

TO: Environmental Committee of the Refinery Advisory Group

FROM: Andrea Welker, PhD, PE, ENV SP

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RE: Philadelphia Energy Solutions Site

I am pleased to offer my comments related to the water quality challenges at the Philadelphia Energy Solutions Site with a focus on stormwater, climate change impacts, and the aquifer.

I reviewed the following materials in developing this commentary:

- <https://www.epa.gov/hwcorrectiveactionsites/hazardous-waste-cleanup-sunoco-point-breeze-refinery-and-marketing>
- <https://www.phila.gov/programs/refinery-advisory-group/>

The site is located near two major waterways: The Schuylkill River and the Delaware River. Its location is ideal from a manufacturing standpoint since the water provides easy access for shipping. The site has been in use since the mid 1800's. Stringent environmental controls were not in place during the early years of the facilities' use. There are now three major contaminants at the site: hydrofluoric acid, lead, and light nonaqueous phase liquids (LNAPLs).

The hydrofluoric acid is the most recent, pressing problem, since the release was a result of the fire. The hydrofluoric acid is currently being remediated.

Although lead is a serious contaminant, it is not a very mobile contaminant, so I will not address this here.

The groundwater table is close to the surface with the depth to the water table varying between 1.5 feet to 30 feet below the ground surface. Since the Delaware is tidal, it likely that daily fluctuations in the water table will occur.

As expected for a site that has processed hydrocarbons for more than 150 years, light nonaqueous phase liquids (or LNAPLs) are the major contaminant. LNAPLs float on top of water, just like oil floats on top of vinegar in salad dressing. Since LNAPLs remain on top of the water table, they are more easily treatable than dense nonaqueous phase liquids (DNAPLs) that are heavier than water. The EPA documents describe an extensive remediation program. Sunoco is currently treating the site using common and effective methods such as pump and treat, vapor recovery, and passive systems.

Infiltration should be minimized on the site to prevent further contamination. Recommended stormwater controls would include lined constructed wetlands or ponds with slow release mechanisms.

Given the proximity of the site to nearby waterways, this site is vulnerable to climate change impacts. Flooding should be thoroughly considered for any future use.

Considering its long industrial use, the site would be best utilized for future industrial purposes. The remediation/containment activities at the site should continue and contact with the soil should be minimized (e.g. not an ideal location for homes, playgrounds, schools, etc).