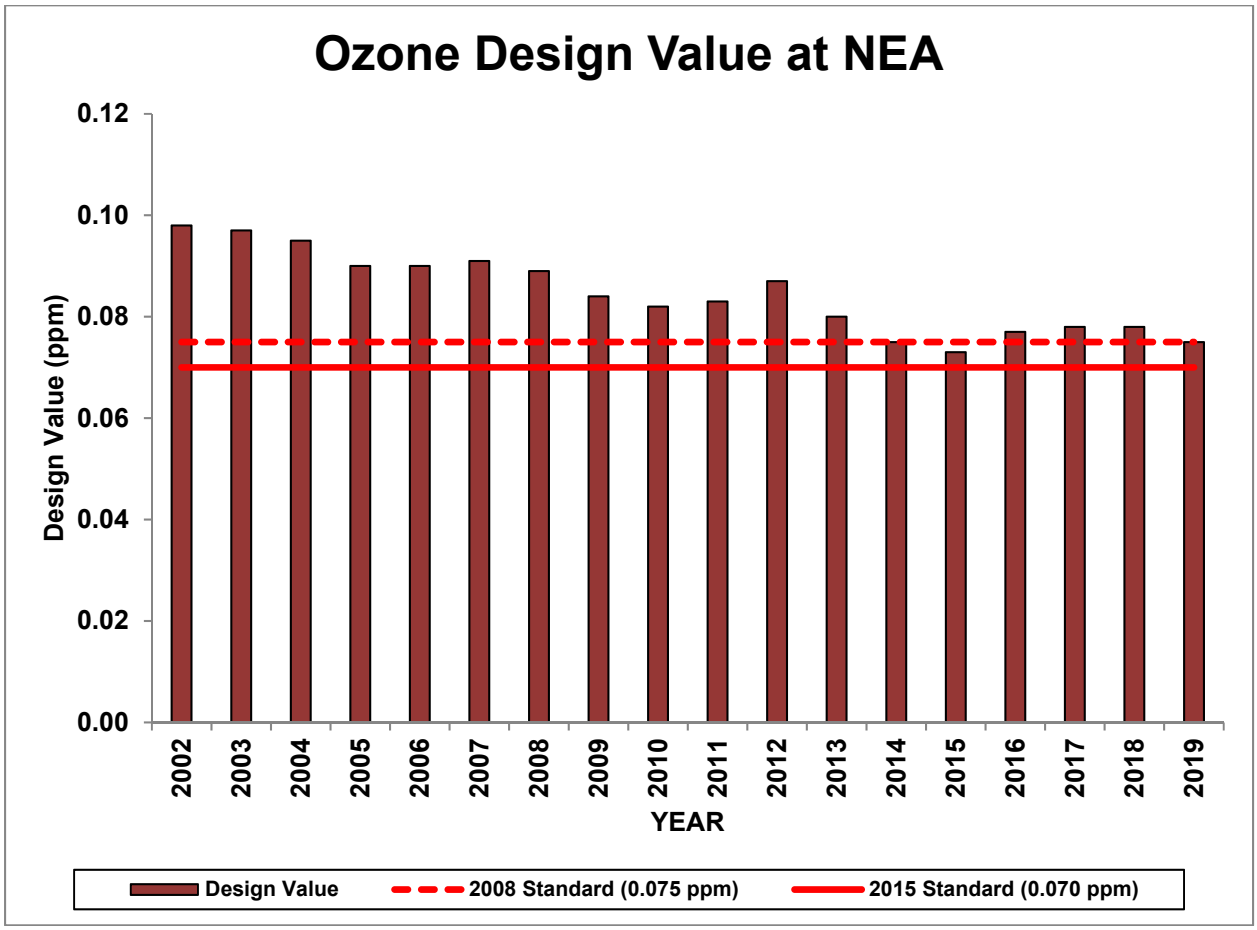
Air quality in Philadelphia has been steadily improving even for ozone and fine particulates – the region is in nonattainment only for ozone. Philadelphia is now designated as being in attainment for fine particulate matter, or $PM_{2.5}$ (particles less than 2.5 micrometers in diameter) for the 2006 24-hour and 1997 annual standards. EPA changed the annual standard for $PM_{2.5}$ from 15

[1] Data from 2019 Q4 were taken from AMS' AirVision data and NOT EPA's Air Quality System.

micrograms per cubic meter to 12 micrograms per cubic meter in 2012. Philadelphia currently meets the 2012 annual standard for $PM_{2.5}$.

For 2019, Philadelphia experienced 6 unhealthy AQI days, all from ozone. For 2020, AMS expects the number of unhealthy days from ozone to increase slightly or stay the same due to the more stringent 2015 standard of 70 parts per billion of ozone over eight hours. AMS expects long term trends for ozone to decrease due to regulations that will reduce ozone precursors

Philadelphia is currently in nonattainment for the 2015 8-hour ozone NAAQS. Ozone is a pollutant that is not emitted directly by combustion sources, but forms in the atmosphere in the presence of heat and sunlight as part of a chemical reaction between other pollutants – specifically, oxides of nitrogen and volatile organic compounds. Ozone is very irritating to the lungs and contributes to heart and lung diseases such as asthma.

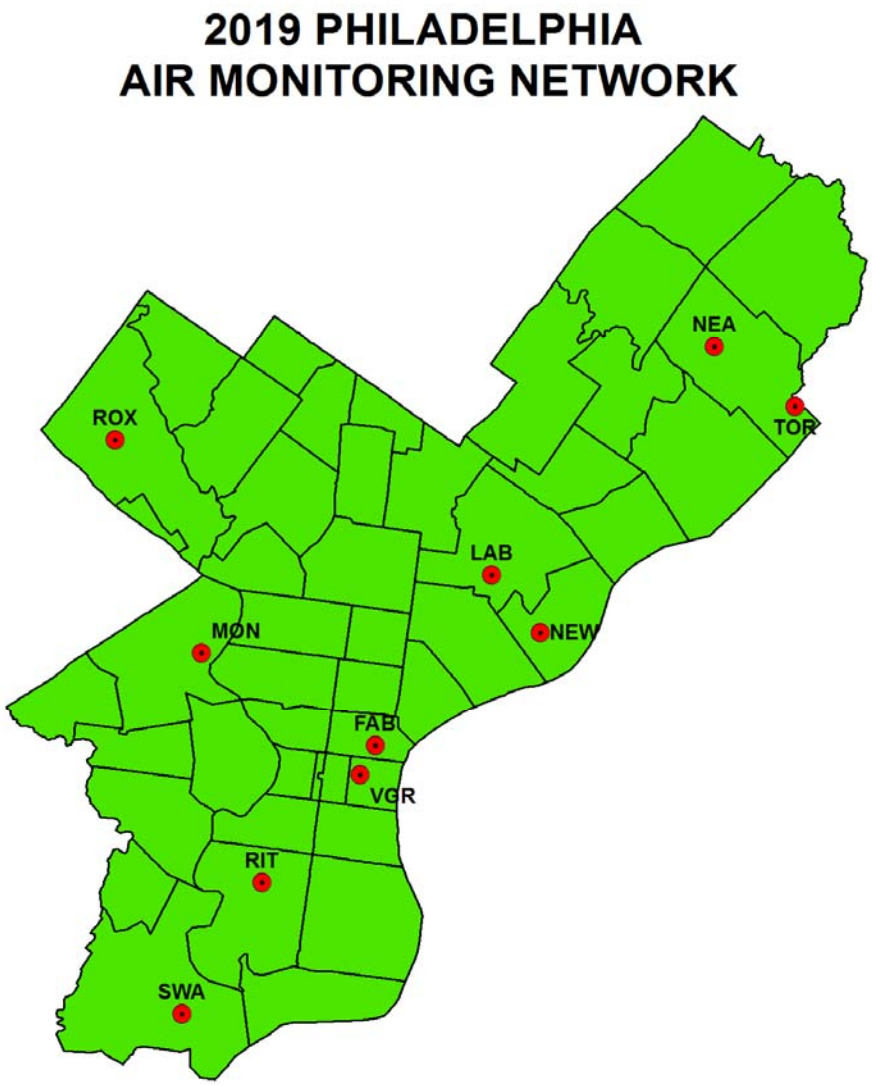


Monitoring Programs

In 2019, AMS operated a network of ten air monitoring sites located throughout the City that measure such parameters as criteria pollutants and air toxics. Eight sites (LAB, NEA, NEW, RIT, FAB, TOR, MON, and VGR) measured a number of criteria pollutants, depending on the

site: ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and particulate matter (PM_{10} and $PM_{2.5}$). These measurements are made in "real time", meaning that the measurements show pollution levels as they occur, instead of after the fact. Four sites (ROX, RIT, SWA, and NEW) also measured toxics through canisters, such as 1,3-butadiene, benzene, and carbon tetrachloride. One site, VGR, measured O_3 and $PM_{2.5}$ as part of a pilot study for research and development, utilizing solar and wind turbine power. The following map shows the location of air monitors and the parameters measured at each monitoring location. AMS measures air quality for several reasons:

- To ensure that long-term goals and targets to reduce levels of air pollution are being met.
- To provide information to the public as to how good or bad the air quality is in Philadelphia.
- To ensure attainment with standards set forth by the United States Environmental Protection Agency.



AMS strives to achieve a 75% or greater data quality capture rate each quarter for each criteria pollutant monitor, per federal requirements in each Appendix in 40 CFR Part 50.

The 2019-2020 Air Monitoring Network Plan for Philadelphia is available at: https://www.phila.gov/media/20190625092419/2019-2020-AMNP-FINAL__20190620.pdf.

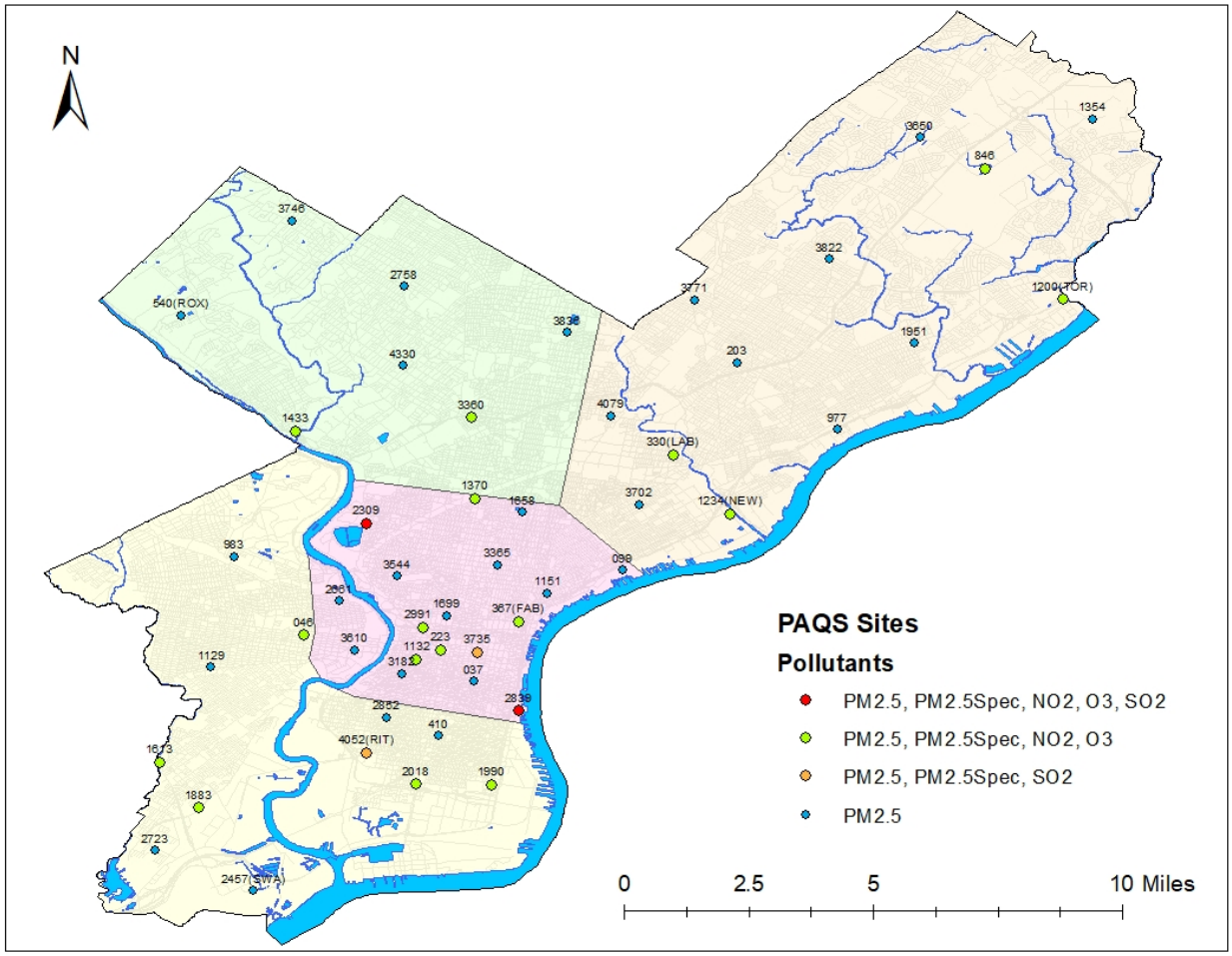
AMS completed its fifth year of monitoring with the Village Green Park Bench Air Pollution Monitoring System at 6th and Arch Streets across from the Constitution Center, measuring $PM_{2.5}$ and ozone, as well as local wind speed, wind direction, temperature, and humidity, utilizing solar and wind turbine power, to increase community awareness of environmental conditions. Additional information about Village Green can be found here: http://www.epa.gov/air-research/village-green-project.

AMS is planning to install air monitoring devices similar to Village Green to measure particulate at the Port and test sensors from SCAQMD's AQ-SPEC Air Quality Sensor Performance Evaluation Center: http://www.aqmd.gov/aq-spec/evaluations. The EPA Office of Research and Development through an EPA Grant (Regional Sustainability and Environmental Sciences Regional Sensor Loan Program) would like to assess the river port.

In 2019, the PAMS start date was extended in a final rulemaking to June 21, 2021 to begin monitoring (no rolling start), giving states two additional years to acquire the necessary equipment and expertise to implement new requirements and get stations up and running by the start of the 2021 PAMS season. In 2019, Philadelphia AMS acquired and is testing all new PAMS equipment including an auto GC, ceilometer, and true NO_2.

In 2018, AMS began a new project called the Philadelphia Air Quality Survey (PAQS). This project aims to set up 50 street level, neighborhood-oriented air sampling sites throughout the City to sample the ambient air for $PM_{2.5}$, NO_2 & SO_2, and O_3. The sites also contain meteorological sensors as well. PAQS capture the seasonal changes and neighborhood-to-neighborhood spatial variances in air quality. At the end of 2019, the PAQS project finished 26 sessions of field operation with each session being a 2-week air sampling period. Each of the 50 sites was monitored once or more during each season (3-month period). Data have been processed and analyzed with the assistance of an expert consultant. For the 12-month period from June 2018 through May 2019, the highest average $PM_{2.5}$ concentration, 10.4 $\mu g/m^3$, occurred at a site in Center City; and the lowest, 6.5 $\mu g/m^3$, at a site in northwest Philly (Roxborough). When comparing 2-week average values, the PAQS data of $PM_{2.5}$, NO_2 and O_3 concentrations track closely with those of FRM/FEM based on collocated samples. Currently AMS is working to compile a project report while continuing the field operation and data analysis.

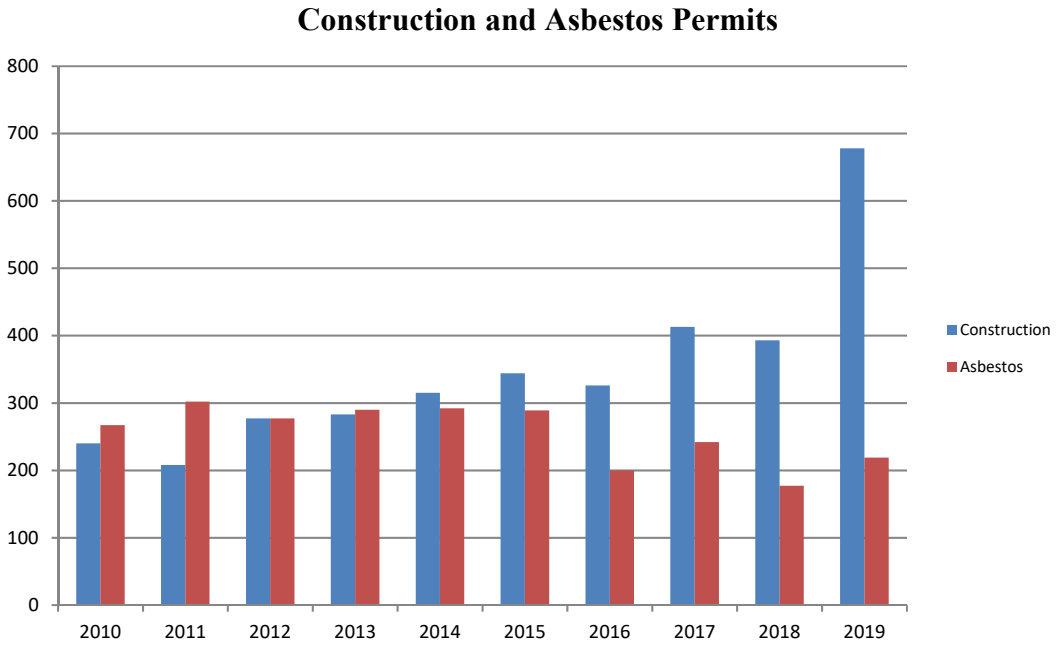
More details about the PAQS project can be found in the 2019-2020 Air Monitoring Network Plan for Philadelphia available at https://www.phila.gov/media/20190625092419/2019-2020-AMNP-FINAL__20190620.pdf.



Permitting Activities

In 2019, AMS issued 678 construction permits and approximately 219 asbestos permits. The large increase in construction permits over previous years is largely due to AMS efforts to find unpermitted sources at non-industrial facilities such as office buildings and schools. Changes to our dust control regulation also required dust control permits for new activities. We expect an increase in 2020 due to the dust control permit requirement for certain construction activities that disturb the ground.

The chart below lists the number of construction permits (installation permits, plan approvals, and general permits) to install or modify sources of air pollution and the number of asbestos abatement permits issued from 2010 to 2019.



Enforcement Activities

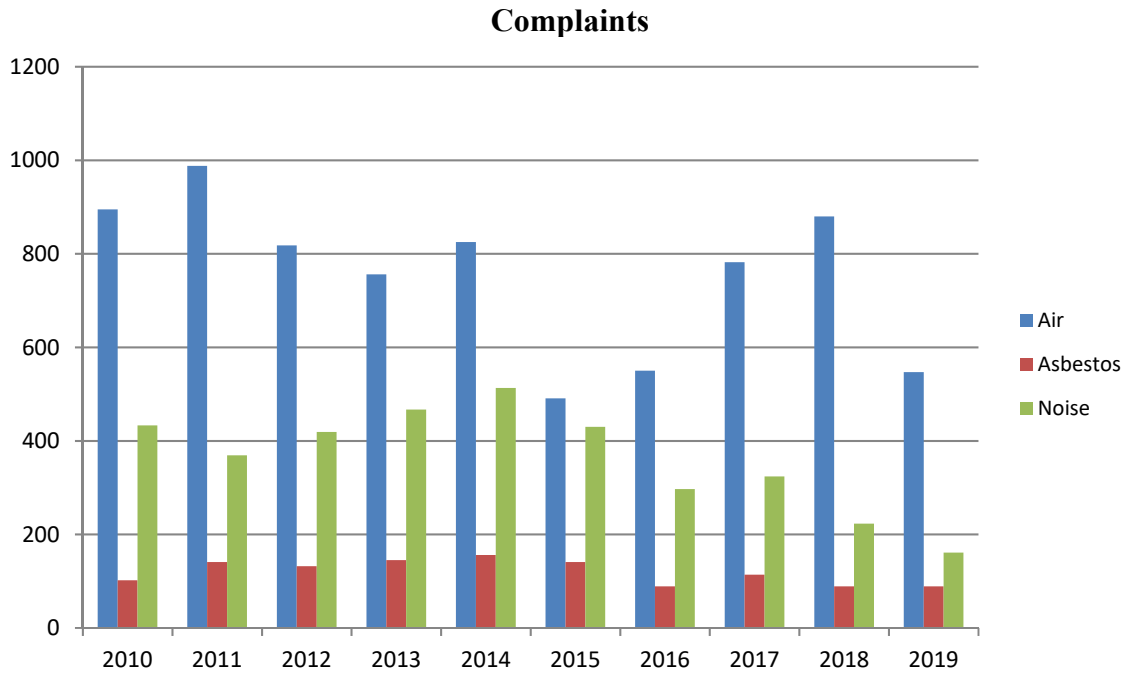
AMS handles citizen complaints, periodic inspections of regulated facilities, and enforces state, local and federal laws related to air quality in City of Philadelphia. In 2019, the enforcement of violations continued to be distributed amongst AMS enforcement staff after the position became vacant early in 2018. AMS is looking to consolidate the work and hire for the enforcement position in 2020. Having additional staff trained in the enforcement process will help if the position become vacant again . On average, violations issued in 2019 are being resolved within our goal of 180 days from the date of issuance. Enforcement is severely strained since three enforcement engineers left AMS in 2019. Violations issued prior to 2019 are being addressed periodically to clear up the backlog.

AMS fully implemented the online cloud based Citizenserve system to monitor and track inspections and enforcement activities for the Asbestos and Facility Compliance and Enforcement units. In 2019 AMS continued to use the enforcement timeline and routing system within Citizenserve to assign and track enforcement activities. In 2020, AMS will continue to make changes to the system to tailor it to specific needs.

In 2020, AMS anticipates the number of inspections and number of violations to increase as a direct result of a staff increase of air pollution control inspectors and filling vacant enforcement engineer positions. The staff increase is needed to inspect new air pollution sources for the newly adopted dust control and parking garage regulations and to increase inspections of unpermitted facilities.

Complaint Response

AMS responds to complaints from the public regarding various nuisance and air pollution issues, such as noise, vibration, odor, smoke, idling vehicles, dust, asbestos, and carbon monoxide. Below is a summary of recent activities:



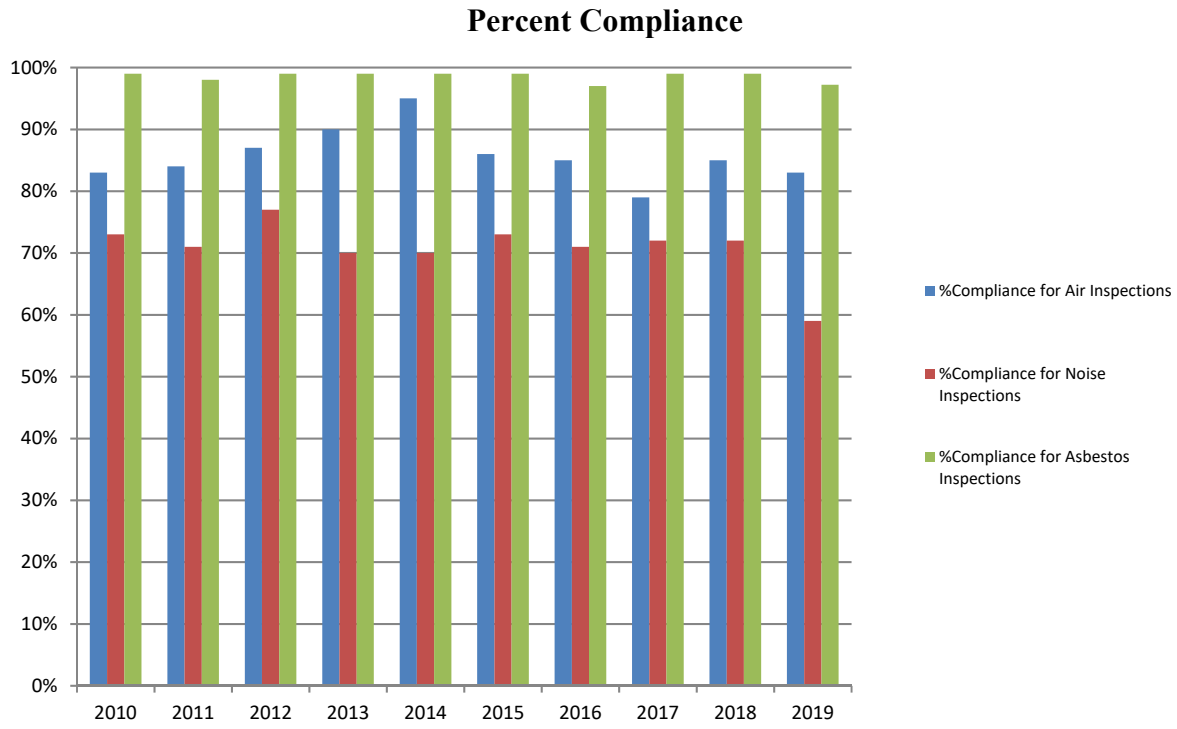
In 2019, there were 89 asbestos complaints, 547 air complaints and 161 noise complaints. As illustrated above, asbestos has tended to stay consistent over time. It is anticipated the total number of asbestos complaints received and serviced will remain consistent on an annual basis. Air and Noise complaints tend to be more variable, and depend on weather and other factors. Complaints are sometimes clustered when there is a significant issue in a particular community, and may decline once that problem is resolved. The decrease in noise complaints in 2019 was due to more monitoring and new violations being corrected in a timely manner. When violations are unresolved, AMS would receive multiple complaints until the case is closed.

Inspection Activities

AMS is supported by a team of well-trained engineers and inspectors who enforce state, local and federal laws related to air quality and noise. They respond to citizen complaints and conduct periodic inspections of regulated facilities. When necessary, they issue Notices of Violation (NOVs) when regulation or permit deviations are observed.

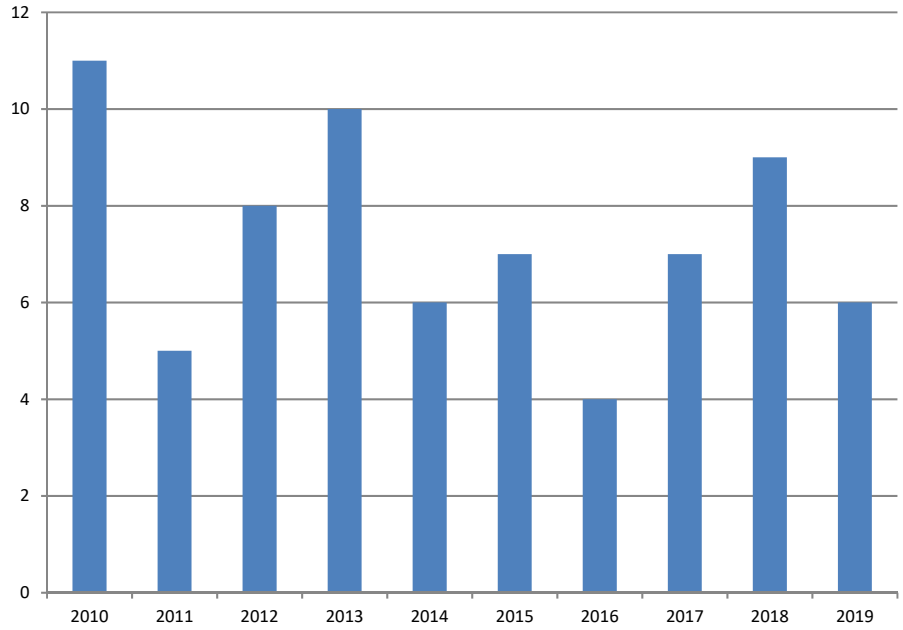
In 2019, 2399 air inspections were conducted resulting in 361 air violations, and 298 noise inspections conducted resulting in 121 violations. The number of air inspections should increase in 2020 due to new sources needing permits to comply with the new dust control, parking garage regulations and more inspections of unpermitted sources. AMS is planning to hire two more

inspectors to address the increased workload. The compliance rate in 2019 for air inspections was 83%, which is the average over the past nine years. The noise compliance rate decreased from around 70% to 59% in 2019 even with the amount of noise complaints decreasing probably due to less complaints about nuisance type of noise. As for noise inspections, the compliance rate is generally lower than air inspections due to the longer time frame to resolve violations, which often involves installing and/or repairing equipment to come into compliance with the restrictions of the Code.



AMS issued 49 asbestos violations as a result of inspecting 2,965 total projects in 2019. The compliance rate is 97.2%, which is relatively consistent with the previous year in Philadelphia. The increase in the number of asbestos violations issued from 2018 to 2019 is a direct result of a focused effort by the asbestos inspectors to inspect properly notified asbestos projects routinely and often in order to bring increased awareness of project vigilance by AMS Asbestos Inspectors. The Asbestos Unit is now fully staffed, and as was anticipated that the total number of asbestos violations resulting from inspections has shown an increase for CY 2019 as a direct result of staff increase.

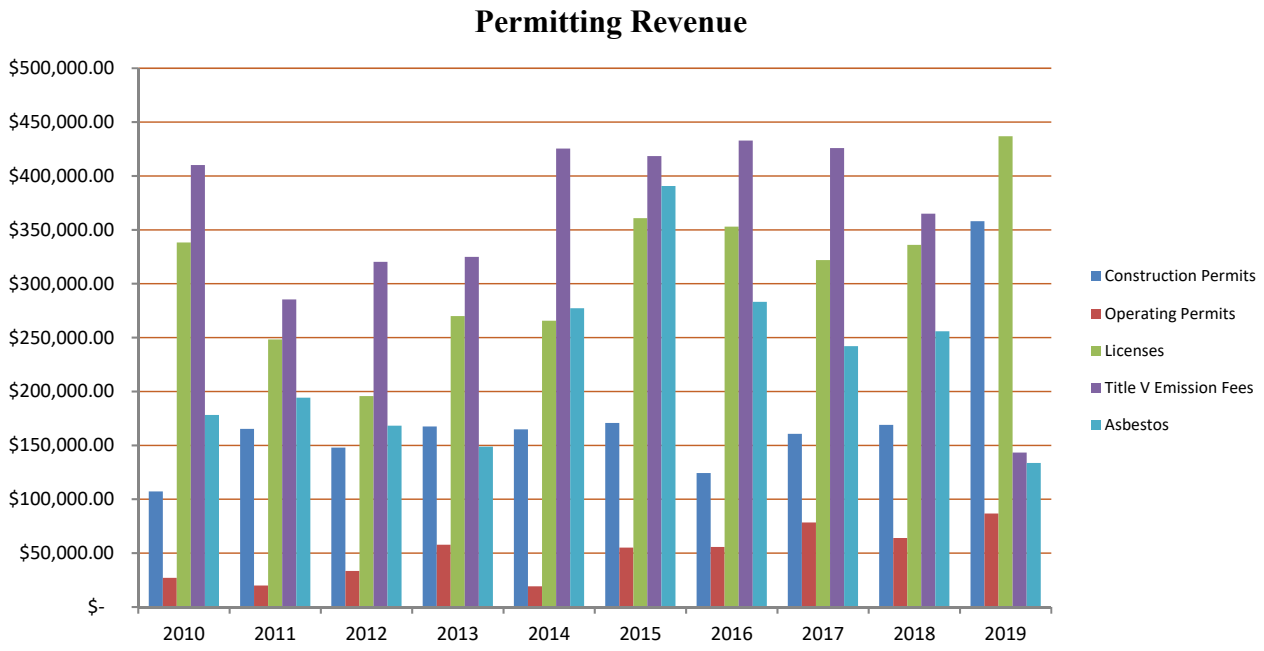
Title V Facilities with Emissions Related Violations



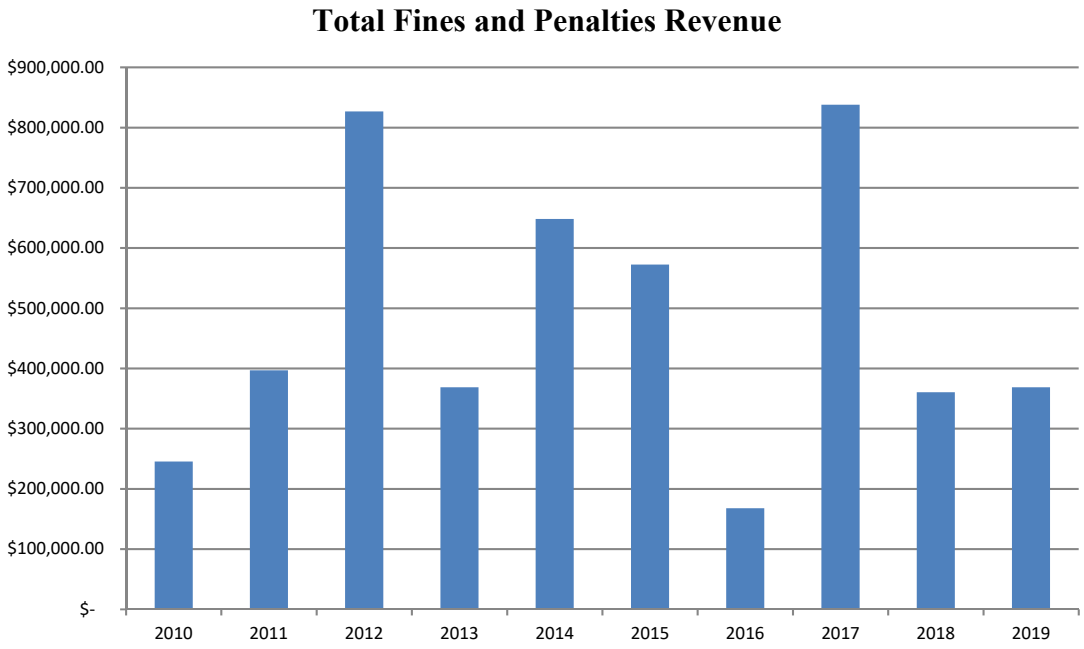
A Title V facility is a major source of pollution that is required to have air quality permits to operate under Title V of the 1990 Federal Clean Air Act Amendments. In 2019, AMS issued emission-related violations to six Title V facilities. The variation from year to year is slight, which is due to a decrease in major emitting facilities and an increase in compliance awareness resulting from thorough inspections.

Revenue Generation

The chart below shows the fees received from construction permits (application fees), operating permits (application and annual administration fees), licenses including asbestos (application and renewal fees, $133,620), and Title V permits (emission fees) in the years 2010-2019. Construction Permit and license fees increased from previous years due to an increase in the number of construction permits and licenses and a 2019 increase in the fees charged for applications under the Air Management Code. Title V emission fees decreased significantly from previous years due to a June 2019 accident at the PES Refinery, which resulted in the cessation of refining operations and bankruptcy filing. PES was unable to pay the emission fees, which are part of the bankruptcy proceedings. PES paid $235,000 in emission fees in 2018. AMS cannot predict the 2020 Title V emission fees due to the uncertainty of the refinery. AMS does not expect a significant change in other fees in 2020.



Below is the sum of fines and penalties revenue collected from 2010 to 2019. In 2019, AMS collected $368,723 in penalties. The penalties were lower in 2019 due to enforcement officer position being vacant. The enforcement of violations are currently distributed amongst enforcement engineers. AMS is planning on consolidating it to one position in the upcoming year.



Philadelphia Energy Solutions Explosion

In the early morning hours of June 21, 2019, a series of explosions occurred at the large refinery site in South Philadelphia. Concerns were raised over what happens beyond the refinery's fenceline, what impacts the refinery has on public health and safety, and what will happen in the future, to the site. Mayor Kenney created a Refinery Advisory Group and a November 2019 report was issued which provides a summary of the information, concerns, and future recommendations. https://www.phila.gov/media/20191202091559/refineryreport12219.pdf

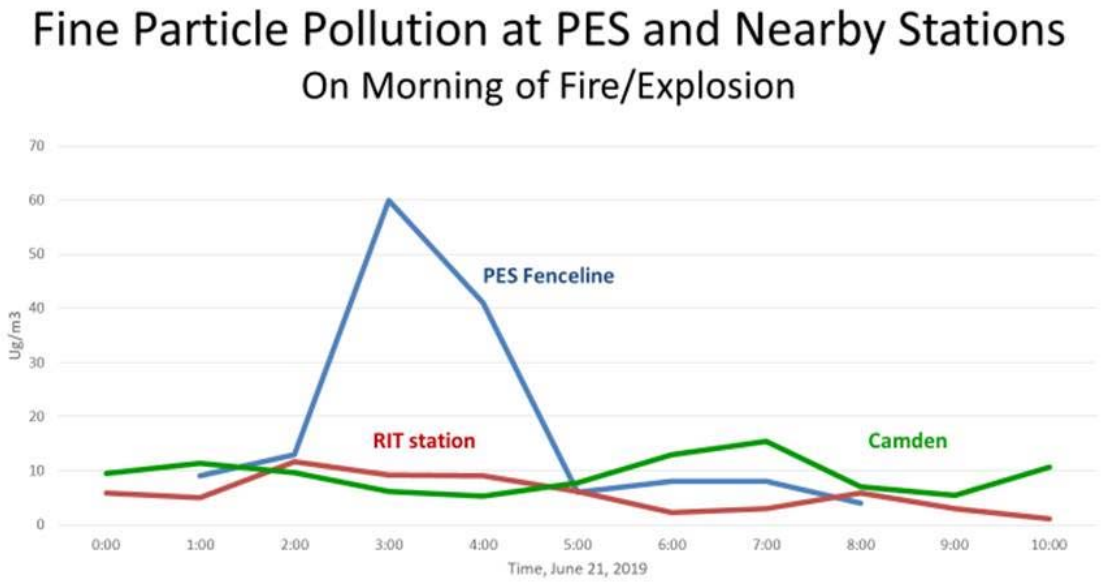
A summary of the air monitoring testing approach by AMS in and around the refinery, demonstrated that there were no health risks in the surrounding neighborhoods from the explosion and fire.

The routine testing of air pollution around the refinery includes:

- Two monitors (upwind and downwind) on the refinery site, operated by the refinery, which measure the following pollutants hourly: fine particles (known as $PM_{2.5}$ and PM_{10}), SO_2, NO_x, H_2S, and volatile organic hydrocarbons. http://pesrm.info/
- One monitor at 24th and Ritner, operated by AMS, which measures $PM_{2.5}$ and SO_2 continuously, and "air toxics" every 6 days.
- Air quality monitors in Camden, NJ.

After the explosion, AMS conducted emergency air quality monitoring using handheld devices at sites near the refinery, using equipment that measures CO, H_2S, O_2, and combustible gases. AMS also took air samples and analyzed them in the air quality laboratory with EPA Method TO-15.

Of all of the testing above, the only test showing a substantial change after the explosion was the downwind monitor on the PES site, which showed a temporary (approximately 2 hour) increase in $PM_{2.5}$ (to a maximum of 60 ug/m^3) and PM_{10} (to a maximum of 84 ug/m^3). The National Ambient Air Quality Standard (NAAQS) is a 24-hour standard and is 35 ug/m^3 for $PM_{2.5}$ and 150 ug/m^3 for PM_{10}, both which were not exceeded.



The neighborhood air monitors did not show significant increases in $PM_{2.5}$ after the explosion. The monitor at 24th and Ritner showed readings below 12 ug/m^3 and the monitor at Camden Spruce street showed readings below 16 ug/m^3 in the hours afterward.

Neither the emergency air quality monitors deployed by AMS nor the air samples taken by AMS showed dangerous levels of air pollutants after the explosion. The Division of Community Health Investigations, Agency for Toxic Substances & Disease Registry (ATSDR)/Centers for Disease Control & Prevention agreed with EPA that the real-time monitored readings for several hours of Lower Explosive Limit (LEL), carbon monoxide (CO), hydrogen sulfide (H_2S, gamma radiation and volatile organic compounds (VOCs) were either non-detect or at background levels.

Testing for Hydrogen Flouride (HF) was performed with 39 monitors operated by PES on the PES site and by testing in the neighborhood by AMS. None showed positive readings for HF. Per the (Interagency Modeling and Atmospheric Assessment Center) IMAAC Modeling, the conclusion was significant HF was unlikely to have crossed the facility perimeter. The Chemical Safety Board (CSB)'s interim animation details the events in the final report released October 16, 2019: https://www.csb.gov/assets/1/6/pes_factual_update_-_final.pdf. The investigation is ongoing. At the conclusion of the investigation, the CSB will publish a final investigation report discussion findings, analysis, and issuing recommendations. AMS also took air samples and analyzed them in the air quality laboratory with EPA Method TO-15 during the HF Neutralization period.

It was determined by all agencies that the contaminants found in the air samples did not indicate a public health concern.

Philadelphia Energy Solutions Benzene Fenceline Monitoring

What happened?

The EPA found that air monitors at the fence line of the PES refinery were reporting levels of benzene above the EPA's "action level," 9 ug/m^3 or ~2.8 parts per billion (ppb) or 0.0028 parts per million (ppm), for the 2018 annual rolling average. In May 2019, they asked PES to perform a Root Cause Analysis and develop a Corrective Action Plan. The City's Air Management Services division was made aware that EPA found concerning levels of benzene at that time. PES delivered the report to EPA and AMS on June 24, 2019, three days after the explosion. The report found that the benzene was likely coming from a number of sources, including PES, other nearby industrial sites, and highway traffic. The AMS air monitors stationed in the community by the PES refinery have not shown dangerously elevated levels of benzene.

ATSDR says that negative health effects from benzene begin between 700 and 3,000 ppm which would be expected to produce immediate adverse health effects (i.e. drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness). The Occupational Safety and Health Administration (OSHA) standard for airborne benzene is 1 ppm for a standard work environment (Time Weighted Average - 8 hours a day; 5 days a week). The annual average concentration found by the fence-line monitors was 0.049 ppm. Benzene levels, as reported by AMS air monitors located in the community, near the refinery, have consistently been well below this level, before, during, and after the June 21, 2019 fire.

While the fence-line monitors picked up benzene levels above the 9 ug/m^3 EPA action level, this is not a measure of health risk to the public. According to the EPA: "The fence-line monitors are not intended to provide a measure of benzene levels in the community. There is no correlation between the benzene action level and any health-based benzene or other hazardous air pollutant exposure standard. The benzene action level does not correlate to a benzene emissions level that presents a risk to the public."

To put this into perspective, ATSDR indicates typical background levels would be anywhere between 0.02 - 34 ppb or 0.00002 - 034 ppm, with benzene levels skewing toward the higher end of the range in urban environments.

What is the City doing to reduce the public's exposure to benzene?

The PES fence line monitors have continued to monitor the air. As of the last reported data from September 30, 2019, benzene levels have been dropping since the refinery stopped operations. The last data point showed benzene levels below EPAs "action level." The City continues to work with EPA and PES to ensure that the refinery is wound down safely. The AMS has, and will continue to monitor benzene levels in the air and will issue alerts in the case that dangerously elevated amounts of a chemical are found in the community.

There was no evidence that benzene levels in the community posed a threat to public health. When the City received the report from PES, the refinery had ceased operation and it was expected that benzene levels would drop below the action level. Moreover, testing by AMS

monitors did not show dangerous levels of benzene in the community. There was no known threat to the public health.

Based on the benzene fenceline requirement, if the action level is above 9 ug/m^3 then PES is required to submit a "root cause analysis" (see Appendix A) and an "action plan." PES submitted the action plan on June 24, 2019 after three days of refinery explosion which was on June 24, 2019. They submitted on time (within 45-50 days of the final report which was in May 2019).

Below is EPA about Benzene fenceline monitors:

> How the Fenceline Monitoring Data Should Not Be Used
>
> The benzene action level is not an ambient air standard. The fenceline monitors are not intended to provide a measure of benzene levels in the community. There is no correlation between the benzene action level and any health-based benzene or other hazardous air pollutant exposure standard. The benzene action level does not correlate to a benzene emissions level that presents a risk to the public. EPA did not establish the fenceline monitoring program as a risk reduction step under the Clean Air Act section 112(f)(2). Rather, the fenceline monitoring requirements are a development of practices that will provide additional information on the status of emission sources for refineries and the public. It is also important to note that the fenceline monitoring program is not an appropriate tool for monitoring and assessing emergency releases since the data from the monitors are not immediately available.
>
> The fenceline monitors are not limited to measuring emissions from only refineries. The passive diffusive tubes may collect benzene from nearby sources that refineries do not manage, such as neighboring facilities, roadways, airports, marine ports, and from environmental events (e.g., smoke from forest fires). External emissions sources may contribute to elevated background readings that are measured by a refinery's fenceline monitors. Consequently, while this monitoring program is a reasonable means for a refinery to oversee its emission sources, there may be situations where the monitors identify benzene emissions that do not originate from the refinery.
>
> The Benzene Action Level
>
> The benzene action level is 9 micrograms per cubic meter (ug/m^3) for the rolling annual average Δc. Exceeding the benzene action level is not a violation of the Refinery MACT CC regulation. Rather, exceeding the action level requires the refinery to perform a root cause and corrective action analysis. While the data from an individual monitor for any 2-week sampling period may be above 9 ug/m^3 or an individual sampling period Δc value may be above 9 ug/m^3, the root cause and corrective action analysis is only required when the rolling annual average Δc is above 9 ug/m^3. It is important to note that an individual elevated value from a monitor may be the result of an upset event in the refinery, but it could also be related to a process change maintenance activity or an intermittent emission from a source external to the refinery, as discussed above. The

fenceline monitoring program recognizes these possibilities and provides a mechanism to identify and address these situations.

Because the rolling annual average Δc is based on the sample results from 26 individual 2-week sample periods, the rolling annual average Δc may remain above the benzene action level even after the root cause of the action level exceedance has been addressed. In other words, one elevated sampling period Δc value may continue to affect the rolling annual average Δc for subsequent sampling periods. This does not mean the emission source that contributed to the higher Δc value is continuing, but rather that the high Δc value may impact the rolling annual average Δc for an additional 25 sampling periods (until the high Δc value is no longer used in calculating the rolling annual average Δc).

Conclusion

AMS has implemented its agency-wide Strategic Plan to review its operations for improving air quality and reducing the impact of nuisances while promoting sustainability and job creation as well as outreach and education on air quality issues. It has been focused on finding ways to allow permit and license applicants to submit forms and pay fees online, investigating ways to improve staff training and exploring ways to connect more closely to the public as well as partners such as universities and nonprofits. In addition, AMS has been working to educate the public about the importance of air quality. These are the major AMS accomplishments in 2019:

- The Asbestos, Source Registration, and Facilities Compliances & Enforcement sections continue to utilize a cloud based permit, license, and enforcement system. The system allows the online submission of asbestos notifications, license applications, and fees. It also allowed inspectors to use tablet computers in the field to document their inspections.
- AMS completed the Philadelphia Air Quality Survey first round air monitoring data collection from 50 locations analysis, now in the stage of finalizing the report to make it available to the public
- Banning of heavy fuel oils were effective on Dec 4, 2019. No heavy fuels will be sell or stored or used in Philadelphia starting from April 1st, 2020
- AMS got around $200,000 from the General Fund to hire three engineers and two inspectors
- Sent letters to a minimum of 200 garages; planned to issue licenses and inspect a minimum of 200 garages that causes the emission of carbon monoxide, nitrogen dioxide, and other toxics to protect the public health.
- Issued Temporary Installation Permits (IPs) for minor sources and started analysis for emission controls for major sources (greater or equal to 10 tons of Methyl Bromide/year) of fumigation at the port.

AMS will continue to gear its work in the future providing outreach to affected populations that may experience adverse human health effects from air emissions. This will include building relationships with the University of Pennsylvania, Drexel University, and community groups.

Appendix A: PES Root Cause Analysis

Benzene Fenceline Root Cause Analysis and Corrective Action Plan

Date of Report:	1) June 11, 2019	

Description:

The Philadelphia Energy Solutions Refining and Marketing LLC (PES) Philadelphia Refinery ΔC for benzene fenceline is above the EPA action level of 9 $\mu g/m^3$.

Root Cause:

Below are the stations that had caused the action level of 9 $\mu g/m^3$ to be exceeded along with their nearby sources.

1) Station 14: this station has multiple nearby sources as shown below:

   a) #2 Separator and associated equipment: used to separate oil and solids from the incoming refinery and chemical unit process wastewater. The separator is covered, sealed, and vented through carbon canisters. Oil skimmed from the separator is stored in an adjacent 42,000-gallon tank before being transferred for reprocessing in the crude unit. Wastewater effluent from the separator is pumped into an adjacent 420,0000-gallon external floating roof tank before being sent to the Wastewater Treatment Plant.

   b) An offsite release of gasoline to the soil and into the Schuylkill River from a third-party petroleum terminal to the west of the Refinery on the other side of the River. Ongoing soil and groundwater remediation activities have also contributed to benzene in air.

2) Station 16: this station has multiple nearby sources as shown below:

   a) #4 Separator and associated equipment: used to separate oil and solids from the incoming wastewater plant. The separator is covered, sealed, and vented through carbon canisters. Wastewater effluent from the separator is pumped into an adjacent 336,0000-gallon external floating roof tank before being sent to the Wastewater Treatment Plant.

   b) Skimmed Oil tanks: Oil from the #4 separator is transferred to two adjacent 21,000-gallon tanks using manually operated pumps. Emissions from the tanks during transfer of oil is piped back to the separator. Oil from these tanks is removed by vacuum truck for reprocessing in the crude unit.

   c) The offsite source mentioned for Station 14 above although further away, likely also contributed to benzene levels at Station 16.

3) Stations 7/8:

a) A nearby source to those two stations are four benzene aboveground storage tanks and a benzene railcar unloading area.

4) Station 13:

a) A nearby source to this station is an offsite release adjacent to and into the Schuylkill River as described for Station 14 above.

5) Station 33:

a) A nearby source to this station is an offsite release adjacent to and into the Schuylkill River as described for Station 14 above.

Action taken to reduce benzene levels

1) Station 14:

a) 2 Separator:

i. Operators were retrained with emphasis on conducting dedicated inspections to ensure the separator cover hatches are being kept closed and latched.
ii. Additional VOC monitoring above the required quarterly BWON was performed starting in early 2018. Additional monitoring includes determining benzene concentrations with a hand held PID monitor (Ultra-RAE with benzene tube) twice per week and checking for VOC leaks using the FLIR infrared camera once per week. A new PID (Tiger Select with benzene tube) was purchased and benzene monitoring using this PID was initiated in February 2019. The Tiger Select can detect benzene at lower concentrations (ppb vs. ppm).
iii. Seal repairs of the separators covers are now being completed more frequently based on the weekly results of the FLIR camera and the PID Tiger Select monitor. In 2017 through early 2019, over $400,000 was spent on repairs for separator covers (2 separator and 4 separator combined). These included replacing packing and caulking, and asphalt sealing around the separator wall at the soil surface.
iv. Additional Separator effluent sampling for benzene was initiated in June 2018. Samples are collected three times a week to look for changes in wastewater benzene concentrations. Further upstream sampling is performed, as necessary, to identify the source of the benzene
v. Additional monitoring stations were installed within the refinery, closer to source areas, to assist in understanding possible benzene sources impacting the fenceline. These samples are collected on a weekly frequency instead of a biweekly frequency to better identify the time period of benzene emissions.
vi. In April 2019, the sewer lid upstream of the 2 separator was replaced with a new concrete air sealed lid for a better sealing system. Soils were excavated around the

sewer box and associated piping to inspect it for leaks. No visible leaks were observed and the area was backfilled with flowable fill.

vii. A meeting was held with the neighboring terminal to discuss methods they could use to reduce benzene emissions associated with their remediation activities.

2) Station 16:

a) 4 Separator:

i. Operators were retrained with emphasis on conducting dedicated inspections to ensure the separator cover hatches are being kept closed and latched.

ii. Additional VOC monitoring above the required quarterly BWON was performed starting in early 2018. Additional monitoring determining benzene concentrations with a hand held PID monitor (Ultra-RAE with benzene tube) twice per week and checking for VOC leaks using the FLIR camera once per week. A new PID (Tiger Select with benzene tube) was purchased and monitoring using this PID was initiated in February 2019. The Tiger Select can detect benzene at lower concentrations (ppb vs. ppm).

iii. Seal repairs of the separators covers are now being completed more frequently based on the weekly results of the FLIR camera and the PID monitor. In 2017 through early 2019, over $400,000 was spent on repairs and improvements for separator covers (2 separator and 4 separator combined). These included replacing packing and caulking, and asphalt sealing around the separator wall at the soil surface.

iv. An analysis of the carbon canister system was completed in 2018 to ensure that the flow from the separator is going through the carbon canisters. Carbon was replaced prior to breakthrough to minimize possible backpressure from older or wetter carbon.

v. Additional Separator effluent sampling for benzene was initiated in June 2018. Samples are collected three times a week to look for changes in wastewater benzene concentrations. Further upstream sampling is performed, as necessary, to identify the source of the benzene.

vi. Additional monitoring stations were installed within the refinery, closer to source areas, to assist in understanding possible benzene sources impacting the fenceline. These samples are collected on a weekly frequency instead of a biweekly frequency to better identify the time period of benzene emissions.

vii. PES recoated the separator cover with a new sealant on May 31, 2019. This should reduce benzene emissions from the concrete cover from non-visible minor cracks. (Any visible cracks are routinely sealed.)

b) Skimmed Oil tanks:

i. Operators were retrained to ensure hatches are closed and latched.
ii. One of the Tanks was replaced in 2018.
iii. Like for the separator, weekly monitoring using the FLIR camera and ultra- Rae to identify leak points for repair was initiated in late 2017.
iv. Starting in mid-2018, a scrubber system has been used on the vacuum truck exhaust when emptying the tanks.

3) Stations 7/8:

i. An engineering analysis was completed on each of the benzene tanks venting system to ensure that there are no extra vents present. It was determined that one tank had extra vents. Sealing of the extra vents was completed.
ii. An inspection of the tank secondary seals was completed for each of those tanks to ensure that that there are no gaps that could cause benzene emissions. No inspection deficiencies were found.
iii. The benzene tanks and benzene unloading operations are part of non-refinery operations and therefore not sources to be controlled for benzene fenceline monitoring required by 40 CFR Part 63 Subpart CC. As discussed in more detail below, PES submitted a request to EPA and AMS for approval of a Site-Specific Monitoring Plan that would adjust the fenceline results from emissions that are caused by these non-refinery operations sources.

4) Station 13:

i. Installed AIHR sharks to determine the benzene source that caused a significant increase in benzene levels in the fourth quarter of 2018.
ii. Shark results clearly indicated that the source of the significantly higher benzene levels was from the remediation activities at the nearby petroleum terminal. PES had a meeting with the terminal company environmental management to discuss ongoing remediation activities and potential controls.

5) Station 33:

i. Installed AIHR sharks to determine the benzene source that caused a significant increase in benzene levels in the fourth quarter of 2018.
ii. See ii above for Station 13.

Along with the actions discussed above, PES submitted a site specific fenceline monitoring plan in March 2019 per Title 40 of the Code of Federal Regulations (CFR) Part 63, Subpart CC (MACT CC). Per 40 CFR §63.658(i), an owner or operation requires approval for a site-specific monitoring plan to account for offsite or onsite sources excluded under §63.640(g). The PES Refinery has non-MACT CC applicable onsite sources and offsite sources contributing to fenceline benzene concentrations; therefore, a site-specific monitoring plan was prepared in accordance with the requirements of 40 CFR §63.658.

Path forward:

i. Continue the additional sampling and inspection frequencies in the 2/4 separator areas and vacuum truck controls
ii. Continue to have discussions with the neighboring facility to discuss remediation activities and potential controls.
iii. Continue with inspection and repairs for inlet piping at the 2 separator.

Approval Section		
Name/Title	**Signature**	**Date**
Janet Ferris **Environmental Manager**	Janet Ferris	6/11/19
James Demes **Executive Director, Maintenance**	J. V. Demes	6/11/19
Michael Reed **Executive Director, Operation**	Michael J Reed	6/13/19