



August 27, 2019

Good Afternoon. I am Dr. Marilyn Howarth, an Occupational and Environmental Medicine physician and Director of Community Engagement at the Center of Excellence in Environmental Toxicology at the Perelman School of Medicine at the University of Pennsylvania. The Center of Excellence in Environmental Toxicology would like to thank the Environment Committee of the Refinery Advisory Group for the opportunity to submit this testimony regarding the environmental health impacts of PES refinery, refinery fire, its shutdown and potential reuse of the site.

The Center of Excellence in Environmental Toxicology (CEET) is the University of Pennsylvania's P30 Environmental Health Sciences Core Center (EHSCC) funded by the National Institute of Environmental Health Science (NIEHS). It is the only EHSCC in Pennsylvania and the only one in EPA Region III. The environmental health researchers, physicians and public health professionals of the CEET work every day on environmental health issues that affect our region and recognize the value of scientific evidence to establish and maintain public policy protective of human health.

To appreciate the impact of the PES refinery on the health of Philadelphia residents requires background on the health outcomes that are relevant to its emissions and releases. The National Cancer Institute estimates that Philadelphia has the highest cancer rate of any large city in the US. 541 people in every one hundred thousand in Philadelphia will get cancer compared with 442 in the US (NCI) and 494 in PA (PA County Health Profile). In Philadelphia, the rates of cancer are higher than Pennsylvania rates in colon and rectal cancer, lung cancer, kidney cancer and prostate cancer. Several of these cancers are caused by environmental exposures. The refinery pollutant benzene is linked to leukemia and kidney cancer and particulates are linked to lung cancer. The World Health Organization, International Agency for Research on Cancer has listed air pollution as a known Group 1 human carcinogen and estimates that this contributes to 230,000 new lung cancer cases per year.

Asthma hospitalization rates are three times higher in Philadelphia than Pennsylvania according to the Pennsylvania Department of Health. So too are Philadelphia's rates of hospitalization for heart attacks and chronic obstructive pulmonary disease. All of these significant health disparities occur in a city whose medical care is considered to be among the best in the country. Certainly, there are many contributors to each of these health outcomes however, the volatile organic compounds emanating from a refinery over years and particulates that were visible in the sky during fires significantly increase the exposure to hazardous air pollutants to residents of Philadelphia and the environs.

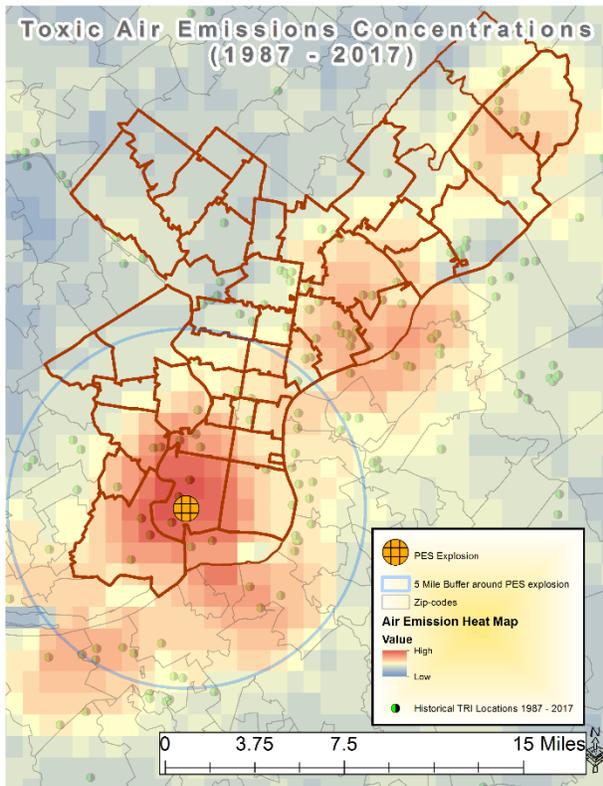


Fig 1: Toxic Air Emissions in Philadelphia  
source: EPA Toxic Release Inventory

The PES refinery is the largest emitter of volatile organic chemicals in the region (NEI,2014). More than four hundred thousand pounds of hazardous chemicals are emitted into the Philadelphia air every year according to the EPA’s Toxic Release Inventory from the PES refinery. More than 10% of the emissions are carcinogens or pre-carcinogens changed into carcinogens in the body. Figure 1 shows the toxic air emission concentrations from point sources in Philadelphia. The refinery stands out as the largest emitter impacting the surrounding neighborhoods. In 1999, a health assessment conducted for the EPA found that lung cancer incidence in the proximity of the refinery was 40% higher than the national average. Knowing that a latency period of more than 20 years exists between exposures and cancer onset indicates that we cannot be complacent about any recent gains in air quality.

In addition, since the passage of the Federal Clean Air Act in 1970, Philadelphia has never been in compliance with it for Ozone. Ozone is a criteria air pollutant formed in the atmosphere when volatile organic compounds and nitrogen oxides react in the presence of sunlight. Ozone is a potent irritant that causes asthma and leads to asthma exacerbations in people who have asthma. In addition, as little as one to two hours of elevated levels of ozone exposure increases heart attack rates and heart rhythm disturbances that lead to sudden death. According to the PA DEP, the PES refinery was out of compliance with its permits for each of the last 12 quarters. That means for the last 3 years, it was never meeting its permits, spewing unauthorized contaminants in the air for residents to breathe. Given the size of the large refinery complex, its significant health impacting emissions and the close proximity to millions of Philadelphia residents, we conclude that permits for this type of industry in this location would not be granted in the future.

The recent fires at the PES refinery have led to many questions about the preparedness of Philadelphia Air Management (AMS) to quickly identify airborne hazards and adequately protect people. On-site monitoring systems should always provide the initial data on releases including those from a fire. However, immediate community level

monitoring should be in place in particular when the emissions could have catastrophic health consequences. In the case of the PES refinery, pre-planning should have identified hydrofluoric acid (HF) as a potential hazardous emission and community level monitoring should have been immediately set up for this deadly chemical known to travel for several miles from the emission source (Dayal, 1992). Even if the on-site monitoring did not show elevated levels, reliance on those monitors alone is not adequate to protect public health because the situation changes quickly in a fire and explosion scenario. Also, monitors can be damaged or destroyed as they were in this case (personal communication EPA). AMS used hand held HF monitors in the first hours after the explosion and fire which occurred at around 4 AM. When AMS monitors in a nearby neighborhood detected elevated levels of HF the EPA was asked to provide confirmation but this did not occur until 10 AM by which time HF may have been long gone. Had there been a substantial HF leak, many residents would have been exposed leading to permanent lung damage and possibly death as have occurred in several other refinery HF leaks in the US (Horton,2004). An example of the effects of an air borne leak of HF can be seen in an industrial accident in Texas in 1987. In that case 24,000 kg of HF were released into the air leading almost 1,000 of the 41,000 residents to seek medical care. 94 were hospitalized with respiratory illness, some with long-term symptoms. The air levels of HF one hour after the leak were 10 ppm and 'minimal' at two hours. In Philadelphia, the PES refinery is reported to have 190,000 kg of HF on site, almost 8 times what was released in Texas (Dayal, 1992). The implications for release of even half of PES's HF would be catastrophic.

Philadelphia has stationary real-time monitors deployed for purposes of regional air monitoring to determine compliance with the Clean Air Act, none of these monitors detected elevated levels of chemicals while residents smelled acrid odors and saw black clouds of smoke for hours. Dr. Peter DeCarlo, Associate Professor of Civil, Architectural and Environmental Engineering at Drexel University and a researcher at our Center of Excellence in Environmental Toxicology at the University of Pennsylvania has analyzed air monitoring data and modeled air flow and documented the inadequacy of the current response and the false reassurance given to the public based on inadequate monitoring. I refer you to his written document where graphs and maps delineate the problems. Hopefully, the lesson learned is that the existing monitoring system should not be assumed to be appropriately placed when considering the rapid deployment of monitoring to protect people. In addition, refineries around the country are using safer alternatives to hydrofluoric acid and we strongly recommend that hydrofluoric acid not be permitted for use within Philadelphia given its dense population in the future.

The closure of the refinery alone, should substantially improve the ozone levels in Philadelphia leading to improved regional compliance with the Clean Air Act and reduced asthma hospitalizations and heart attacks. There are many other air pollution emitters in Philadelphia and the effects on people of these emissions are cumulative. In

other words, the relatively small emissions of multiple pollutants are experienced by people as much greater cumulative exposure that continually bombards the lungs, heart and other organ systems. Regulators of air pollution sources do not currently have an effective quantitative process for establishing individual permit limits that consider the cumulative impact on the population of the multiple sources of air emissions in cities where many are permits are requested. The regulatory process considers each permit in isolation determining how much of each pollutant that source can add to the air. On the face of it, the process seems like the fairest approach. However, it is ultimately unfair to the residents of the city when each additional exposure allowed by each new permit issued increases the health risk. In fact, this process is not in keeping with the environmental rights amendment of the PA constitution Article 1 Section 27 that guarantees each Pennsylvanian the right to clean air, pure water and the preservation of the natural scenic historic and aesthetic values of the environment. Understanding that Philadelphians are not well protected by the current regulatory process should help guide the future use of the PES refinery property. Replacing the refinery with a similarly polluting industrial process will pose substantial health risks to Philadelphia residents. We understand that an economic driver is to preserve jobs but there is another economic driver which is the cost of providing health care for chronic illness and lost days at work or school due to that illness. These associated costs also affect the most vulnerable, our children and the elderly.

Legacy pollution at the PES refinery location must be considered in the plans for future use for the site and potential for ongoing health impacts to people. The site is in the midst of a PA Act 2 remediation with clean-up levels clearly in the industrial re-use range. The Philadelphia community has not been involved in the evaluation of the remediation plans or the establishment of clean-up levels as required by Act 2. Perhaps this is why the established clean-up levels are extremely high. The soil and ground water contamination that exists throughout the property is believed to have occurred mostly in the more than 100 years of the refinery's operation prior to Federal and State environmental regulation. During that time period, it is estimated that up to 53,000 barrels of gasoline each month was lost into the soil and ground water due to leaking and spills (Quivik,2015). The contaminated soil abuts the hard shore bulkhead (DEP internal memo 3/22/19) at the Schuylkill River, a main source of drinking water for Philadelphia. The ground water has not been a source for drinking water for Philadelphia but the deeper aquifer is a drinking water source for NJ. Recent data for the deeper aquifer has not been published on the Act 2 site as required by the DEP, so it remains unclear what the current risk to NJ drinking water supplies is (Final Report AOI 11, 6/21/13). This widespread contamination would certainly meet criteria for a Superfund site but the EPA and PA DEP allow for the remediation to proceed under a hybrid process where EPA determines RCRA and CERCLA compliance while the DEP determines state regulatory compliance under Act 2. Sunoco, the responsible party, has decided that they will pursue a site-specific clean up option rather than the stricter background standards or state-wide health standards. The selection of site-specific

clean-up standards ensures that this property would not be safe for use for anything other than industrial purposes. This would be a permanently lost opportunity for the 1,400 acre land mass in the City of Philadelphia. A good example of how settling for site-specific standards could impact health is found in their site-specific standard for lead. The EPA has determined that a safe level of lead for bare soil in a child's play area is 400 ppm while at the same time the EPA accepted a site-specific standard for PES refinery clean-up of 2240 ppm. Ironically, on the same day as the PES refinery fire, the EPA came to Philadelphia to announce that based on the evolving data of the harm of extremely small amounts of lead they were lowering the acceptable house dust and window sill levels of lead to better protect children. We know that 50% of house dust occurs from tracked soil from the outside. Tracked in soil containing 2240 ppm lead could easily exceed the 10 mcg/ft<sup>2</sup> on floors. This is just one of the hazardous chemicals known to be contaminating the soil and ground water at the PES site. Vapor intrusion studies in buildings on the site have found levels of carcinogens in the air above state-wide health standards (DEP memo 3/22/19). If the current site-specific standards are kept in place this property will be so restricted that few industries would be willing to work there because any soil disruption would pose an unacceptable risk to human health. By allowing the site-specific standards to remain in place, any future remediation beyond these standards would be the responsibility of the Commonwealth since the responsible party would have been deemed to have met their obligation.

In summary, researchers, medical doctors and public health professionals at the Center of Excellence in Environmental Toxicology are very concerned about the large-scale contribution of PES refinery emissions to cancer, lung and heart disease in Philadelphia residents. We hope that recognition of these significant health impacts informs decisions regarding the use of this property. We are concerned about the ineffectual monitoring in neighborhoods during the fire at the PES refinery that could have led to serious public health impacts given the current response plan for monitoring the air. We recommend that decisions that have established clean-up levels at the property committing it to industrial use for the foreseeable future be re-considered because the proximity of large-scale industry in proximity to densely populated Philadelphia neighborhoods may pose undo risk to public health. We also strongly recommend that the City insist that public participation by residents in this process be enhanced as the remediation plans are developed. We would gladly bring scientific expertise and join community members to allow for improved public engagement. Thank you for your attention and for the opportunity to submit these comments.



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Final Report AOI 11 PES Refining and Marketing LLC Facility Philadelphia, Pennsylvania. prepared by Langan Engineering & Environmental Services, Inc. June 21, 2013

PA DEP Air Permit Compliance: <https://echo.epa.gov/facilities/facility-search/results>