



**pennsylvania**

DEPARTMENT OF ENVIRONMENTAL PROTECTION

Bureau of Environmental Cleanup & Brownfields



# **Cleanup of the Philadelphia Refinery**

City of Philadelphia Refinery Advisory Group  
Environmental and Academic Committee Meeting  
August 27, 2019

# Outline

- Regulatory cleanup programs
- Refinery regulatory history under DEP
- Overview of the Act 2 cleanup
- Current status and future activities
- Key cleanup issues

# Scope

- DEP's mission is to protect human health and the environment; we do not control land use
- "Cleanup" here refers to contamination in soil, groundwater, and surface water
- The cleanup addresses the primary risk drivers but not every contaminant present at the site
- The law does not require a cleanup to conditions before there was a refinery

## Regulatory Cleanup Programs

# Regulatory Cleanup Programs

## DEP's Land Recycling Program (Act 2 of 1995)

- Encourage cleanup of properties to return them to productive use (i.e., brownfields)
- A “voluntary” cleanup program
- Remediator chooses cleanup standard and property use
- Remediator obtains liability protection

# Regulatory Cleanup Programs

## Land Recycling Program—Standards

- Statewide health standard
  - Defined cleanup standards for soil and water
  - Example: drinking water standards
- Site-specific standard
  - Demonstrate acceptable risks, and/or
  - Eliminate exposures to contamination
  - Examples: cap over soil, vapor controls

# Regulatory Cleanup Programs

## Land Recycling Program—Reporting

- Notice of intent to remediate
- Remedial investigation report:  
characterization of the contamination
- Risk assessment report
- Cleanup plan
- Final report

# Regulatory Cleanup Programs

## Land Recycling Program—Public Involvement

- Newspaper notices and notification letters to city required for each submission
- City may request a public involvement plan
- The public involvement plan allows public participation in the cleanup and reuse plans
  - The public may comment throughout the Act 2 process



# Regulatory Cleanup Programs

## DEP's Storage Tanks Corrective Action Program

- Applies to regulated storage tanks
  - Underground and aboveground tanks
  - Releases of substances to the environment
- Reporting similar to Act 2
- Cleanup standards same as Act 2



# Regulatory Cleanup Programs

## EPA's RCRA Corrective Action Program

(Resource Conservation and Recovery Act)

- RCRA regulates facilities that handled hazardous wastes
- Corrective action requirements apply to past releases of those materials
- Site characterization
- Evaluation of remedial alternatives
- Remedy implementation

# Regulatory Cleanup Programs

## DEP and EPA One Cleanup Program

- Allows Act 2 cleanups to satisfy RCRA corrective action requirements
- DEP is the lead agency
- EPA also reviews all submittals
- Additional community participation provisions

## Refinery Regulatory History

# Regulatory Cleanup Programs

## Cast of Characters

- Sunoco, Inc.
- Evergreen Resources Management Operations
- Philadelphia Energy Solutions (PES)
- Energy Transfer Partners

# Refinery Regulatory History

- Sunoco, Inc. owned and operated the refinery from 1988 until 2012
  - Responsible for historic (legacy) contamination and releases during their period of ownership
  - Energy Transfer acquired Sunoco, Inc. in 2012
  - Subsidiary Evergreen manages cleanup (2013–)
- PES acquired the facility in 2012
  - Responsible for releases from 2012 to present
  - Energy Transfer holds a minority ownership

# Refinery Regulatory History

- Significant environmental investigation did not occur until the 1980s
- DEP consent order & agreement with Sunoco for Point Breeze Refinery (1993)
  - Discharges to Schuylkill River
  - Infiltration into city sewer system
  - Offsite petroleum migration
  - Recovery of oil in subsurface

# Refinery Regulatory History

- The 1993 agreement required environmental investigation and monitoring of several areas
  - Sunoco agreed to remediate at least six areas
  - Included submittal of work plans and progress reports for DEP review
- Neighborhood sewer odors in 1990s
  - Sewer vapor collection system installed (1998)
- Defense Supply Center Philadelphia site (DSCP)



# Refinery Regulatory History

- DEP renewed the consent order and agreement with Sunoco in 2003
  - Point Breeze Processing Area, Girard Point Processing Area, Schuylkill River Tank Farm
  - Comprehensive characterization
  - Characterization reports for review (2005–2011)
  - Quarterly progress reports
  - Continued remediation projects
  - Required to attain Act 2 cleanup standard

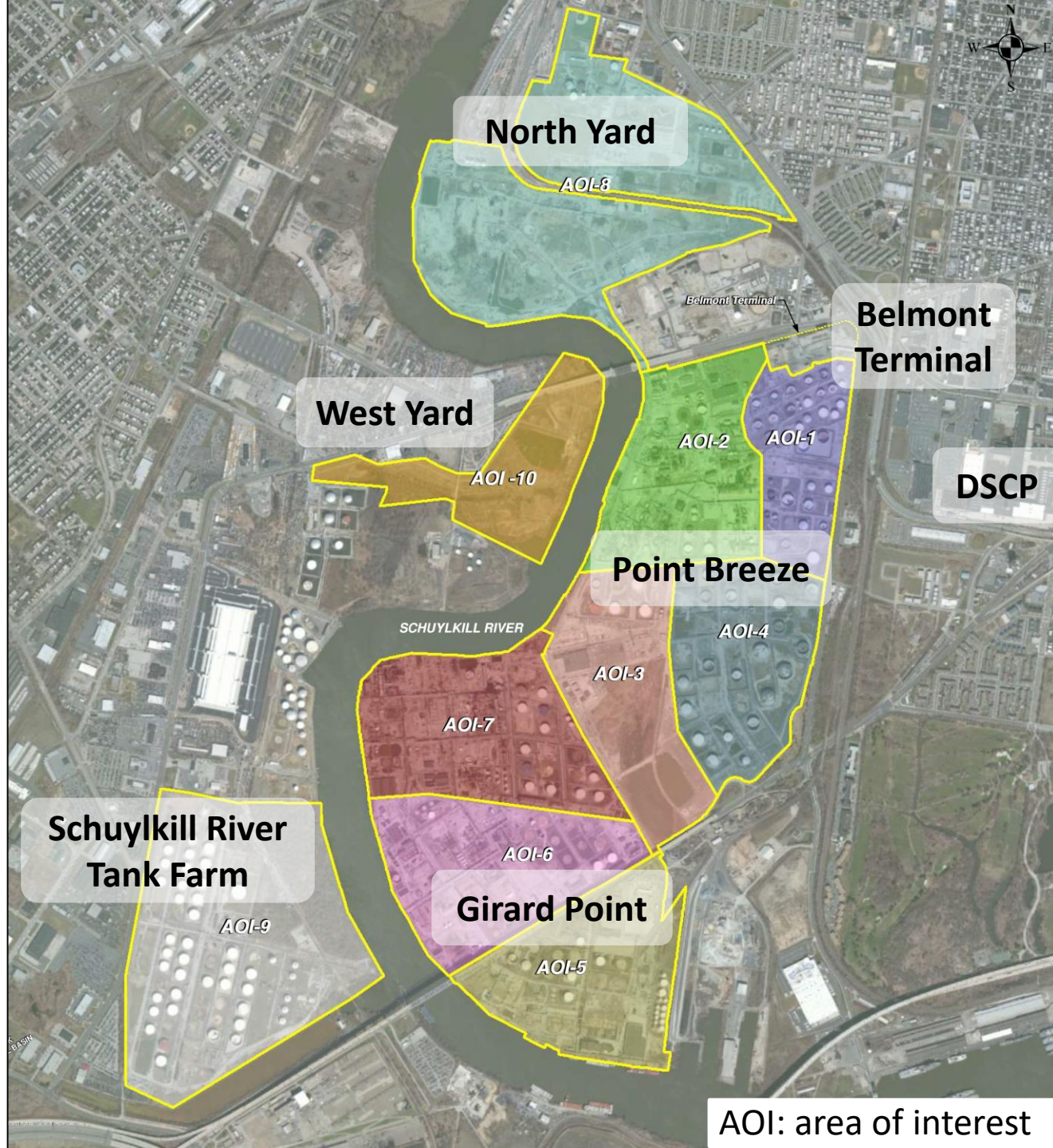
# Refinery Regulatory History

- Sunoco filed an Act 2 notice of intent to remediate in October 2006
- City requested a public involvement plan
  - Sunoco prepared a PIP
  - Public information session held September 2007
- DEP and EPA accepted the site into the One Cleanup Program in November 2011
- Act 2 reporting commenced in 2011

# Refinery Regulatory History

- Buyer–seller agreement September 2012
  - Sunoco’s (and Evergreen’s) obligations:
    - Complete site characterizations, submit reports
    - Develop cleanup plan(s)
    - Submit final report(s) by **December 2020**
  - PES’s and subsequent owners’ obligations:
    - Commercial or industrial use only
    - Maintain needed engineering controls
- EPA agreement with Sunoco and PES (2012)
  - Financial assurance conditions

## Overview of the Act 2 Cleanup



AOI: area of interest

# Overview of Act 2 Cleanup

- DEP has received Act 2 remedial investigation reports for all ten areas of interest (AOIs)
  - Submitted 2011–2017
  - Reports were reviewed for compliance
  - Eight remedial investigation reports approved
  - Two remedial investigation reports disapproved
  - Deficiencies: incomplete delineation of groundwater contamination beyond property line

# Overview of Act 2 Cleanup

## Additional Act 2 reporting:

- AOI 11 (deep aquifer) 2011–2013
  - Disapproved
  - Work since incorporated into other RI reports
- Lead risk assessment report 2015
  - Established a risk-based soil lead standard
  - Approved



# Contaminants of Concern

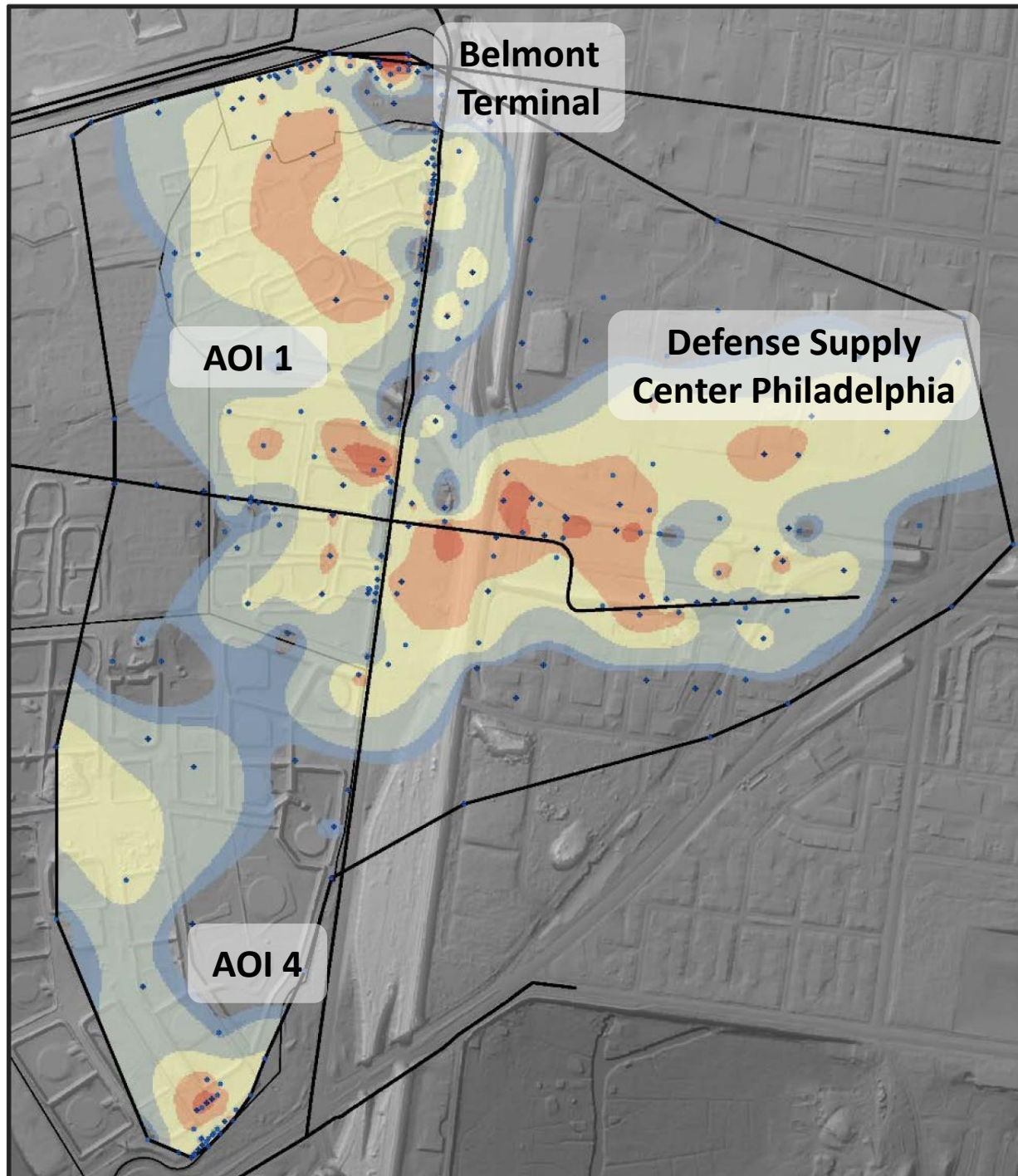
Volatile Organic Compounds	Semi-Volatiles	Metals
Benzene Cumene 1,2-dibromoethane 1,2-dichloroethane Ethylbenzene Methyl tert-butyl ether (MTBE) Toluene 1,2,4-trimethylbenzene 1,3,5-trimethylbenzene Toluene Xylenes	Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Chrysene Dibenz(a,h)anthracene Fluorene Naphthalene Phenanthrene Pyrene	Lead



# Overview of Act 2 Cleanup

Most significant contaminants of concern:

- Benzene is a primary risk driver
- Soil:
  - Benzo(a)pyrene, lead
- Groundwater:
  - MTBE, 1,2,4-trimethylbenzene, naphthalene
- Light nonaqueous phase liquids (LNAPL)
  - Oil floating on groundwater

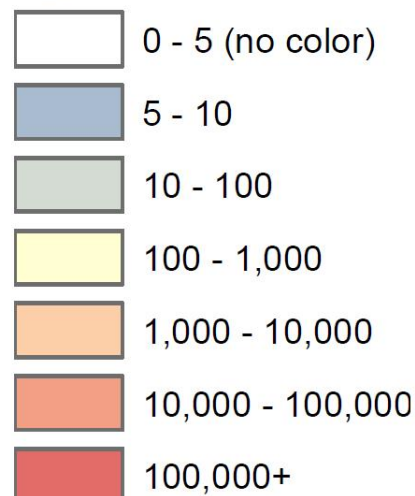


# Maximum Benzene in shallow groundwater (2014–2017)

[Stantec, 2018]

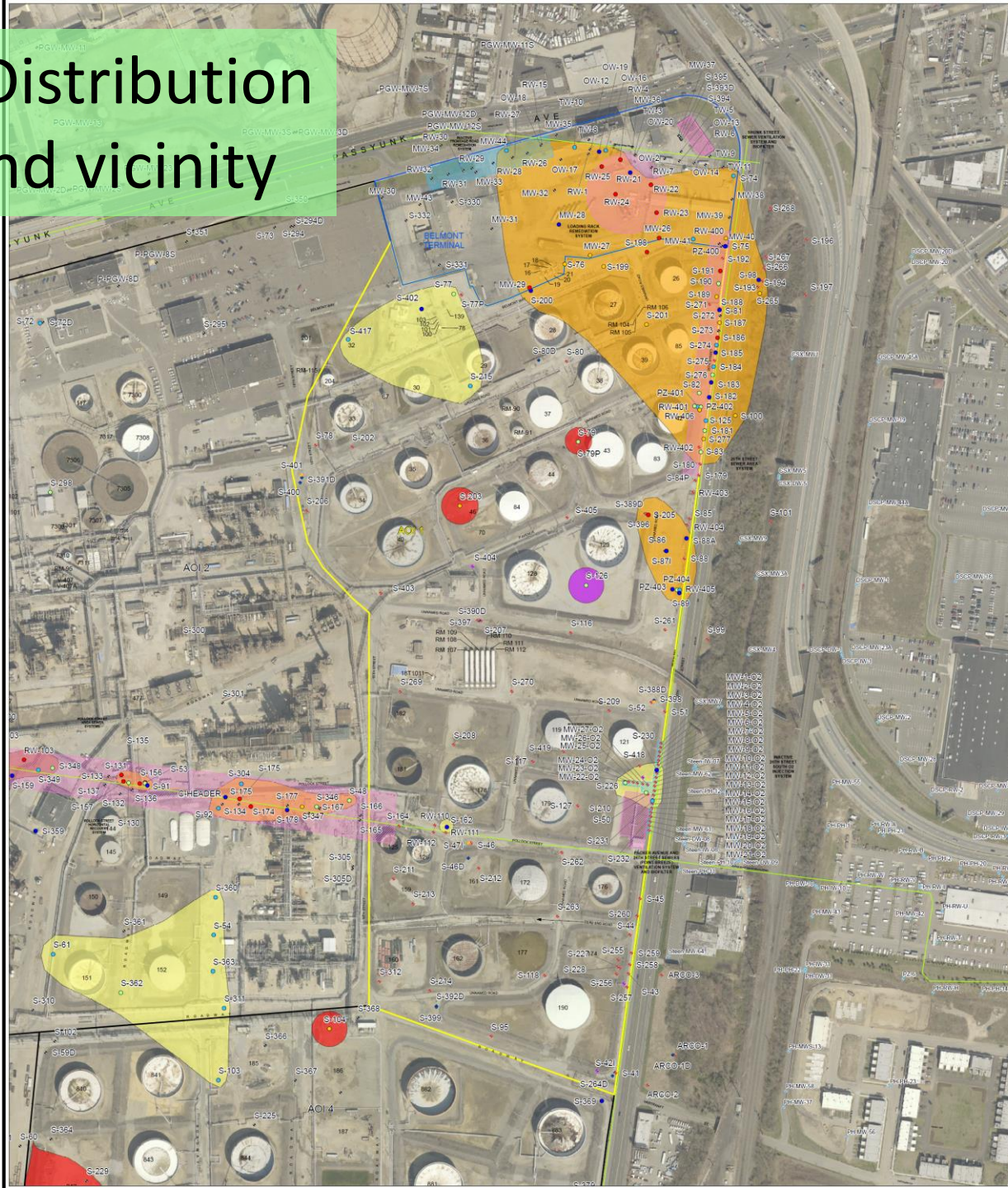
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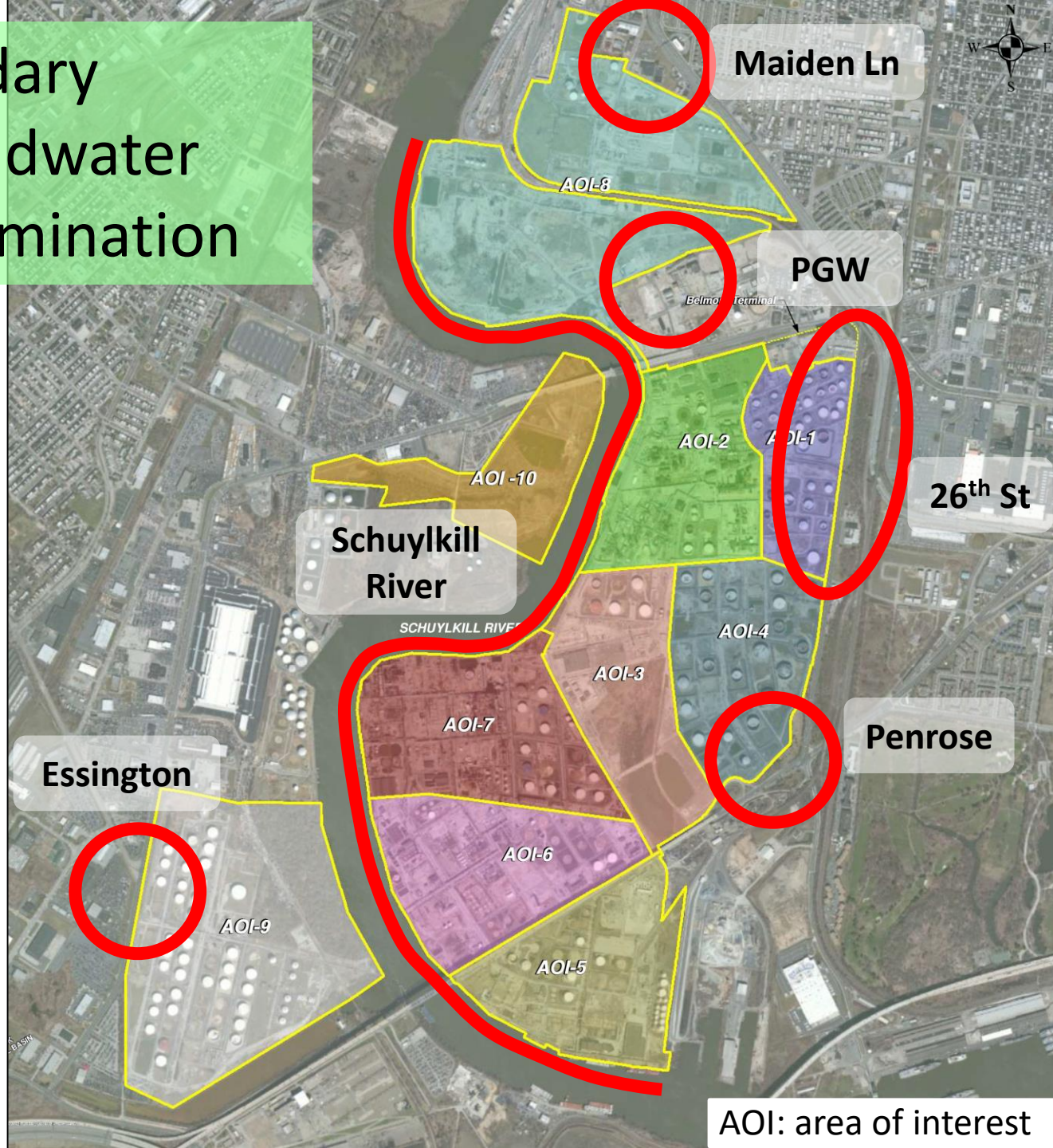


# LNAPL Distribution AOI 1 and vicinity



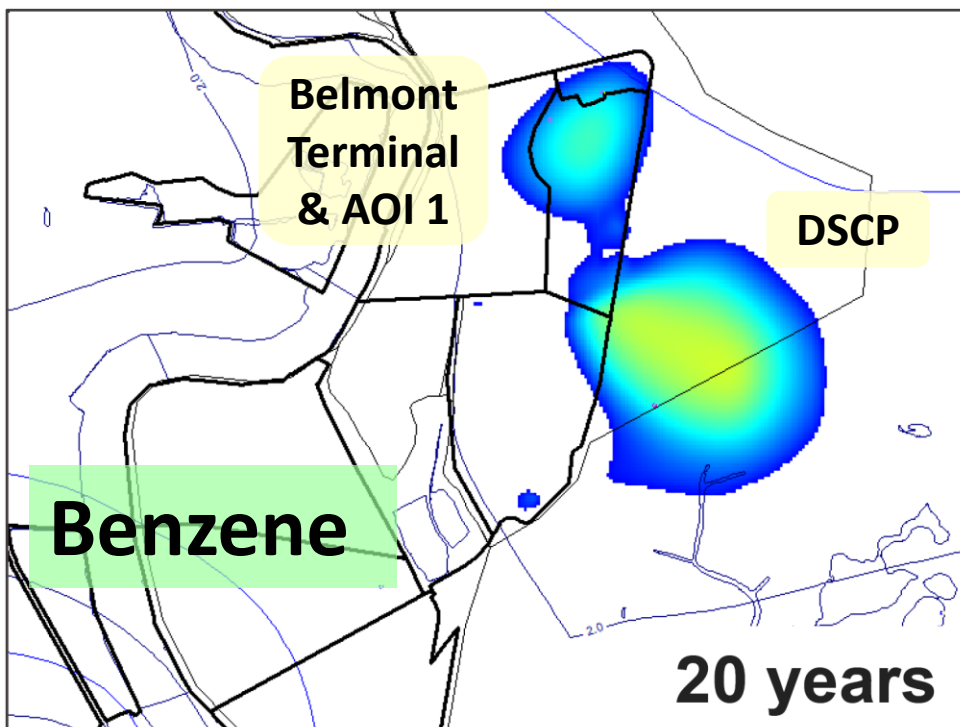


# Boundary Groundwater Contamination



# Overview of Act 2 Cleanup

- Computer modeling of contaminant migration in the lower aquifer
  - Predict spread of plumes in the future
  - Results have not been submitted for DEP review



# Overview of Act 2 Cleanup

- Storage tank cleanups
  - PES operates 196 regulated tanks
  - Numerous tank releases since 1989
  - Sunoco/Evergreen have satisfactorily addressed and closed 65 tank incidents
  - Approximately 35 tank incidents are still open and are being addressed through the Act 2 process
  - PES has one open tank incident

# Overview of Act 2 Cleanup

- Groundwater remediation
  - At least 18 remedial systems since the 1990s
  - Objectives to protect river, prevent migration outside the facility, and collect sewer vapors
  - Designed to recover oil, groundwater, vapors
  - Recovered oil: > 325,000 gallons
  - Nine systems continue to operate
  - Evergreen assesses upgrades and reactivation



## Areas of Interest

AOI 1 – Point Breeze No. 1 Tank Farm

AOI 2 – Point Breeze Processing Area

AOI 3 – Point Breeze Impoundment Area

AOI 4 – No. 4 Tank Farm

AOI 5 – Girard Point South Tank Field

AOI 6 – Girard Point Chemicals Area

AOI 7 – Girard Point Fuels Area

AOI 8 – North Yard

AOI 9 – Schuylkill River Tank Farm

AOI 10 – West yard

AOI 11 – Deep Aquifer Beneath the Complex

**VIEW REPORTS**





# Overview of Act 2 Cleanup

## Where to get more information

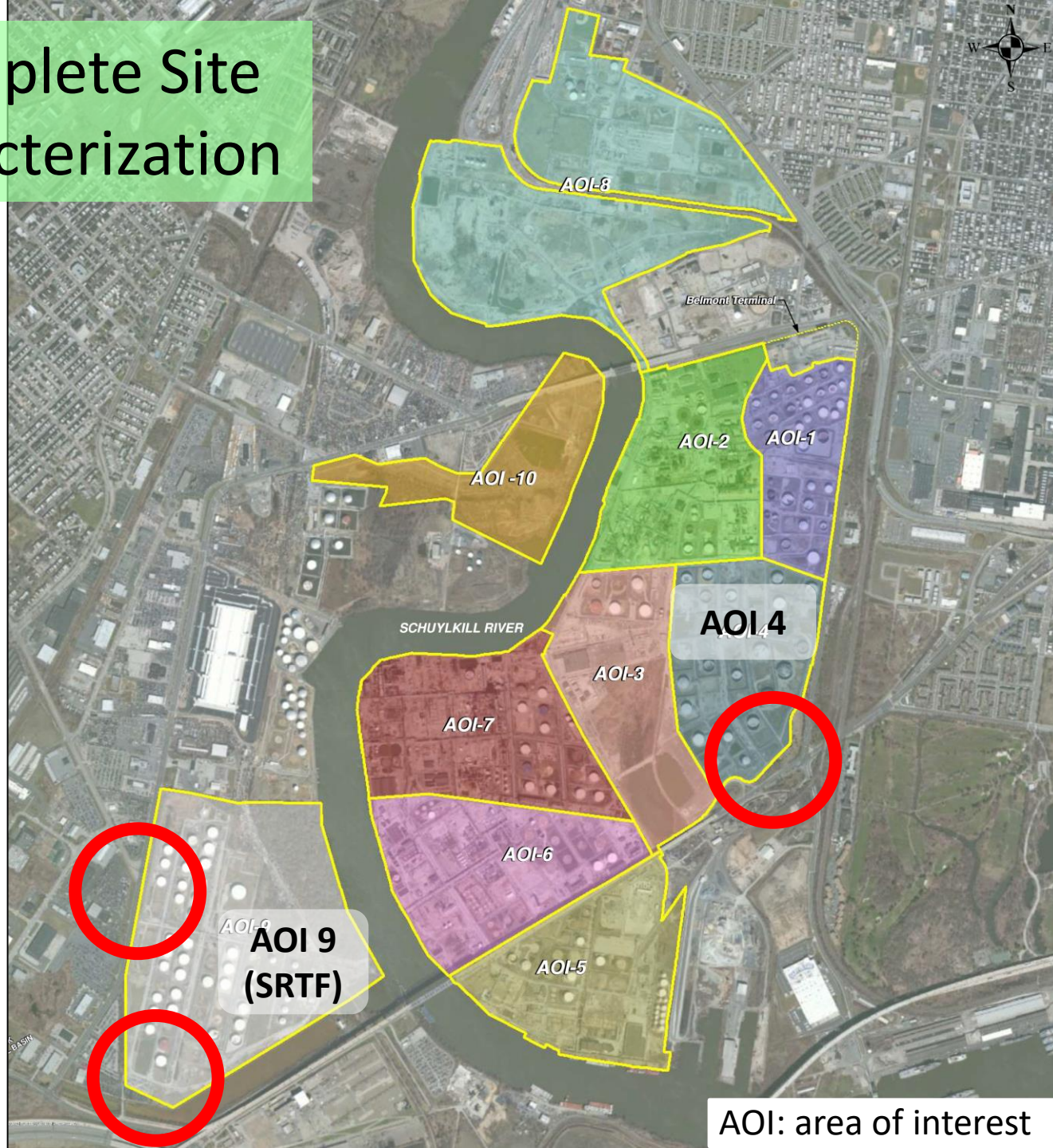
- Evergreen website:  
[phillyrefinerycleanup.info](http://phillyrefinerycleanup.info)
- T. Donatucci & Eastwick [Free Library](#) branches
- DEP's eFACTS database: [www.dep.pa.gov](http://www.dep.pa.gov)  
Data and Tools → Tools → eFacts
- DEP public file review: [www.dep.pa.gov](http://www.dep.pa.gov)  
Public Records → Informal File Review

## **Current Act 2 Status and Future Activities**

# Status and Future Work

- Evergreen must complete site characterization
  - AOI 4: Evergreen installed and sampled offsite monitoring wells near Penrose Avenue
  - AOI 9: Evergreen installed and sampled offsite monitoring wells near Essington Avenue
  - Evergreen will prepare and submit revised remedial investigation reports to DEP and EPA
  - DEP & EPA review and decision

# Incomplete Site Characterization



# Status and Future Work

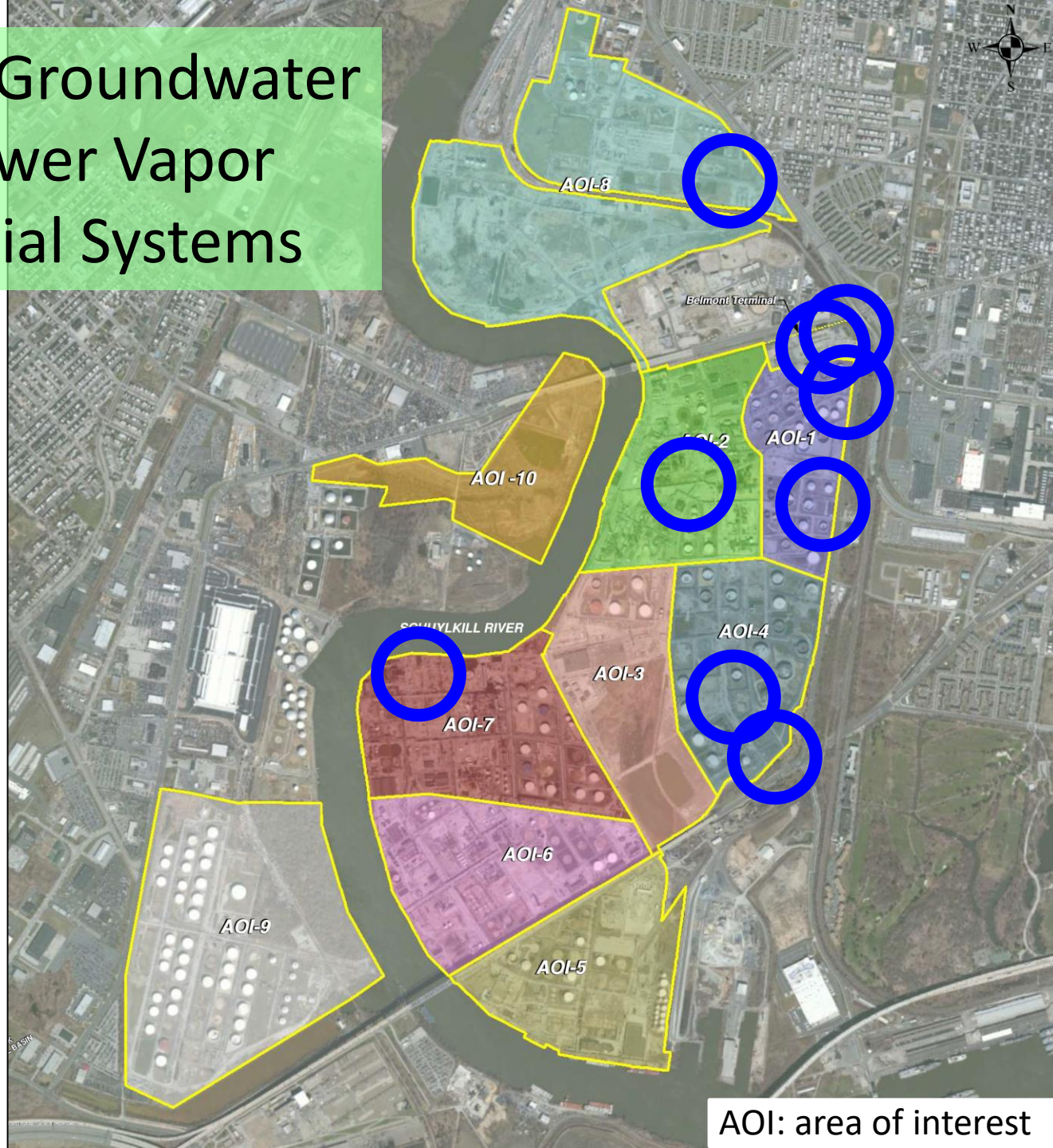
- Forthcoming Act 2 work and reporting
  - Ongoing semiannual progress reports
  - Groundwater fate-and-transport modeling
  - Evaluation of impacts to Schuylkill River
  - Human health risk assessment
  - Ecological risk evaluation
  - Cleanup plan
  - Final report
  - Environmental covenant(s)

# Status and Future Work

- Act 2 public involvement requirements
  - No public participation occurred since 2007
  - Evergreen will remedy this lapse with:
    - Revised public involvement plan (June 2019)
    - Two public meetings (anticipated fall and spring)
    - A 120-day public comment period, via [website](#)
    - Submittal of a site-wide remedial investigation report addendum responding to all public comments
- All future Act 2 reports must comply with public involvement requirements



# Active Groundwater and Sewer Vapor Remedial Systems



AOI: area of interest

## Key Cleanup Issues



# Key Cleanup Issues

- The refinery property is deed-restricted to commercial or industrial activities
  - Cleanup will be to a nonresidential Act 2 standard
- North Yard ball field
  - Evergreen must achieve residential cleanup standard for recreational use



# Key Cleanup Issues

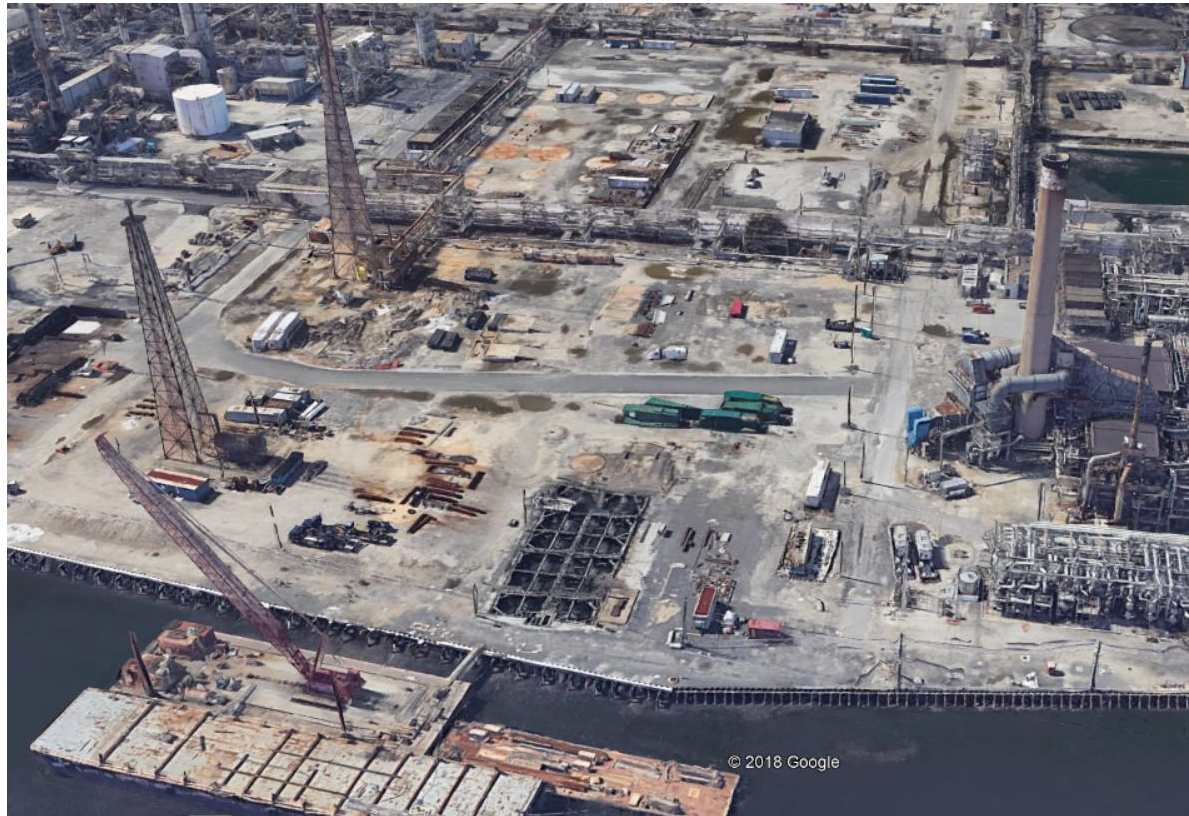
- Site characterization has been performed under conditions of an operating refinery
  - If facility is permanently shut down, process areas will become accessible for investigation
- Further site characterization would be required
- Implications for timeline and costs





# Key Cleanup Issues

- PES is responsible for environmental releases during its period of ownership (since 2012)
  - Unknown if PES or another party will perform their cleanups



# Key Cleanup Issues

- Public comments may influence Evergreen's progress through Act 2
- How will Evergreen's Act 2 milestones interplay with decisions on the site's future?
  - Development of the risk assessment depends on current and known future uses
  - Evergreen will need to obtain an extension of the December 2020 final report deadline

# Key Cleanup Issues

- Does Act 2 constrain future uses of the site?
  - Attainment must be consistent with the present or currently planned future use
  - Act 2 does not preclude cleanup of the site to a higher standard
  - If the use changes, future owners could re-enter Act 2 and remediate consistent with that use

# Key Cleanup Issues

- Does the buyer–seller agreement constrain future uses of the site?
  - Evergreen is only obligated to attain a nonresidential cleanup standard
  - Changing the nonresidential deed restriction would require concurrence of all three parties: Evergreen, PES, and DEP

# EPA Contact

Environmental Protection Agency, Region III

RCRA Corrective Action Section

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**keyword: “Land Recycling”**