Overview of Environmental Actions
Supporting Site Revitalization

Ambler, Pennsylvania
March 10, 2020
Introduction

- 26-Acre Site in Ambler, Pennsylvania
- 25 Buildings

Former Operations
- Metal-Treatment Products (1914 – 2003)
- Agricultural Chemicals (1938 – 1980)

- Ambler Yards Initiated Redevelopment: 2015
- Environmental Work: 1990s – Present
Introduction

➢ Regulatory Programs
  ✔ Pennsylvania Land Recycling & Recovery Act (Act 2)
  ✔ USEPA – PADEP One Cleanup Program

➢ Stakeholder Communications
  ✔ Henkel/Cognis/BASF <> Local Townships
  ✔ BASF <> Ambler Yards <> Local Townships
Goal: Site-Wide Release from Liability

Investigation Partitioned based on:

- Former Operational Areas
- Site History
- Consultation w/ PADEP

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No Site Investigation Soil Samples Proposed
Inaccessible
Previously Investigated
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Focused & Systematic (Random) Sampling Grids

- 167 Locations
- 286 Samples
- 18,461 Analytical Records

TCL VOCs & SVOCs
TAL Metals
Pesticides/Herbicides
PCBs
Cyanide
Dioxin

Statistically-Based Investigative Program:

- Efficient & highly cost-effective
  (30-75% < traditional methods $, depending on site)

- Enables high level of certainty:
  - Cleanup volumes & costs for contamination possibly missed
    (defines potential residual liability w/ 90% certainty)
  - Much appreciated by PADEP – Fits perfectly w/ Act 2 (95%UCL)
  - Supports informed decision-making re site redeployment

Soil Investigation
> >99.8% Analytical Results < PADEP’s most stringent Applicable Non-Res SHS

➢ Isolated, Targeted Removals

➢ Risk-Based, SSS – Building 14 & 23

➢ Indoor Air Building 23 < PADEP IASL

➢ Closure Conditions

✓ Non-residential use restrictions

✓ Engineering Controls: Buildings 14 & 23

✓ Uniform Environmental Covenant (UEC) (routine inspections/maintenance/reporting)

➢ PADEP Approved Release from Liability

**Soil Remediation**

SHS – Statewide Health Standards

SSS – Site-Specific Standards

IASL – Indoor Air Screening Levels

Asphalt/Concrete Cap (arsenic, dioxin, pest/herbicides)

Concrete Cap (arsenic, VOCs >SHS; VOCs > VI SV)

Isolated, Targeted Removals (ethylbenzene, lead, 2,4,6-TCP)

Isolated, Targeted Removals (former RR siding, early-1990s)
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Groundwater Investigation

- Investigation & Semi-Annual (+) Sampling since 2006
- 46 Overburden, Weathered, Shallow & Deep Rock Wells
- Contaminant Conditions
  - OB/WR: Predominantly Metals & Herbicides (similar to soil)
  - SR: Predominantly 1,2-dichloroethane (1,2-DCA) & other CVOCs
  - DR: No concerns
  - Off-Site:
    - Public Water Supply
    - No Off-Site Indications of Site-Related Analytes
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Groundwater Investigation

Rock Coring & Geophysics Surveys
- Optical & Acoustic televiewer
- Natural gamma
- Fluid temperature
- Fluid resistivity

Further Surveys
- Packer tests
- Focused aquifer stress tests
- ID Zones: Highest T & Concentrations

Observations
- Dominant N-S fracture trend
- Several transmissive zones
- Clay in bedding & joint planes (water movement)
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1,2-DCA Concentrations & Specific Capacity as a Function of Depth

(gpm/ft)(ug/L)

Feet below ground surface (top of zone)

Zones of highest 1,2-DCA concentrations

x  specific capacity (transmissivity) values

SR0904
SR0905
SR0902
SR0903

Zones of Higher 1,2-DCA Concentrations

Correlate with Zones of Higher Transmissivity
(~20 to 45-foot bgs Interval)

Groundwater Investigation

Packer Configuration Schematic

2-inch Submersible pump

Potential transducer locations (#1, #2, #3)
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Groundwater Remediation

2008
Low-Flow Extraction
& Ex-Situ Ozone/Hydrogen Peroxide Treatment

2011
Hydraulic Fracturing
& In-Situ EHC
1 Injections
(Targeted Locations)

1) EHC – Fibrous organic carbon &
zero valent iron (ZVI) amendment
2) RYR – Red yeast rice & ZVI amendment

2013
Pneumatic Fracturing
& In-Situ EHC
1 Injections
(Plume Core)

2017
Pneumatic Fracturing
& In-Situ RYR
2 Injections
(Plume Core)

1,900
190,000
97,000
7,700
28,000
2008
Low-Flow Extraction
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Groundwater Remediation

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Groundwater Remediation

2011 – Targeted Test Sites (Hydraulic)
2013 – Plume Core (Pneumatic)
2017 – Plume Core (Pneumatic)

Injection & In-Situ Treatment

- Red Yeast Rice (2017)
- ZVI Amendment

- Hydraulic Injection of Water (2011)

Chemical Reduction (in-situ)

1,2-DCA & Other CVOCs
Degrade to: Ethene
Ethane
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Groundwater Remediation

2007

Ex-Situ Ozone & Hydrogen Peroxide Treatment
(2008 – 2010)

Max 1,2-DCA 230,000 ug/L

55,000 ug/L

2012

In-Situ Injection RYR/ZVI
(2017)

580 ug/L

2015

In-Situ Injection EHC/ZVI
(2013)

10,000 ug/L

2019

In-Situ Injection RYR/ZVI
(2017)

580 ug/L
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- 80.0% Plume Area Reduction
- 99.8% Mass Reduction

1,2-DCA Plume Evaluation

Groundwater Remediation
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Status:

- Stable/Declining Contaminant Trends
  - Several COCs < SHS
  - Several COCs > SHS (Determine SSS)
- Exposure Pathways Incomplete
- SHS & SSS Attainment Supported by Above
- Post-Closure Plan: UEC & Long-Term Monitoring
- Act 2 Final Report & Release From Liability Pending

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Some Closing Thoughts
Case Study
Lower Gwynedd, PA

Ambler Yards – The Numbers

• Over 500 employees
• Approximately $90,000 annual revenue to Lower Gwynedd
• Approximately $210,000 annual revenue to Wissahickon School District
• Approximately $40,000 annual revenue to Montgomery County
• Public Access
  o Green & hardscape open space
  o Walking trail
Panel

Questions & Answers

AMO ENVIRONMENTAL DECISIONS
Environmental Risk & Remediation Consultants