

VIAP ASSESSMENT AND MITIGATION IN A COMPLEX SETTING



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Case Study Overview

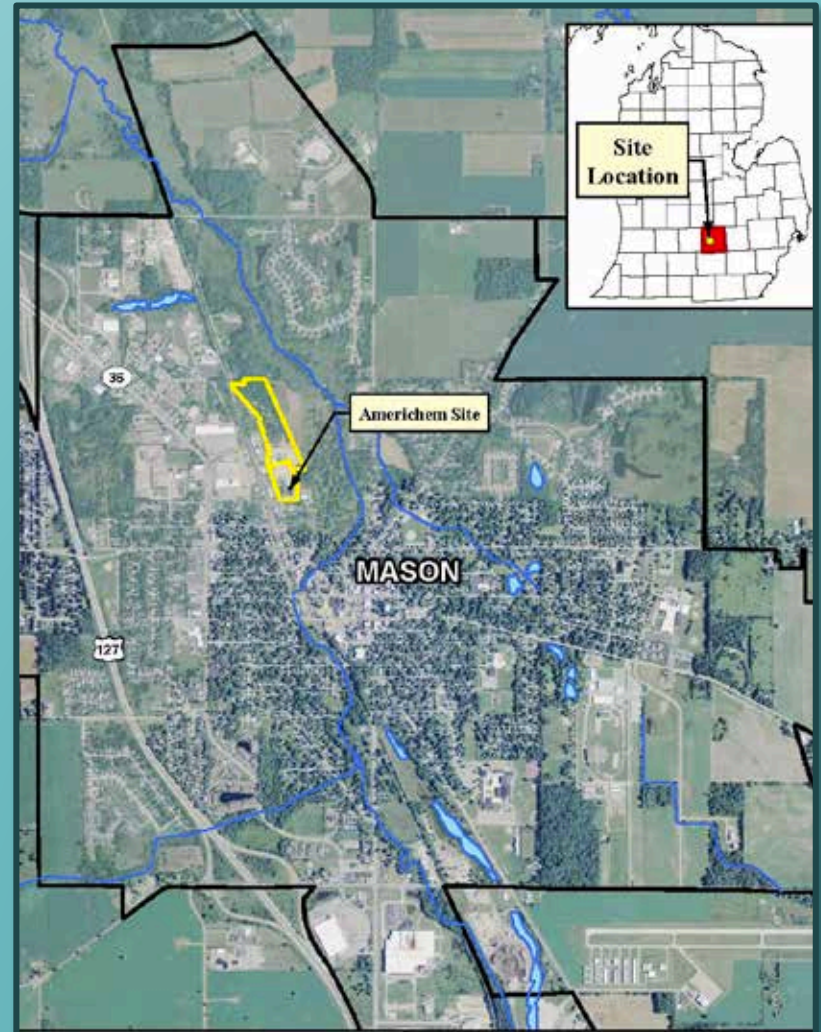
- Exposure Setting Complexities and Challenges
- VIAP CSM Assessment
- VIAP Mitigation
- Outcomes



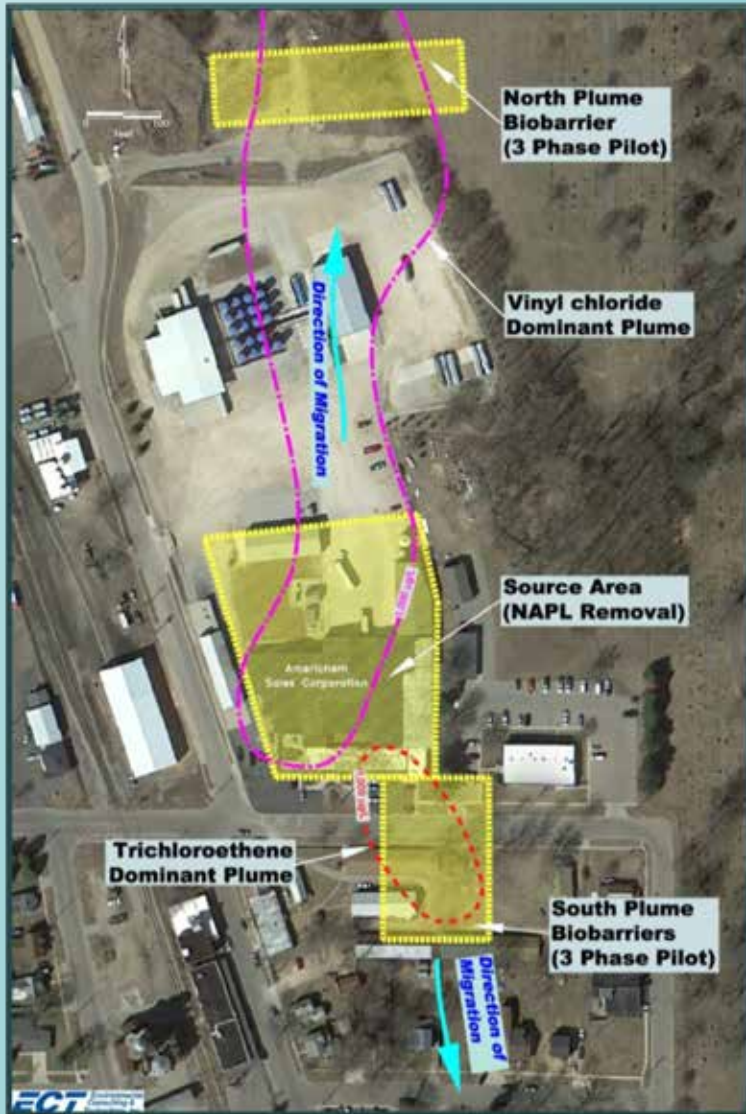
Mason Esker

Site Setting

Americhem Sales
Corp.
340 North Street,
Mason



Environmental Setting



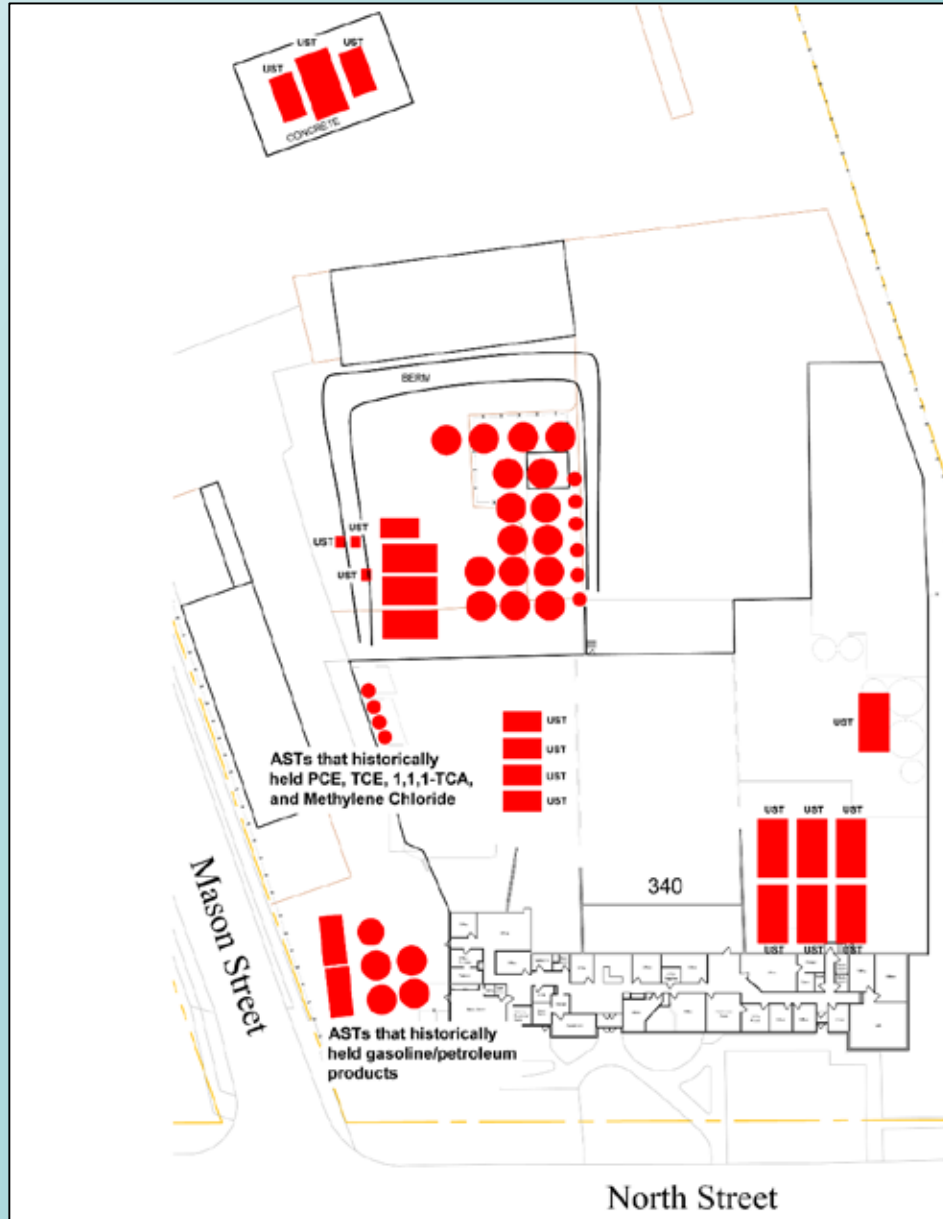
- Chemical Distributorship
- Mason Esker
- Bifurcated Plume
 - North Plume – VC
 - South Plume – TCE
 - Source – Everything
- Americhem Sales
 - Due Diligence in '97
 - Discovery of NAPL Mass
- MDEQ Takes Lead
 - SWQIF funded

Original Site



- Old tank farm tight to the facility, **NO** containment and rusted tanks.
- Old fuel island with no containment
- No security

Historic Tank Locations



- PVOCs
- CVOCs
- Solvents

Improvements

NAMED 2010 NACD DISTRIBUTOR OF THE YEAR

  **AMERICHEM**
Sales Corporation 

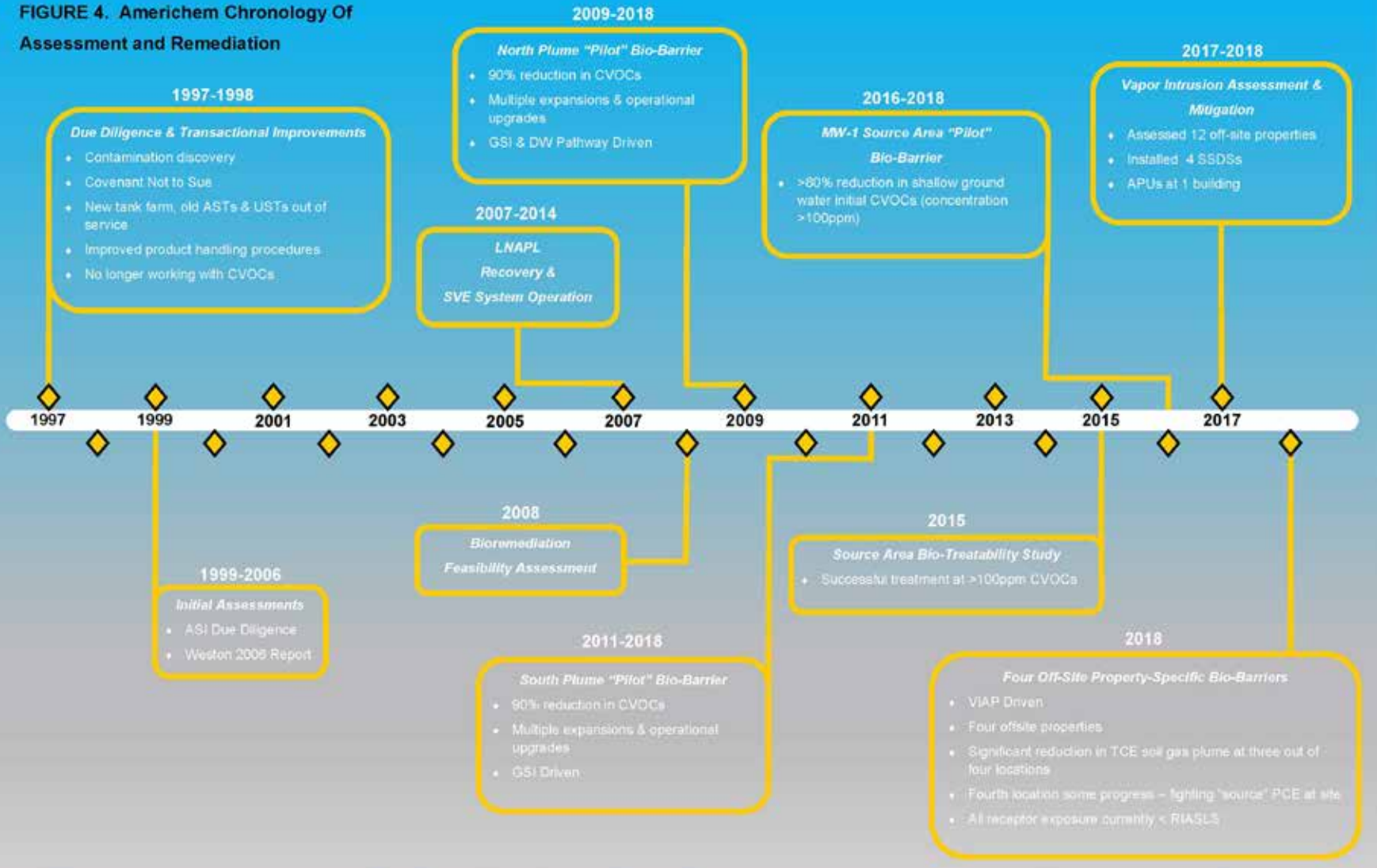


SAFETY IS MORE THAN A PRIORITY
NACD 2012 WESTERN REGION MEETING
FRIDAY, APRIL 20TH
AMERICHEM SALES CORPORATION
FIRST RECIPIENT OF THE NACD RD EXCELLENCE AWARD - 2006
WWW.AMERICHEMSALES.COM

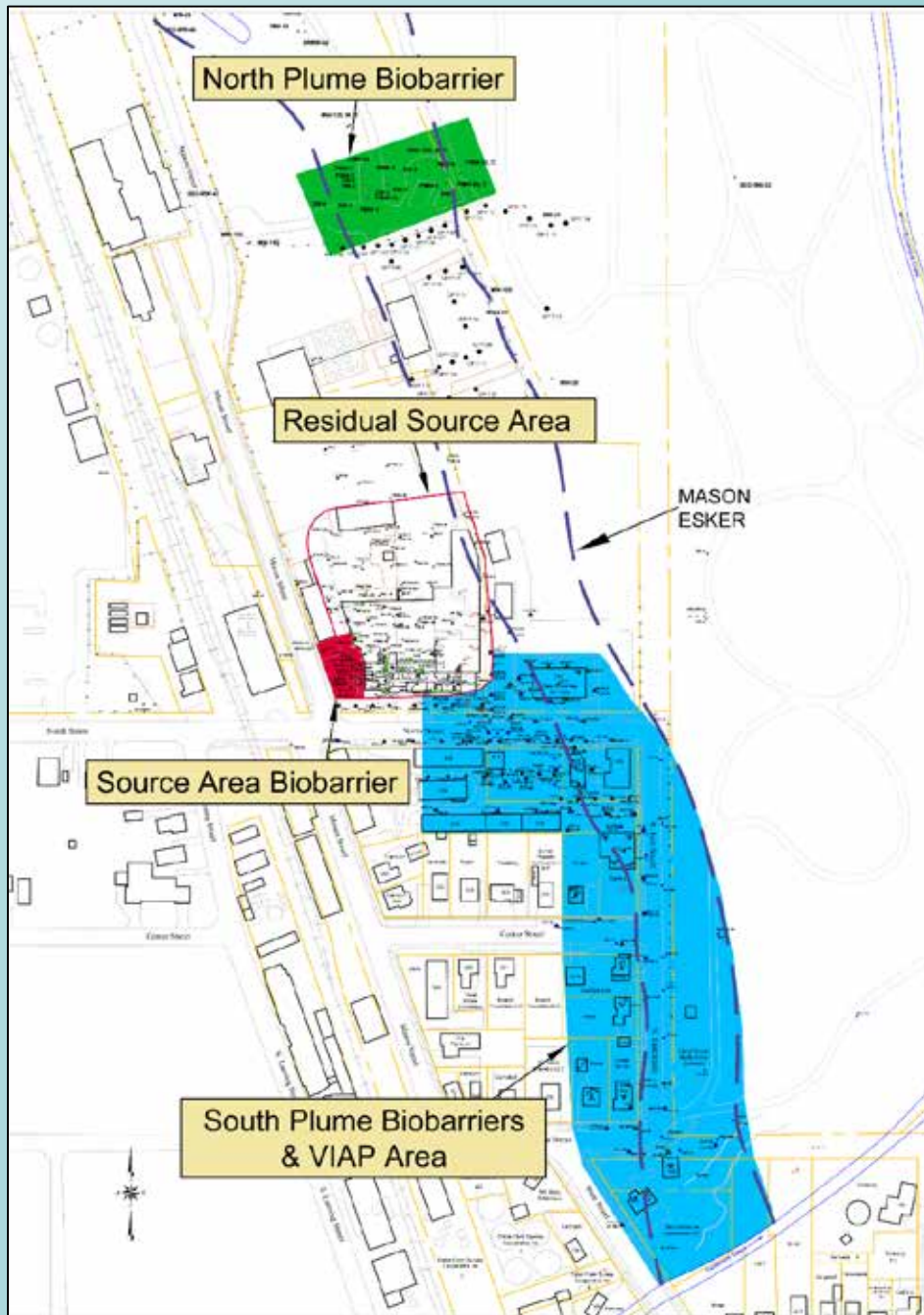
Speech given to the NACD (National Association of Chemical Distributors) members on safe site layout and safety practices.

Environmental History

FIGURE 4. Americhem Chronology Of Assessment and Remediation



Major Work Areas



- North Plume
- Source Area
- South Plume
- Off-Site VIAP

Mason Esker

“Hogsback”



HOGBACK MARKER—The glacial “hogsback” or esker, a high ridge running between Levis and Lansing, is now more or less artificially broken ground. Mason Scouts of Troop No. 30 are shown placing a marker in Mason City Park on W. Ash Street. Grouped around William Jacobs are scouts Ralph Osterberg, Steve Armstrong, Terry Zanger, Charles Pettit, and Fred Carver.

FAMED GLACIAL ESKER

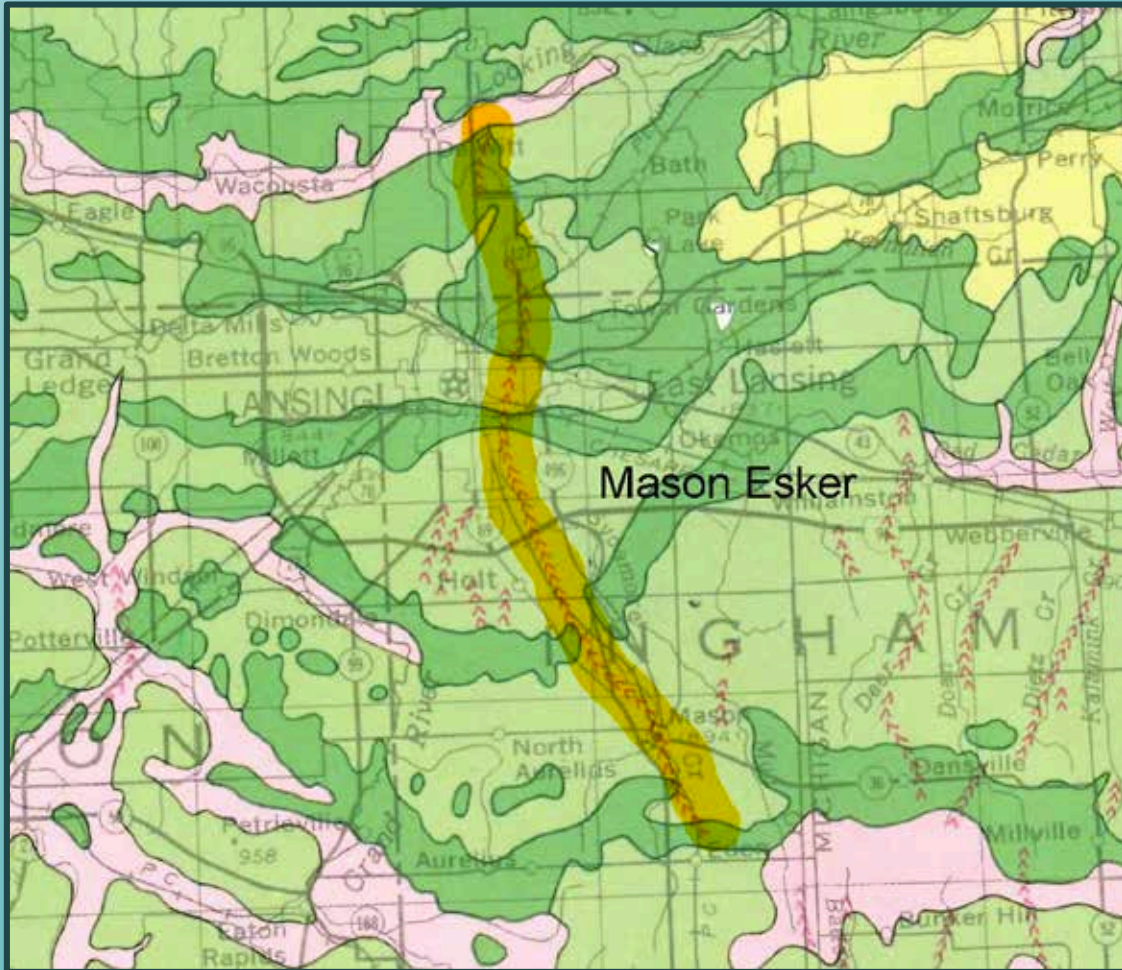
Mason Scouts Mark ‘Hogsback’

MASON—An historical marker of retreating glaciers thousands of years ago, the “hogsback” or esker, a high ridge running between Levis and Lansing, is now more or less artificially broken ground. Mason Scouts of Troop No. 30 are shown placing a marker in Mason City Park on W. Ash Street. Grouped around William Jacobs are scouts Ralph Osterberg, Steve Armstrong, Terry Zanger, Charles Pettit, and Fred Carver.

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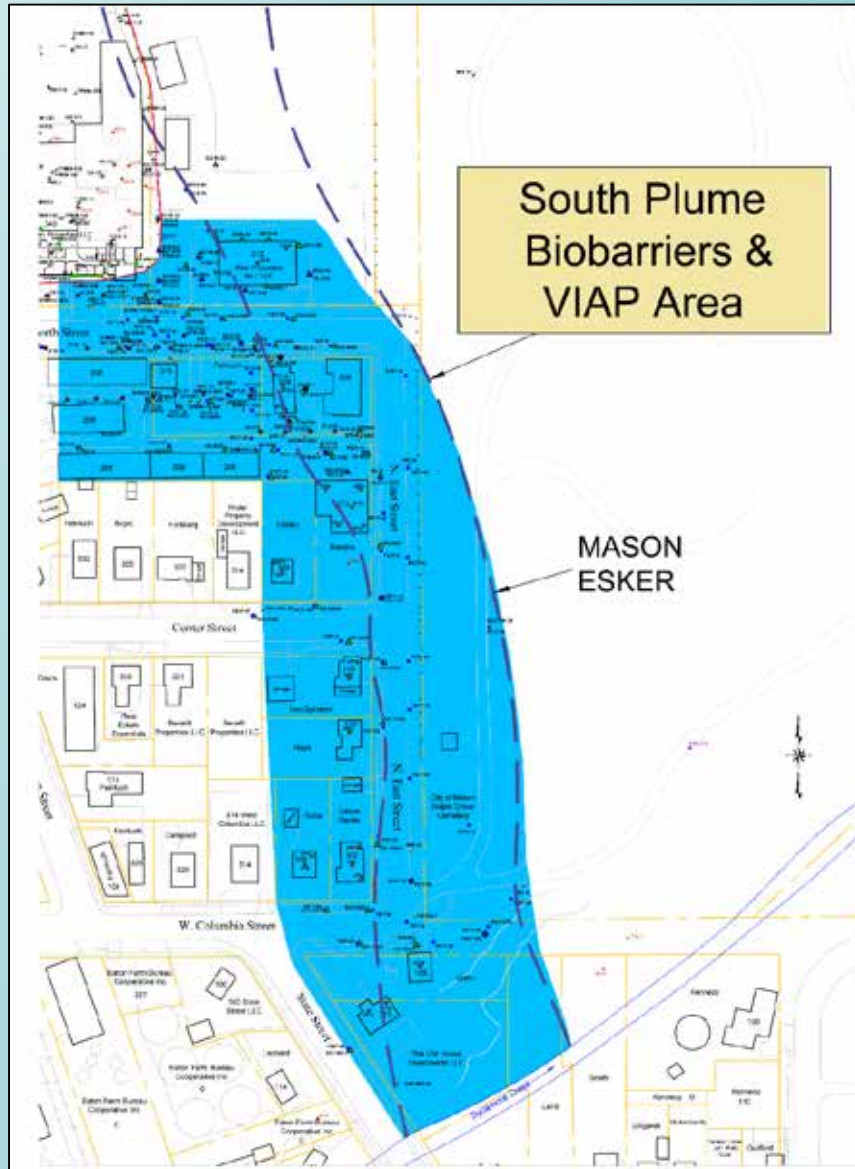
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Off-Site VIAP Setting

- Mixed Use
- Mason Esker
- 12 Properties



Rapid VIAP Assessment

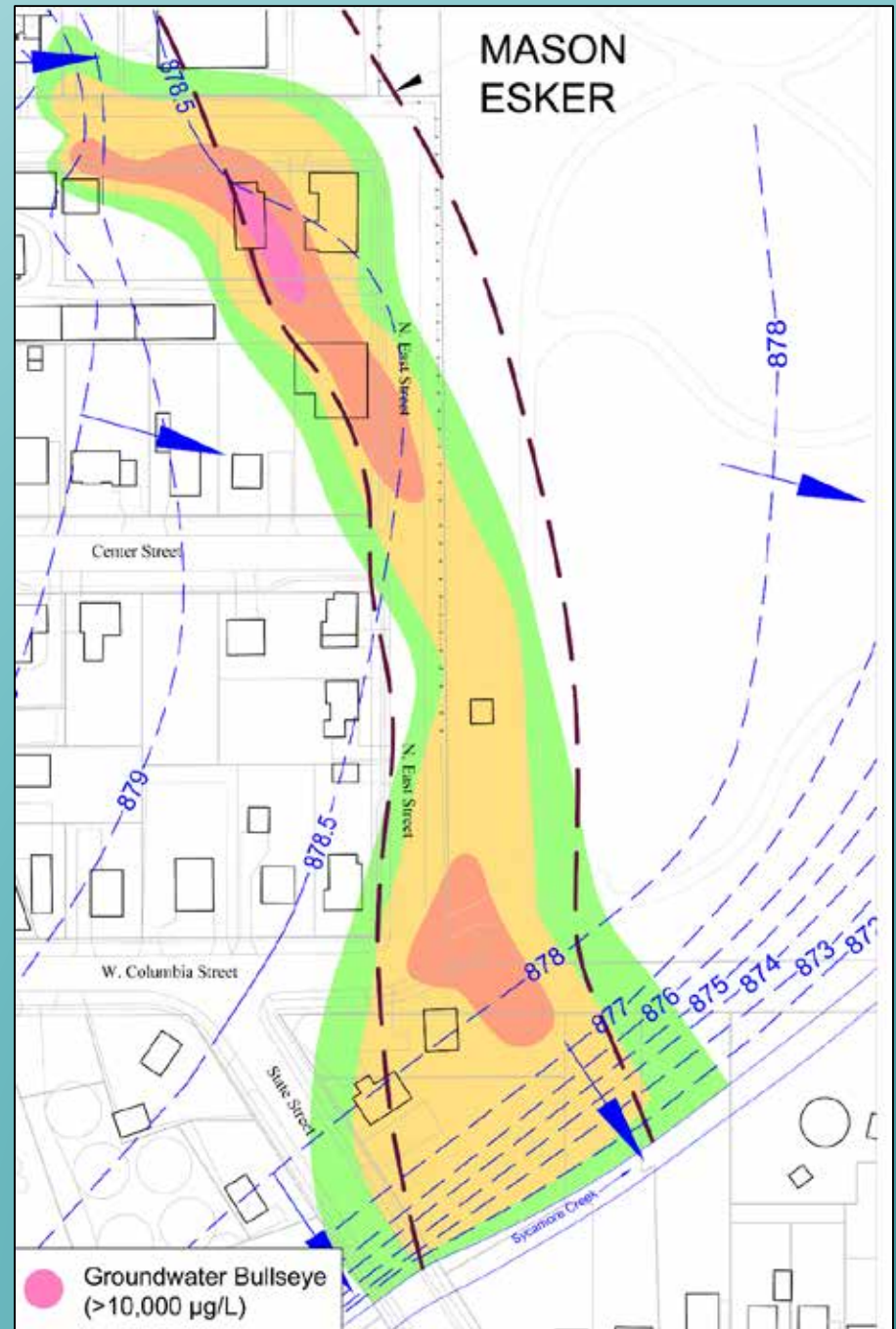
- Assess TCE in Shallow Groundwater as Potential Vapor Source
 - 60 shallow piezometers
 - 6 Vertical Aquifer Sample Borings
- Assess TCE in Soil Gas
 - 35 nested soil gas points (deep & shallow)
- August to October 2017

Rapid VIAP Assessment

- Home or Property Specific Assessments
 - 12 properties (IAs & VPs)
 - November – December 2017
- Utility/Sewer Special Assessments
 - Multiple sewer video surveys

August 2017 Shallow GW - TCE

- Groundwater flow to the east and slow until it reaches Esker
- Flows fast and follows the Esker South
- Does not underflow the Sycamore

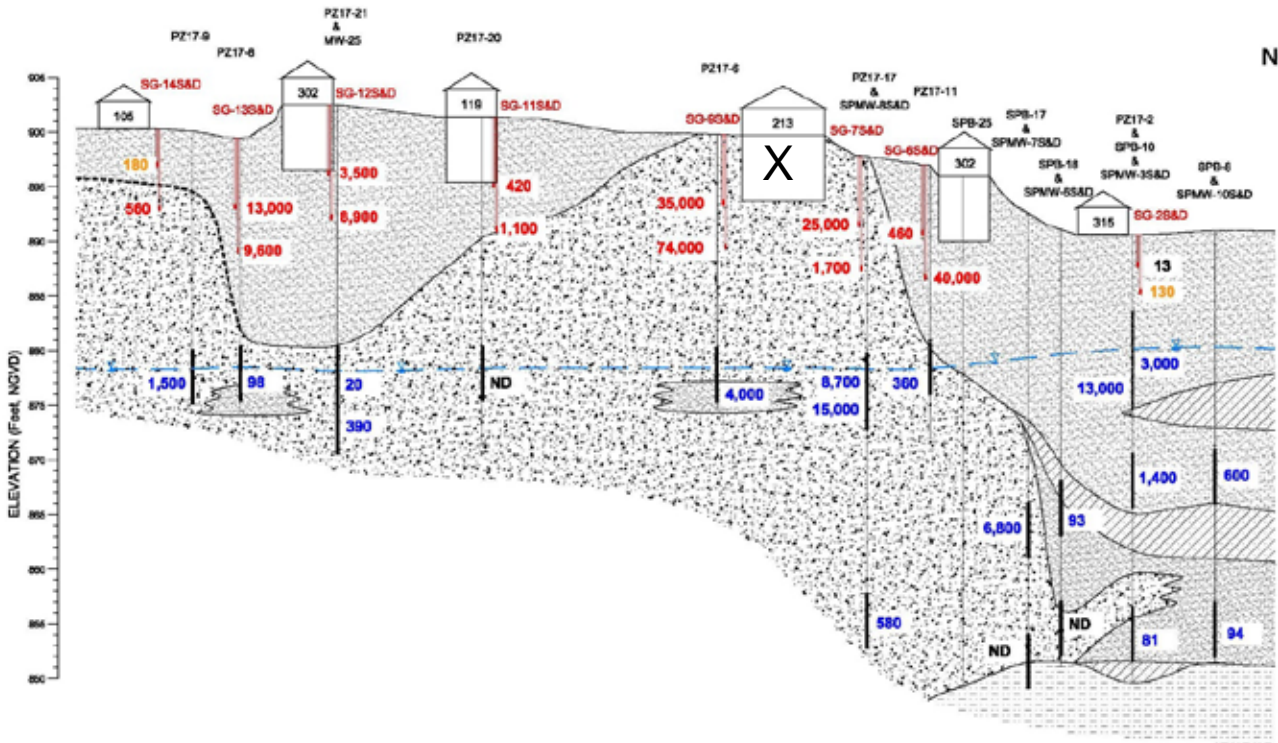


August 2017 Soil Gas - “Early Snapshot”

- All exterior building soil gas, two depth intervals
- TCE > RIASLs and TS RIASLs
- Some homes we expected to Mitigate remained “Assessment”
- Some homes we expected to “Assess” only required Mitigation
- Confounded by second source (Home 3 – furniture restoration)



A
SOUTH



A'
NORTH



LEGEND

- SANDSTONE
- SAND
- GRAVEL
- CLAY
- SOIL VAPOR PORT LOCATION
- Well Screen
- TCE SOIL VAPOR CONCENTRATION ($\mu\text{g}/\text{m}^3$) EXCEEDING TS RL (200 $\mu\text{g}/\text{m}^3$)
- TCE SOIL VAPOR CONCENTRATION ($\mu\text{g}/\text{m}^3$) EXCEEDING RL (87 $\mu\text{g}/\text{m}^3$)
- TCE GROUNDWATER CONCENTRATION ($\mu\text{g}/\text{L}$) EXCEEDING TS RL (18 $\mu\text{g}/\text{L}$)
- STATIC WATER LEVEL
- HOUSE NUMBER
- GROUNDWATER POTENTIOMETRIC

HAMP, MATHEWS & ASSOCIATES, INC. MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY AMERICHEM SALES CORPORATION MASON, MICHIGAN

FIGURE 1
CROSS-SECTION A-A'

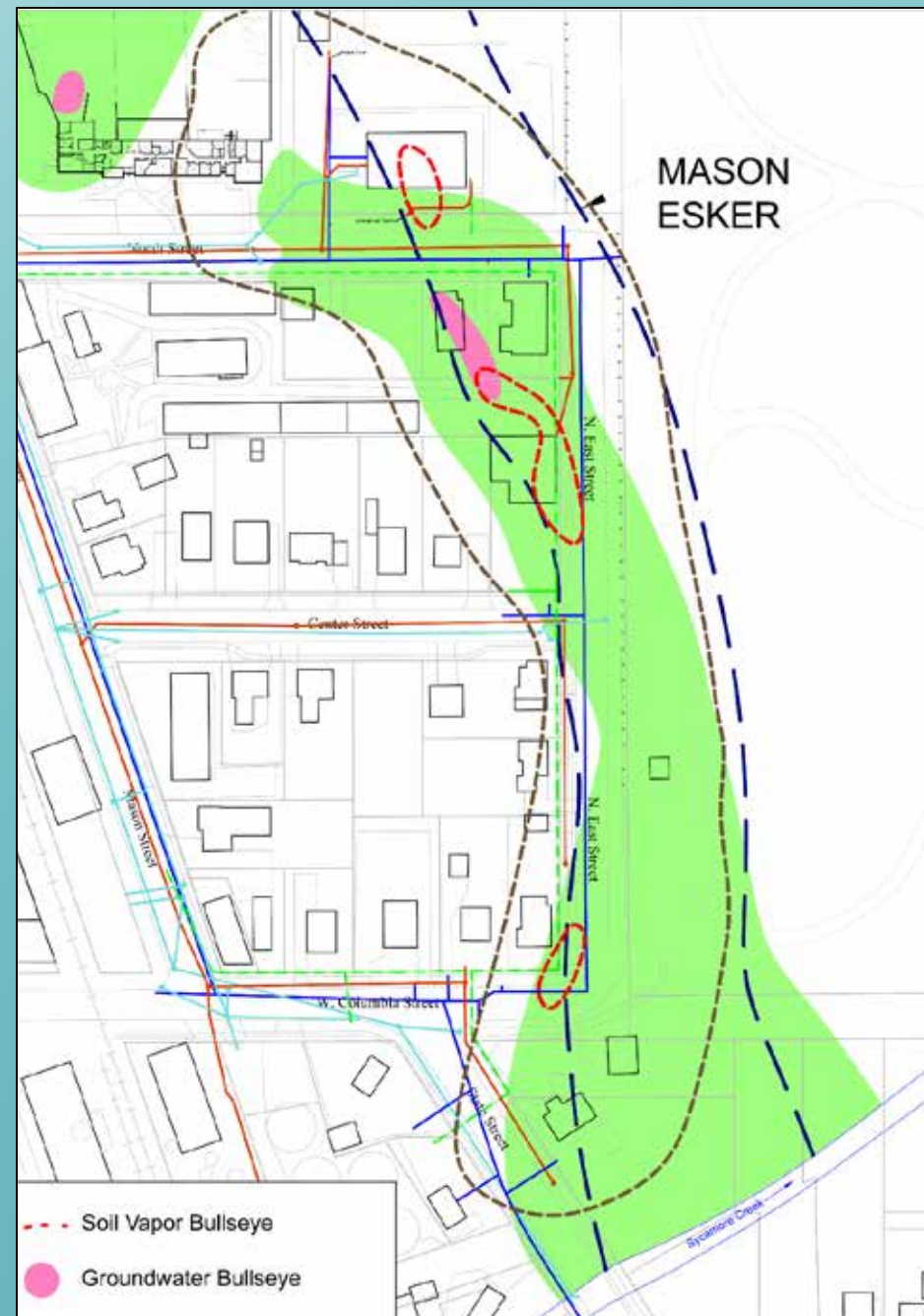
DRAFT

Horizontal Scale 1" = 100'
Vertical Scale 1" = 10'
Vertical Exaggeration 10X

DATE: October 2017 PROJECT: SP-100 DRAWING: South Cross Section (rev)

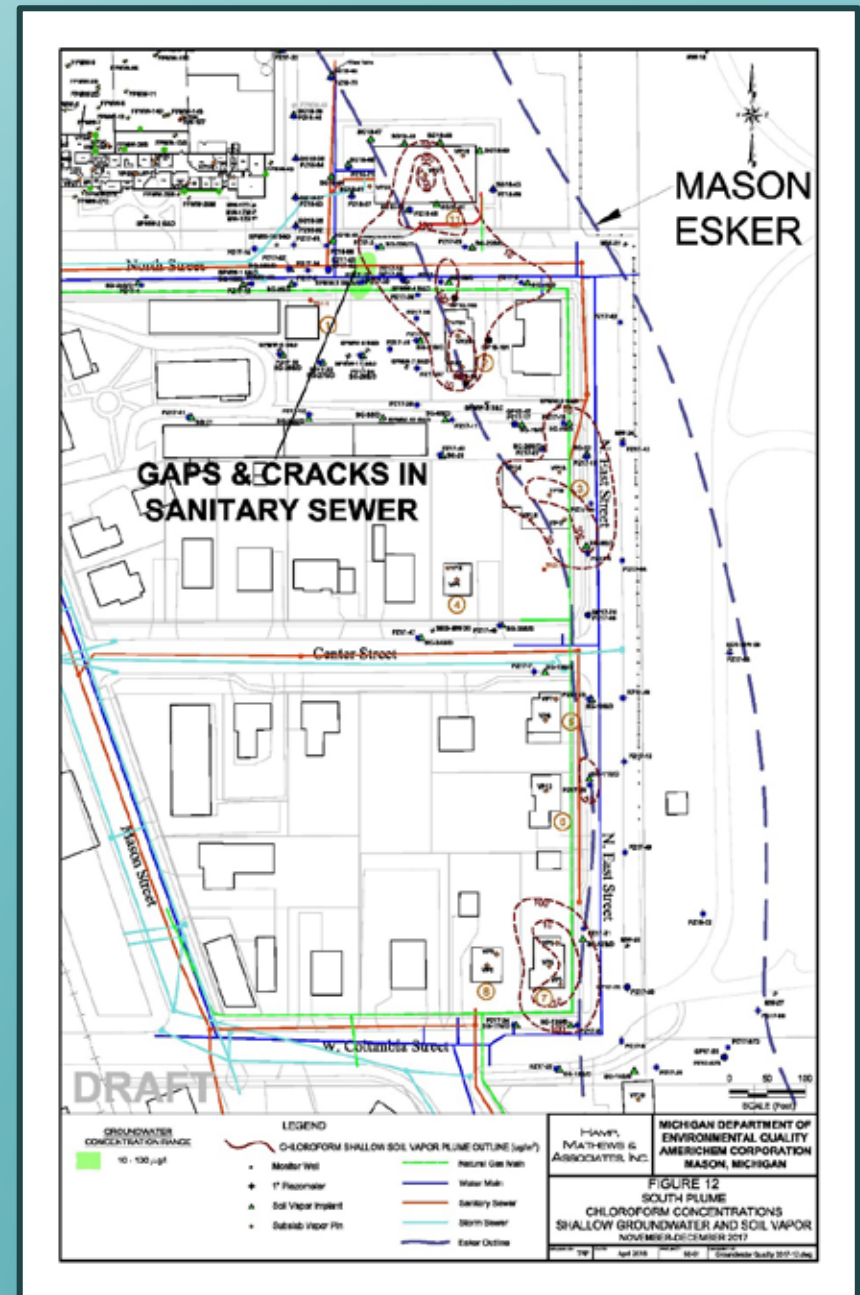
Overlying Soil Gas Plume

- “Bullseyes” don’t match
- Utilities influence transport



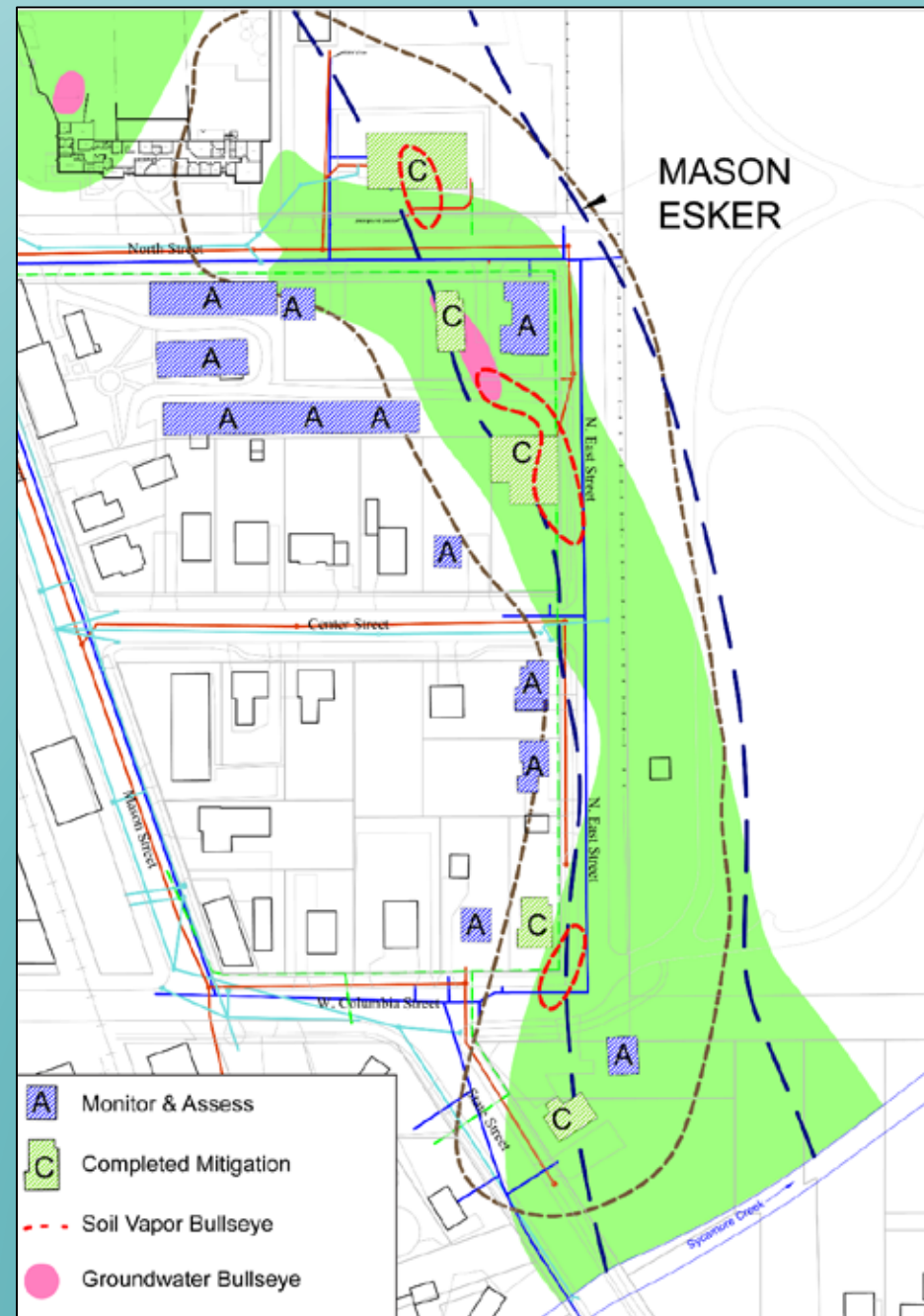
Utilities as Secondary Transport Mechanism

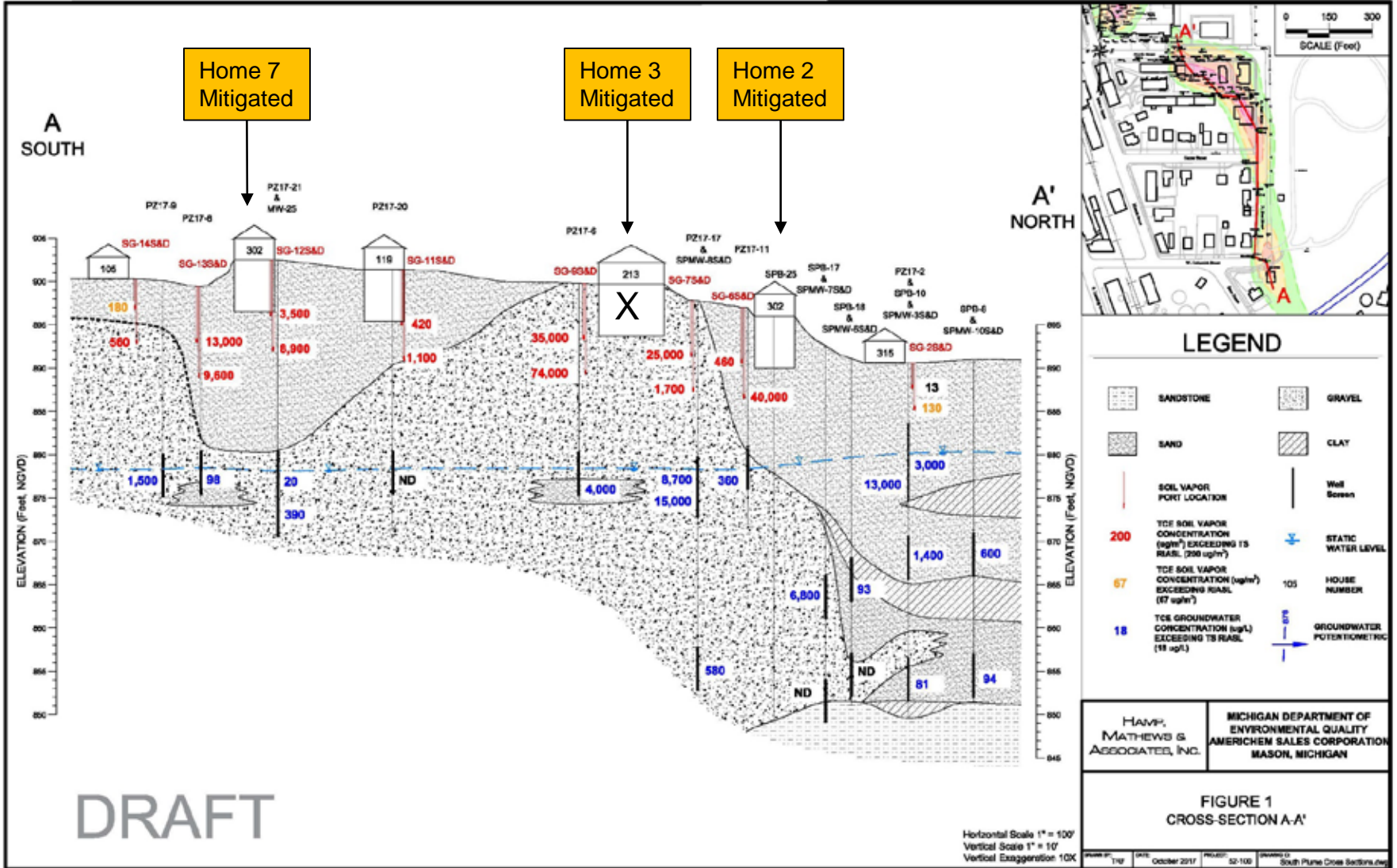
- Chloroform from sewer and water
- Coincident with gaps and cracks
- Utilities capable of transport



Final Mitigation Locations

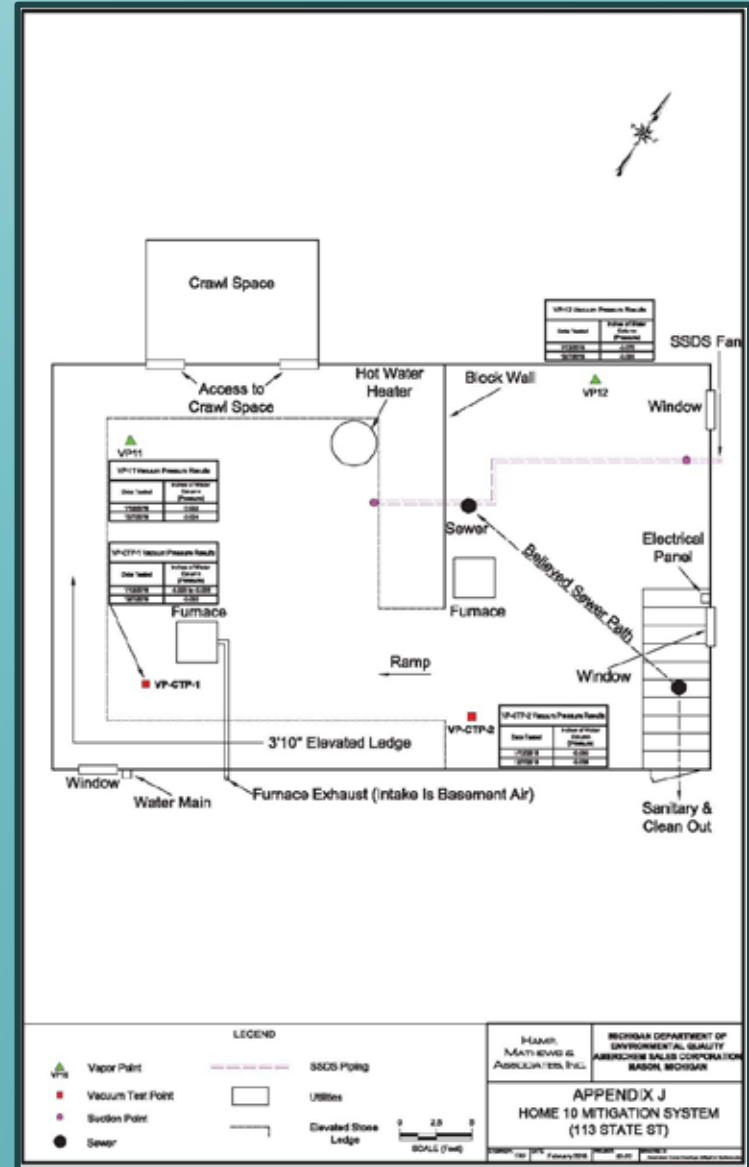
- 5 Mitigation Properties
- 7 Monitor & Assess
- Spatial Relationship to Source/Site Not Reliable for Predictions





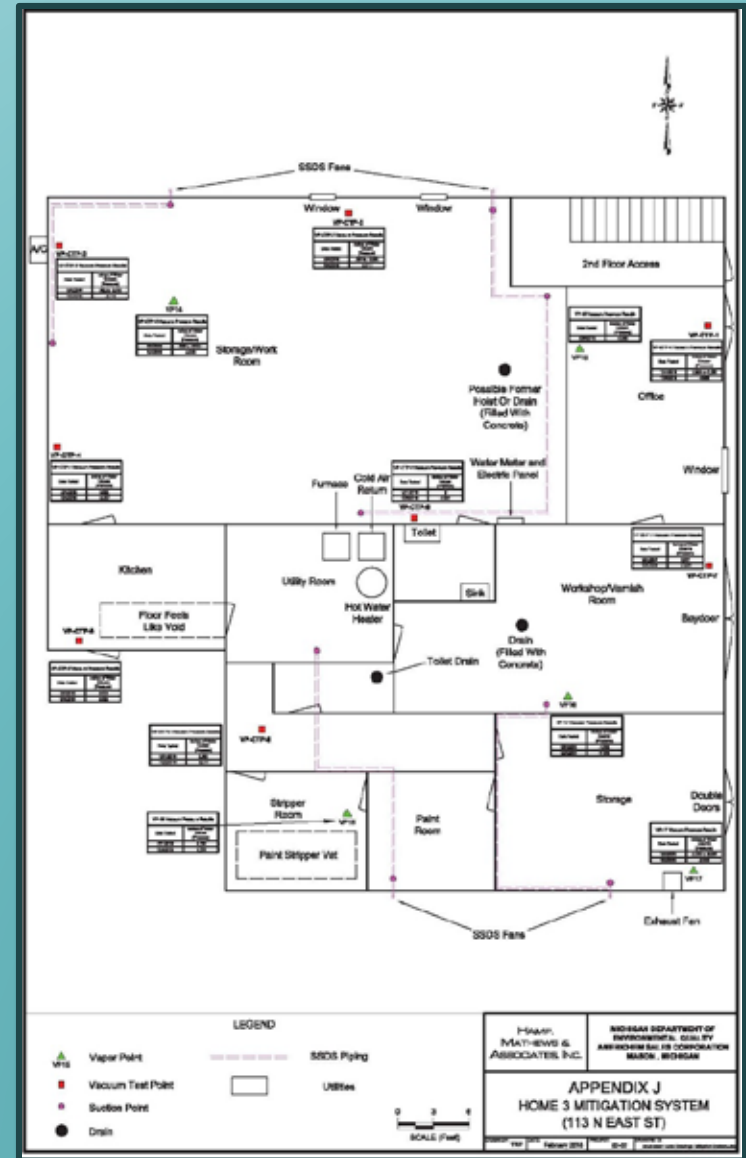
Home 10 Mitigation

- 3-Unit Apartment
- Old Basement, c. 1800's
- 2 Suction Points
- 1 Fan
- Sealed Many Cracks
- Prove-Out Successful



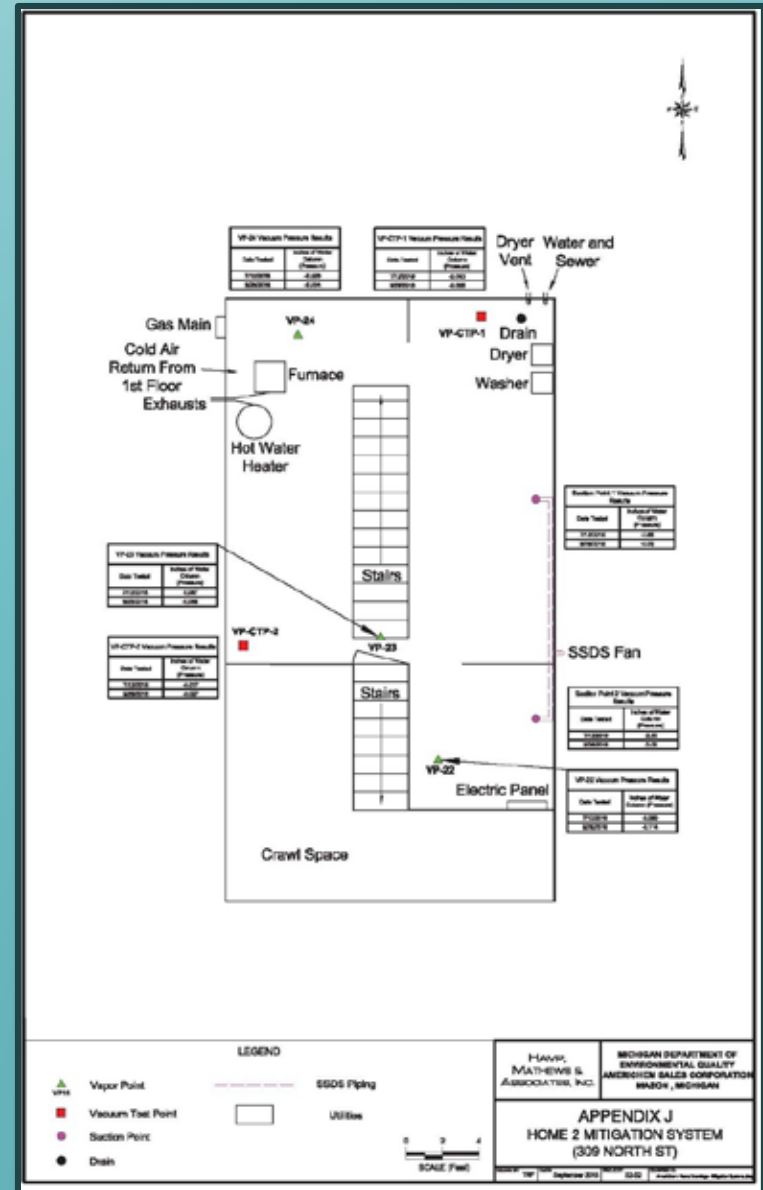
Home 3 Mitigation

- Former Body Shop
- Furniture Repair Shop
- Mixed Use Building
- 6 Suction Pits
- 4 Fans
- Several Sub-slab Obstructions
- Building Specific Design
- Prove-Out Challenging but Successful



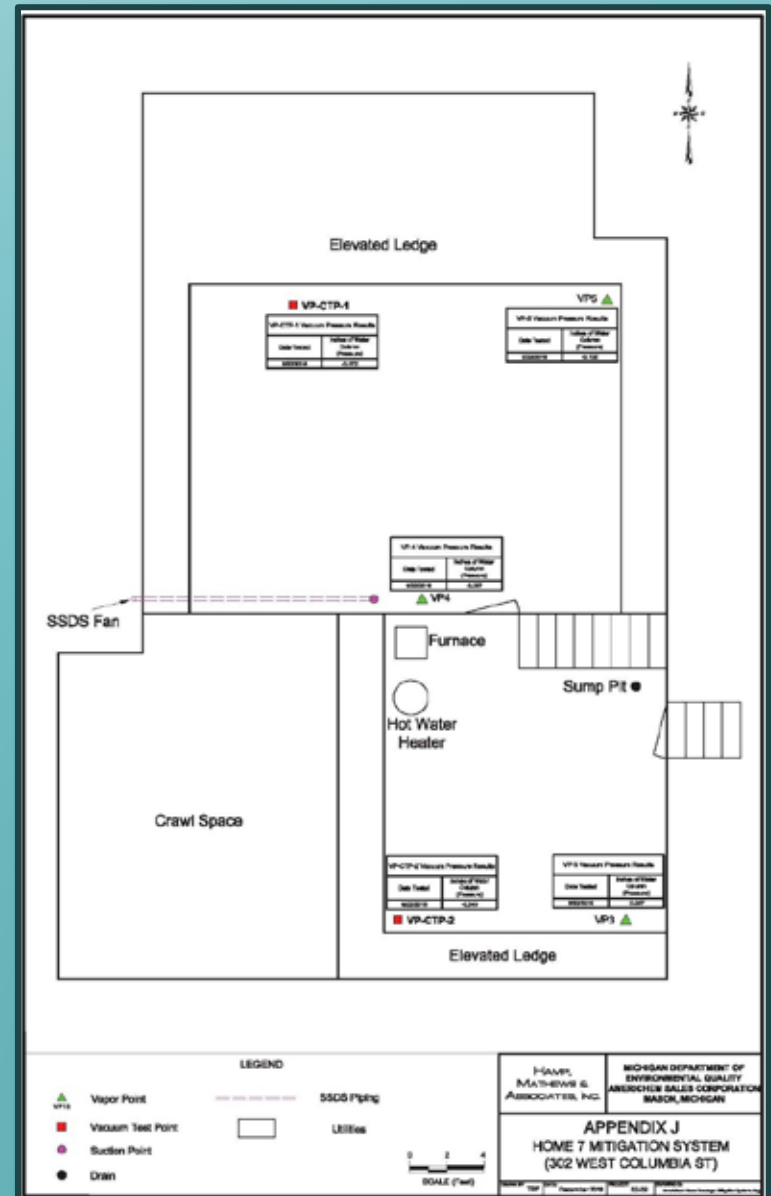
Home 2 Mitigation

- Residential – Old Basement & Crawl
- Sealed Significant Cracks
- 2 Suction Pits & 1 Fan
- Prove-Out Challenging but Successful

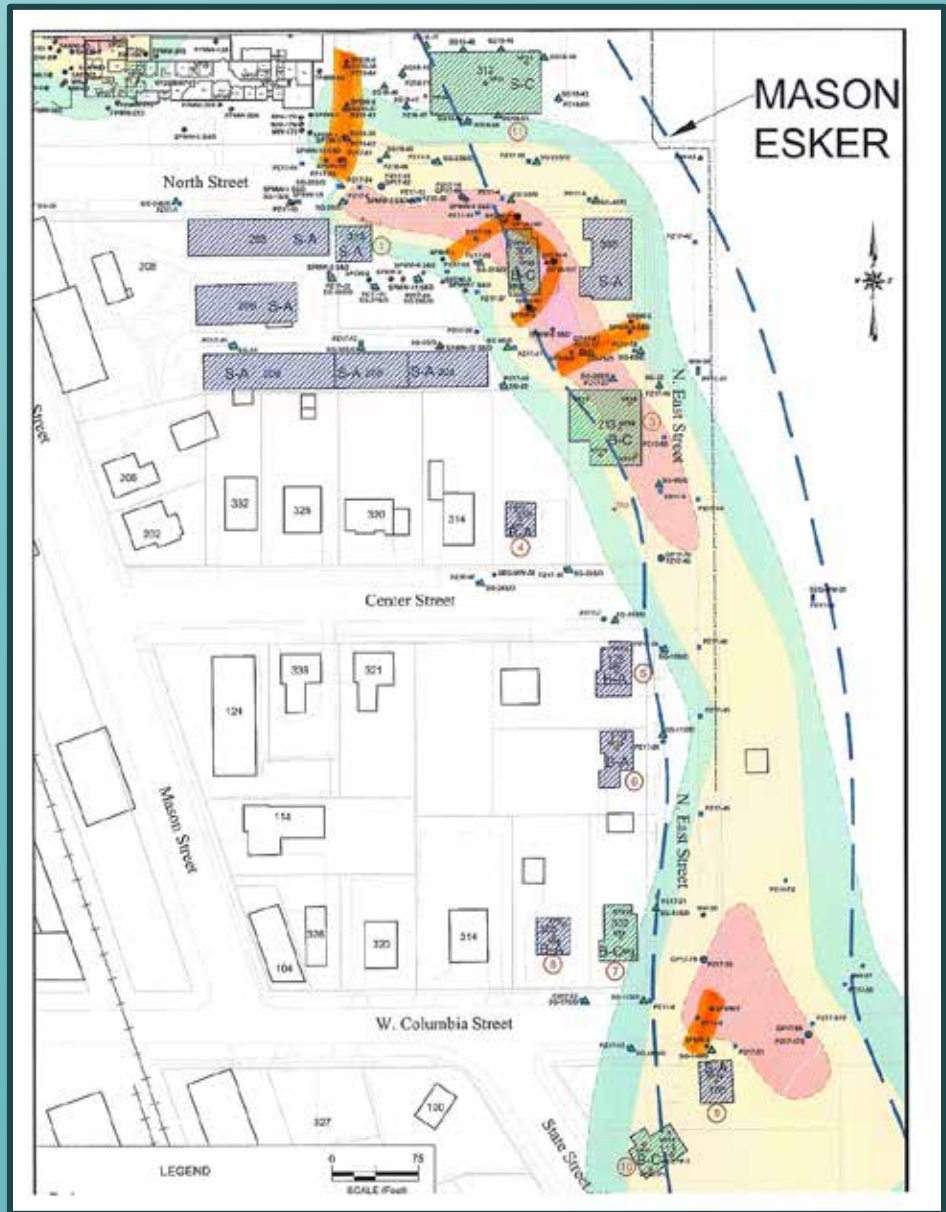
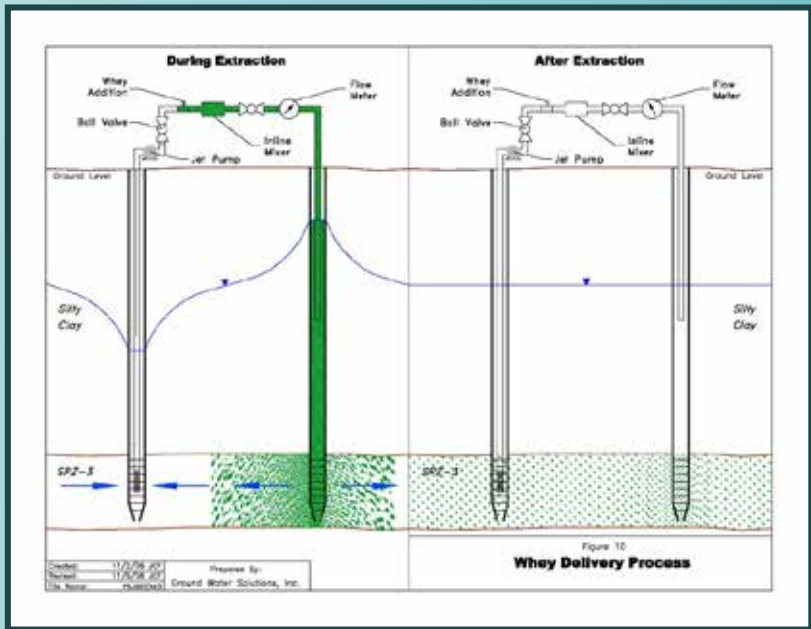
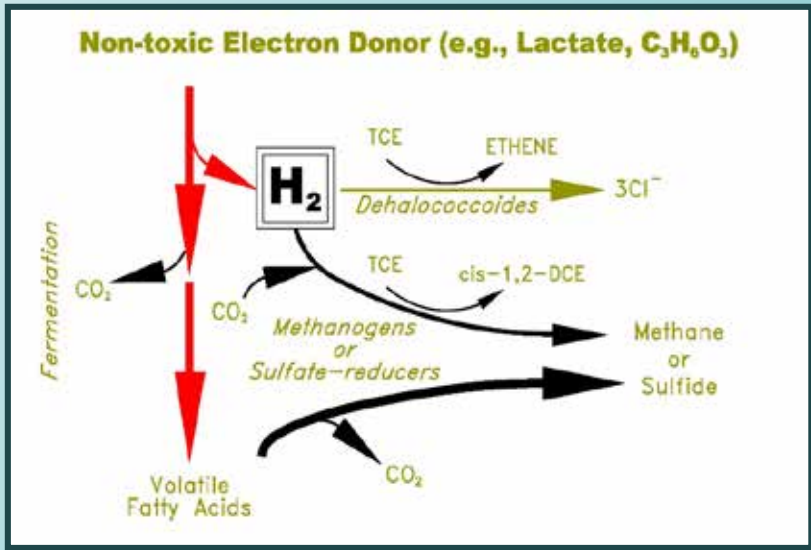


Home 7 Mitigation

- Residential – Old Basement
- Sealed Sump & Significant Cracks
- 1 Suction Pit & 1 Fan
- Simple Design Due to Detailed Diagnostics
- Prove-Out Successful

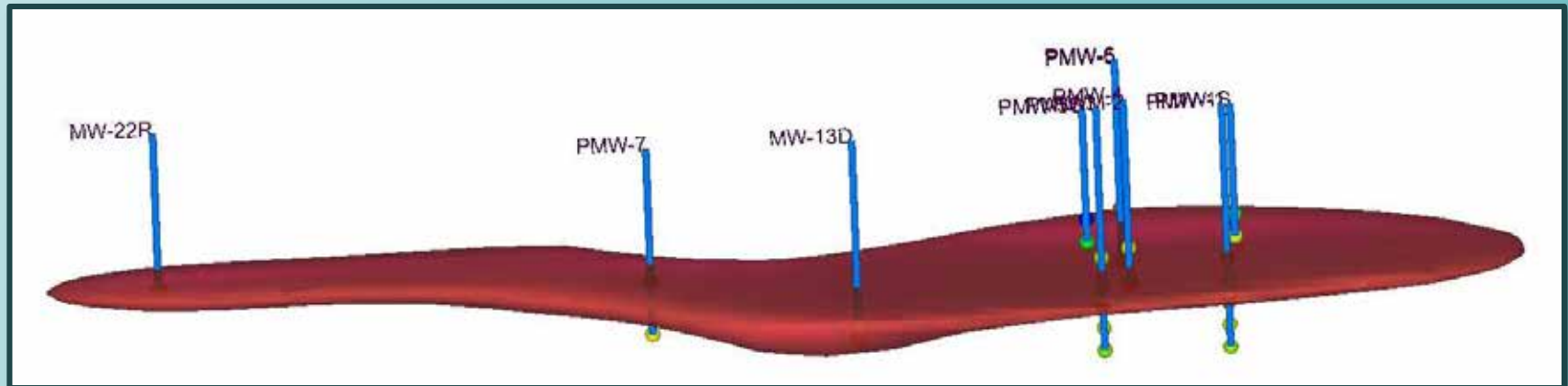


Vapor Source Bioremediation

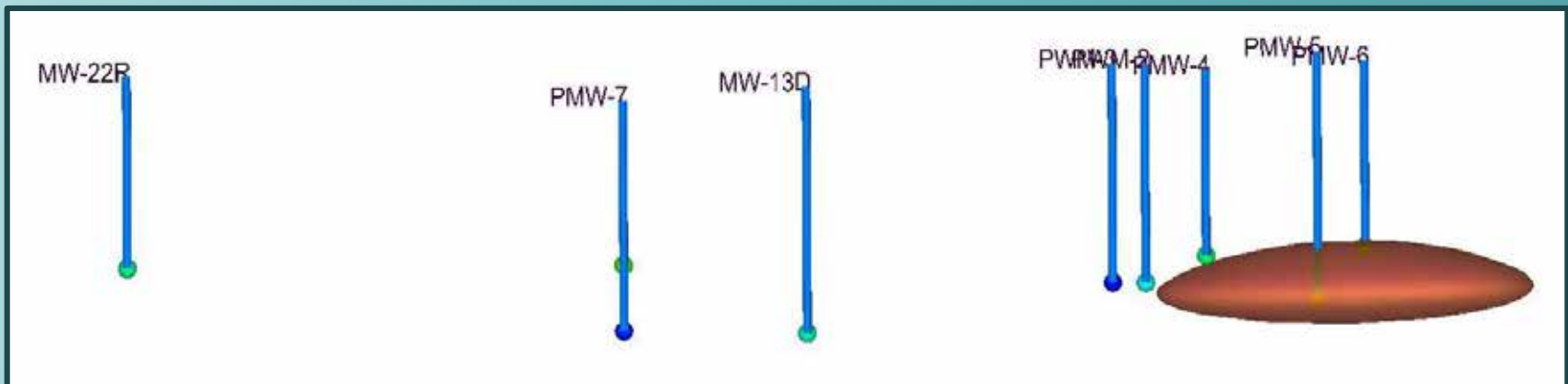


Vapor Source Bioremediation

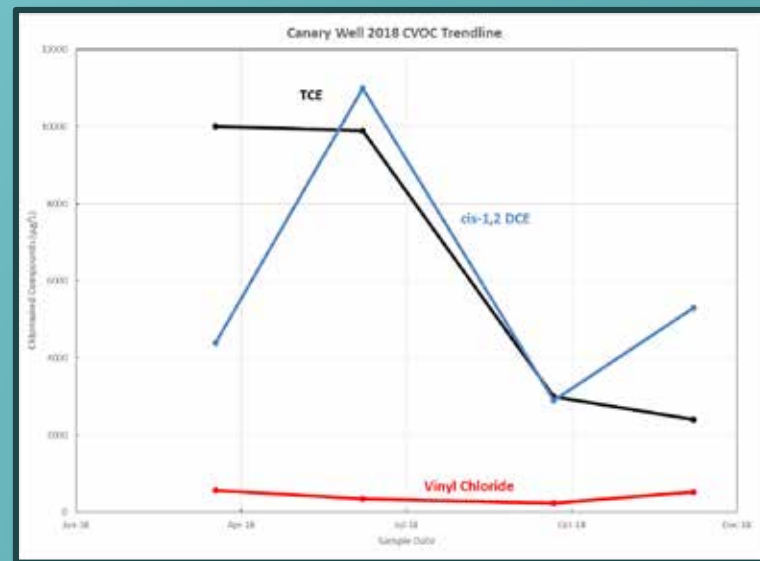
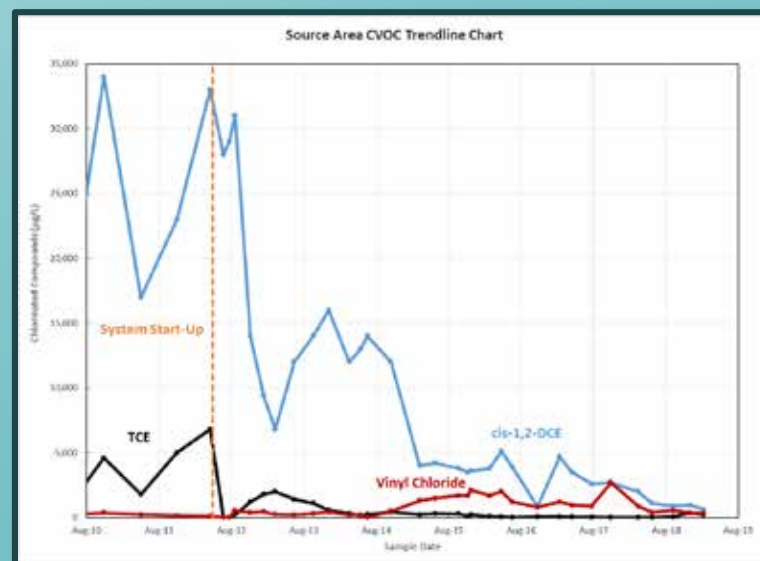
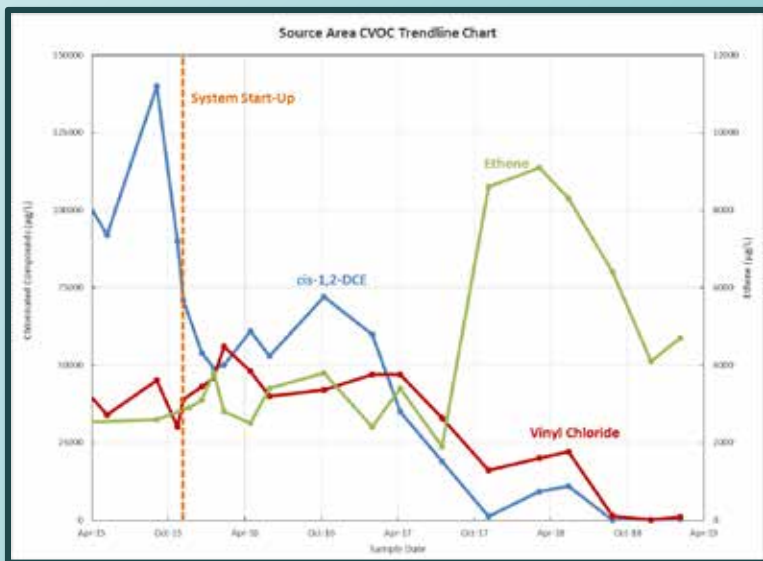
Before



After

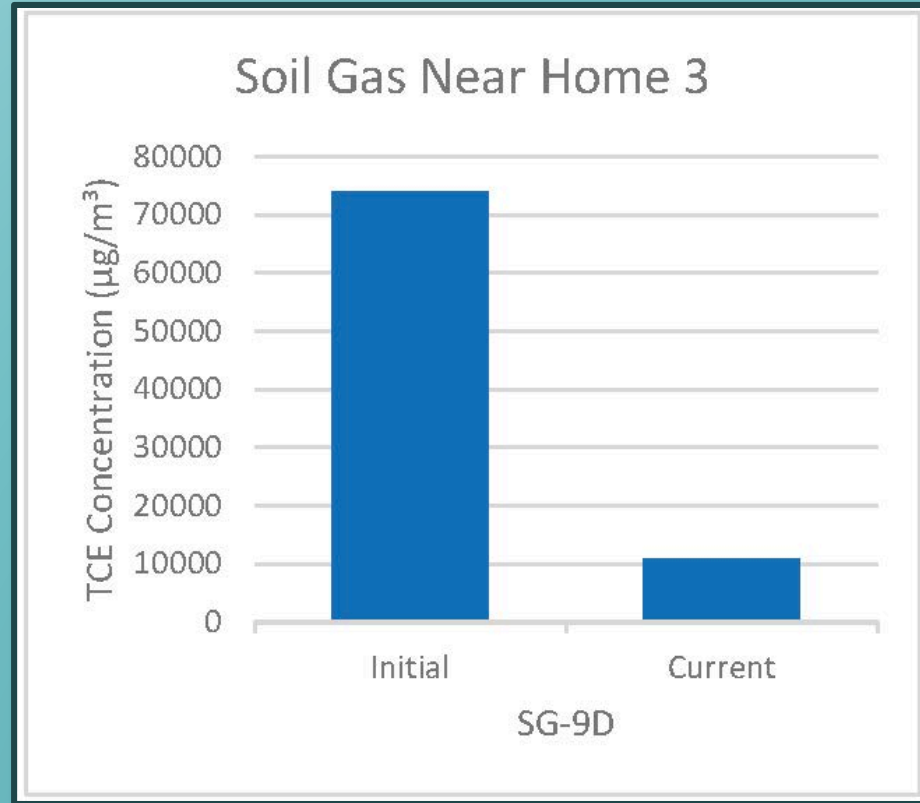
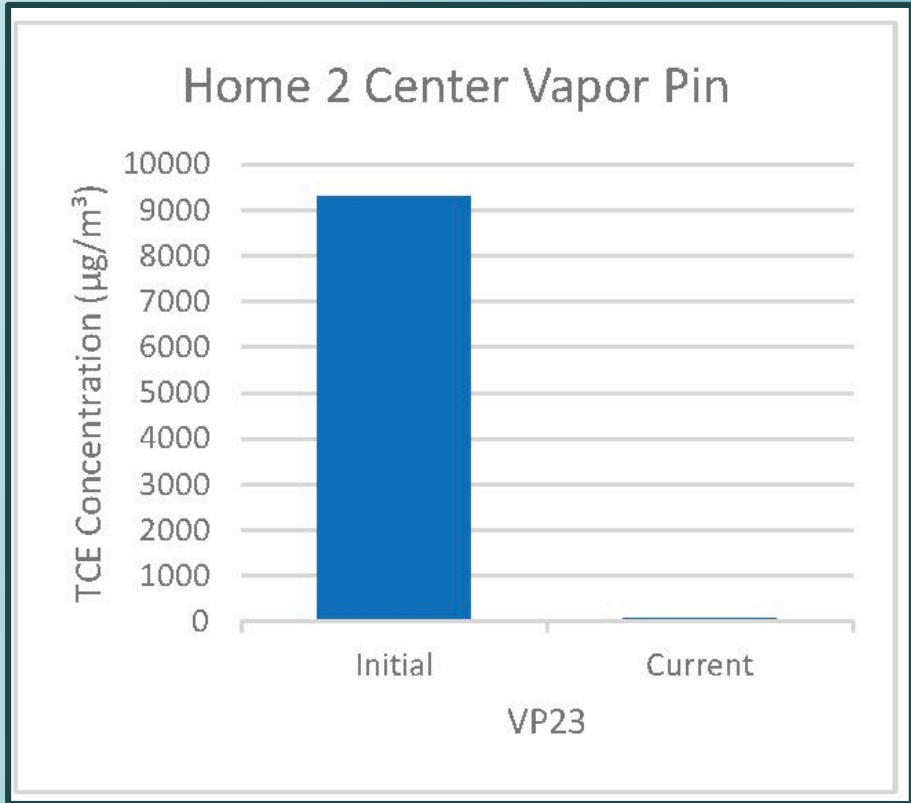


Vapor Source Bioremediation



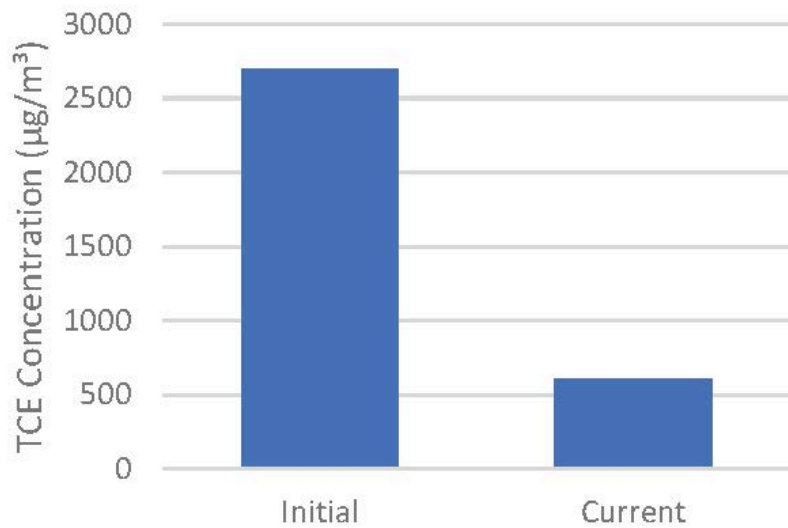
Dehalococcoides Concentration
 2×10^8 cells/liter

Improvements in Soil Gas Quality



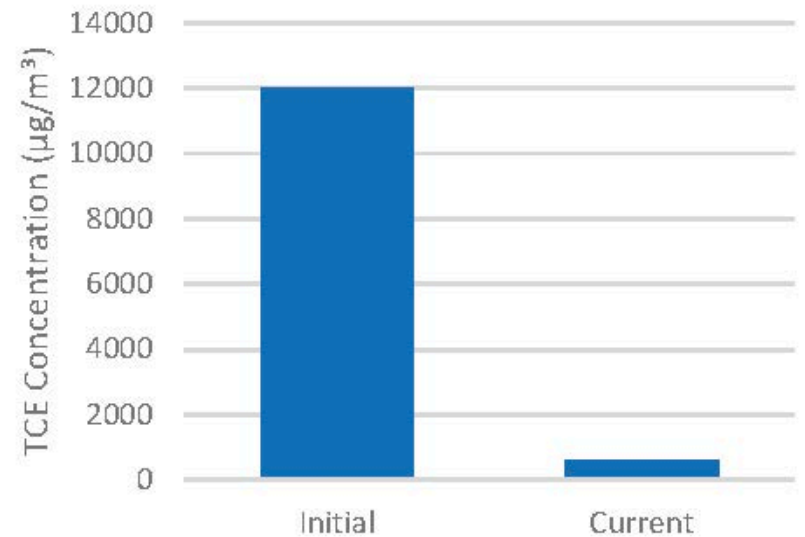
Improvements in Soil Gas Quality

Soil Gas Near Home 10



SG-16D

Home 11 Center Vapor Pin



VP21

Outcomes & Findings

- Assessed 12 Private Properties
- Installed 5 VIAP Mitigation Systems
 - 4 SSDS
 - 1 Air Purifying Units + Bioremediation
- Remediation of Vapor Source
 - Significant Improvement in Vapor Plume
- “Monitor & Assess” at 7 Properties
 - IA < RIASLs After 1 Year, i.e., VIAP Not Complete
- VIAP CSM and Mitigation Very Home Specific
- 100’ Inclusion Zone Valid

Future Activities

- Continued Off-Site Vapor Source Remediation
- Continued VIAP Mitigation System O&M
- Increased Source Area Remediation
 - Intensified Bio
 - N₂ Sparge Pilot to Enhance Bio & Physical Removal

Key Contributors

- Americhem/Bruce Whetter
- MDEQ/EGLE
- Roy F. Weston
- Environmental Consulting & Technology, Inc.
- M.Dybas & Associates LLC

Questions???