Assessing Vapor Intrusion Associated with a Large LNAPL Plume

Kevin Lund, PE, CPG

Michigan Department of Environmental Quality

Tom Kinney, CPG

GHD (Formerly CRA)

October 1, 2015

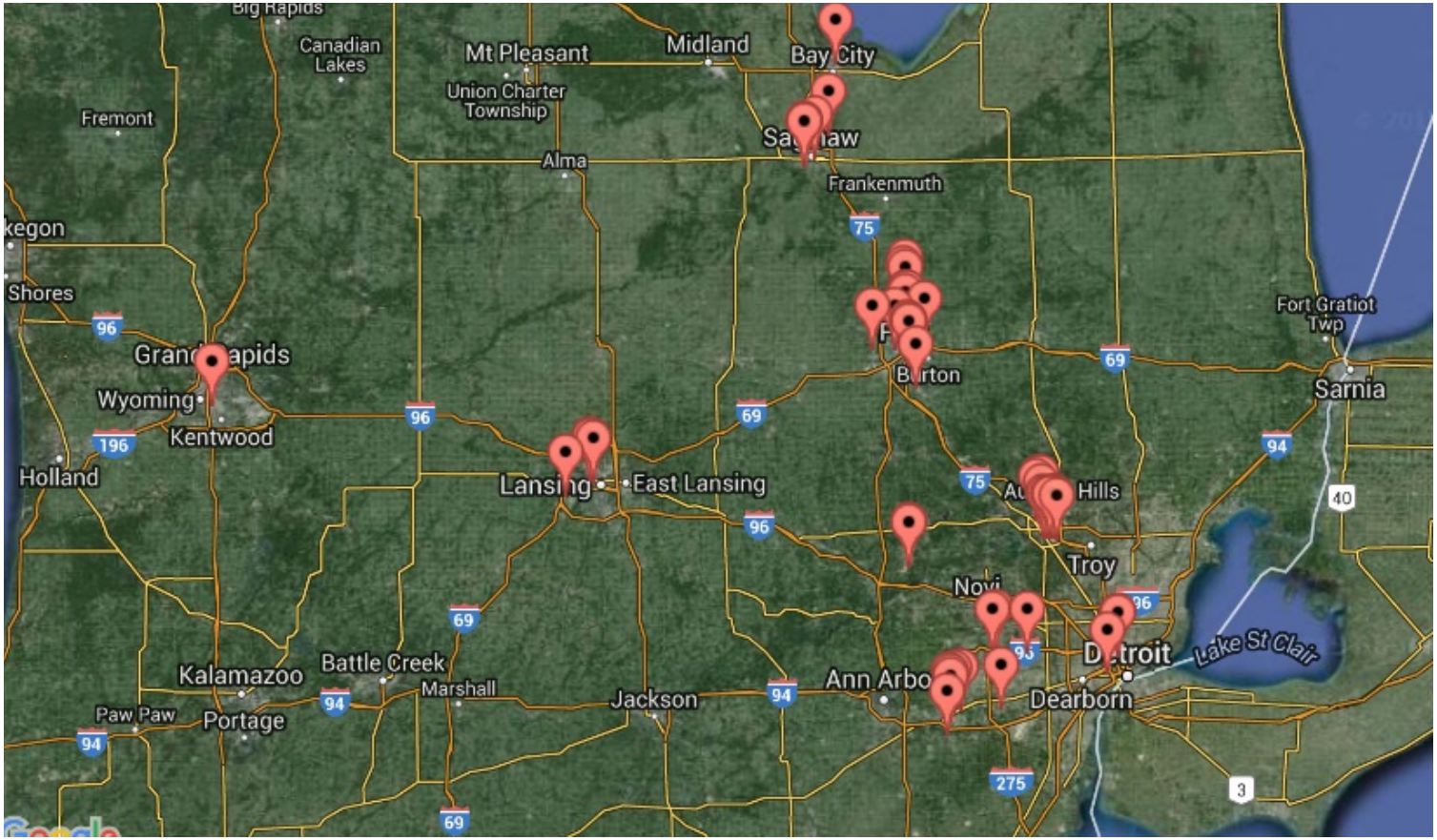
Novi, Michigan

Agenda

- Bankruptcy Settlement Agreement - Creation of RACER Trust
- Part 201 vs RCRA Corrective Action
  - Similarities/Differences
  - How the two regulatory programs are being combined
- Site History
  - Site Use
- VI CSM
- VI Investigation
- Collaboration

GM Bankruptcy Settlement Agreement
June 2009 to October 2010

RACER TRUST CREATED MARCH 31, 2011 MICHIGAN SITES



How the RACER Trust Was Created

- Federal and State environmental regulators used in-house and outside experts to determine necessary remedial and administrative costs for each site
- Largest environmental response trust in any bankruptcy case to date

Why the States and the U.S. Entered Into the Trust

} Avoids unaddressed contamination and abandoned properties in bankruptcy

} Promotes property redevelopment and other economic and employment opportunities

} Returns property to municipal/city tax rolls

} Not Many Other Attractive Options….

Working Together

Key Elements

- RACER conducts and pays for cleanups.
- Cleanups approved by state and/or federal regulatory agencies.
- RACER can sell or lease properties even before cleanups begin or are completed, as long as RACER access is guaranteed.
- RACER's goal is to obtain "No Further Action" letters from environmental regulators for all locations where cleanups are required.

Our Missions Align

The Michigan Department of Environmental Quality promotes wise management of Michigan's air, land, and water resources to support a sustainable environment, healthy communities, and vibrant economy.

RCRA CA and Part 201

RCRA/Part 111 vs. Part 201

- Liability scheme
- Environmental protection standards, including:
  - September 2012 criteria
  - Background soils
  - Vapor intrusion MIOSHA provisions
  - EPA VI Guidance
- Waste classification
- Administrative processes, including:
  - Terminology
  - Reporting/Tracking
  - 525 Deed Notices

We Can Do It!
WAR PRODUCTION CO-ORDINATING COMMITTEE

Willow Run Area Partnership

RACER Trust

Redevelopment
Bruce Rasher

Remediation
Grant Trigger
Dave Favero

GHD

Beth Landale, PE
Tom Kinney, CPG

MDEQ

Remediation and Redevelopment Division

Mitch Adelman
Kevin Lund, PE (Project Manager)
Michael McClellan

Hazardous Waste Section, Office of Waste Management and Radiological Protection

Deb MacKenzie-Taylor
John McCabe
De Montgomery

Area

0
1000
2000ft
WILLOW RUN POWERTRAIN
YCUA WWTP
WILLOW RUN AIRPORT
FORMER WILLOW RUN ASSEMBLY PLANT
TYLER POND
DAM
WILLOW RUN COMPANY VEHICLE OPERATIONS (CVO)
FONS LANDFILL (CLOSED)
WILLOW RUN SLUDGE LAGOON (CLOSED)
EQ LANDFILLS
OLD WAYNE LANDFILL (CLOSED)
EDISON POND
BELLEVILLE LAKE

History

- RCRA Corrective Action Site located in Michigan
- 315 acres with a building footprint of approx. 3.8 million ft^2

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AT HISTORIC WILLOW RUN

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GHD

DEQ

Background

- Originally developed in 1941 as a bomber production plant
- Over the following years the plant was used to produce airplane and automobile components
- Plant ceased operations in 2010

SOUTH ELEV. R-2 JOB
4-15-42

BOMBER · EAST END ASSEMBLY BLDG. LOOKING N.W.
4-15-42

FORD BOMBER - SOUTH ELEV. OF EAST END ADDITION TO MAIN BLDG.
4-23-42

FORD BOMBER · EAST END ADDITION LOOKING N.W.
6-5-42

Background

A 138,900 square foot portion of the main plant building is being redeveloped

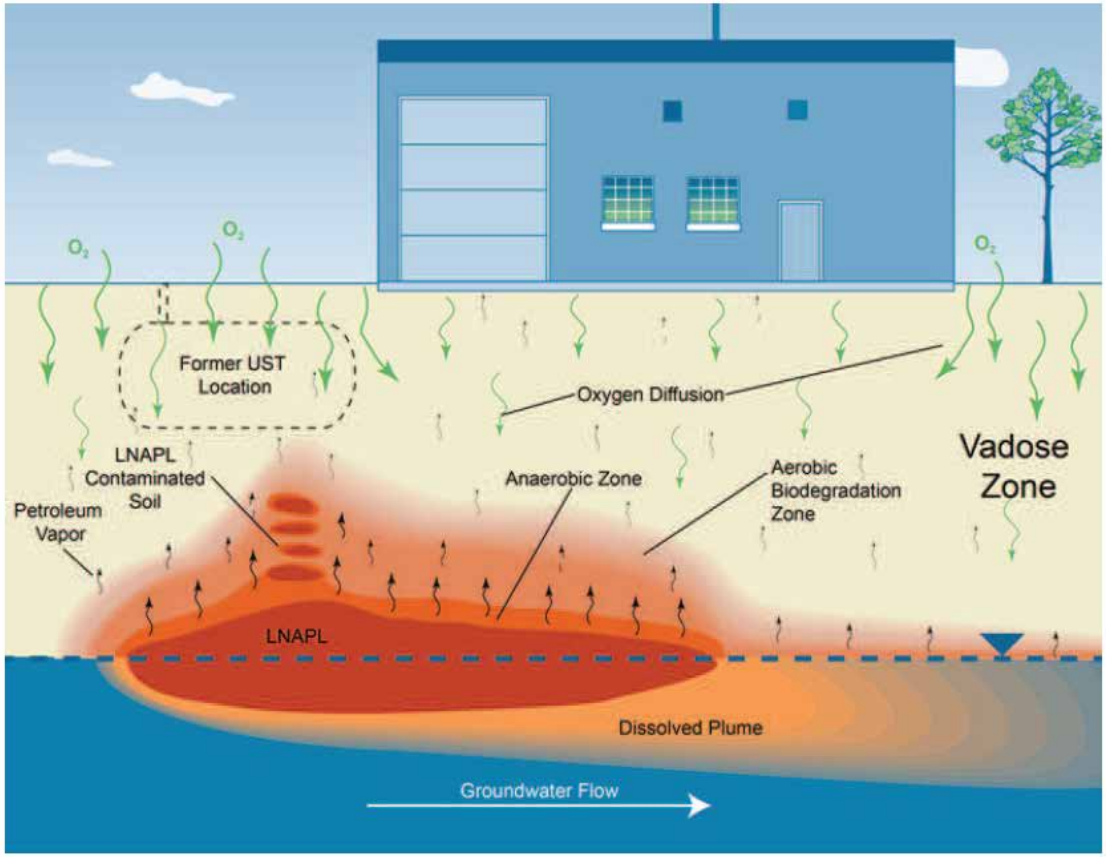
Background

Steam tunnel ran under the portion of the building that was left in place

Background

YAM Case Study Agenda

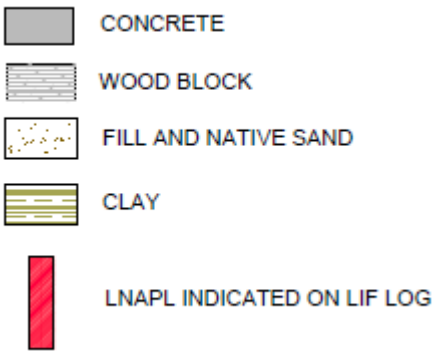
- Background
- Conceptual Site Model (CSM)
- DEQ Timeline
- Investigations and Sampling
- Results
- Conclusion

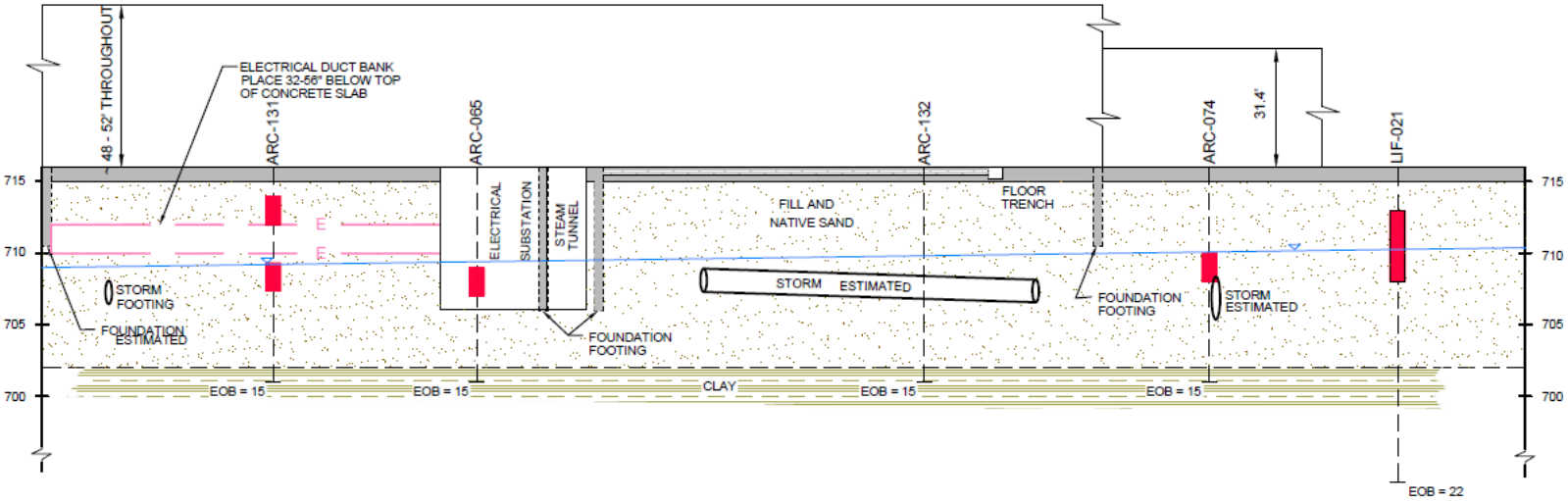


General conceptual model for the PVI pathway.
ITRC – Petroleum Vapor Intrusion, October 2014

CSM

- Source depth and location
- Geology and hydrogeology
- Chemical type/LNAPL type
- Potential receptors
- Building Characteristics
- Steam tunnel, former electrical conduits, former trenches and footings and foundations

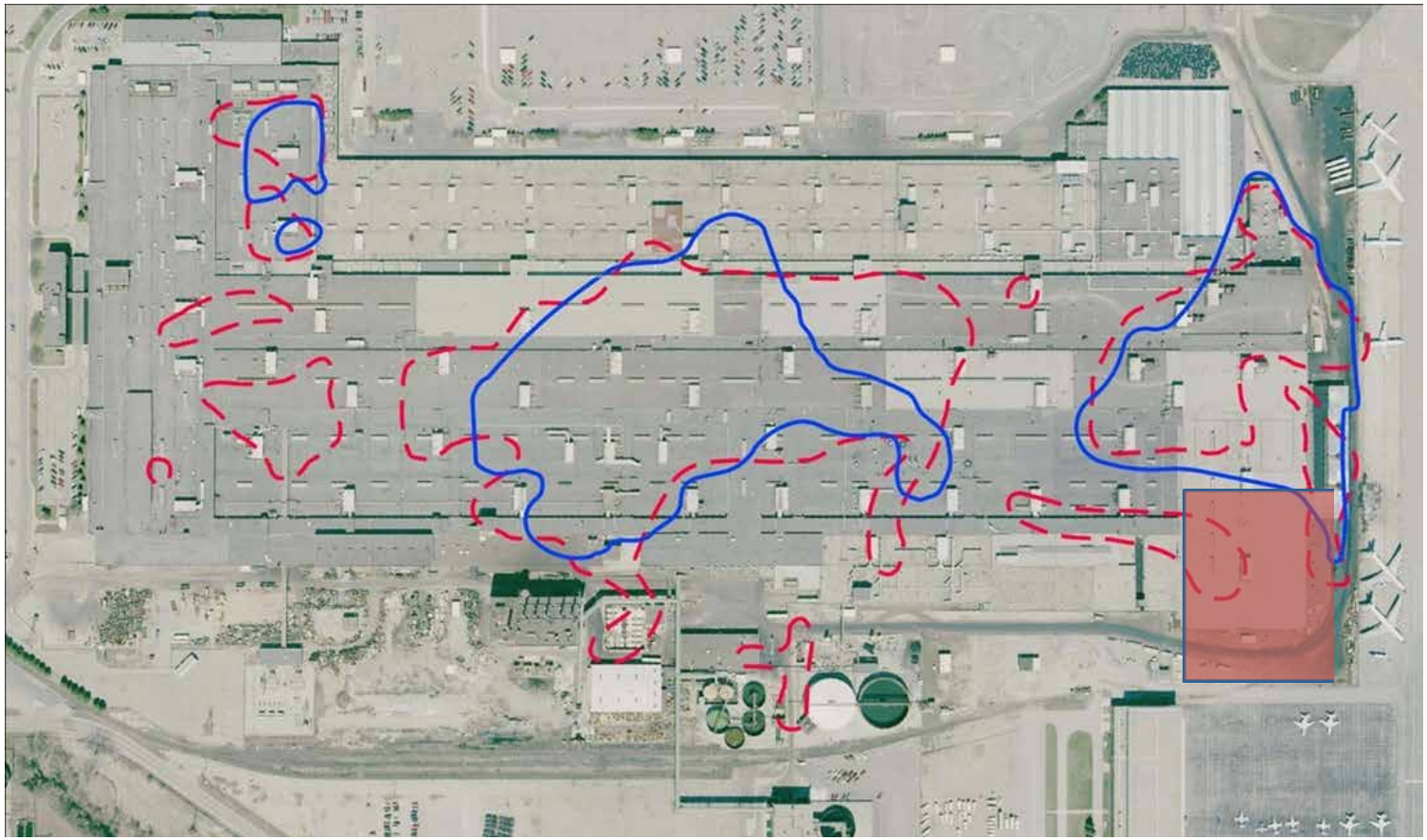




CSM

- BBM
- Building Characteristics
- Large open areas
- >43,000 ft^2
- Ceilings >36ft
- Slab on grade with concrete >6 inches

CSM-LNAPL Plumes



LNAPL Limits defined by in well thickness (2008)

Extent of LNAPL defined by LIF investigation and in well thickness (2011)

YAM portion of Site

CSM-LNAPL Plumes

- Two major LNAPL plumes located at the Site
- The plumes are located under the eastern and central portions of the remaining plant slab
- Plumes are a mixture of 3 types of oil that have accumulated from trenches, storage tanks, and spills over the many years of plant operations
- Plumes have a combined footprint of approximately 45 acres.

CSM-LNAPL Plumes

- A portion of the eastern plume sits directly under approximately 35% of the remaining portion of the plant
- LNAPL is typically present at a depth of approximately 5-7 feet below grade
- LNAPL was the main driving force in the vapor intrusion investigation

YAM portion of Site

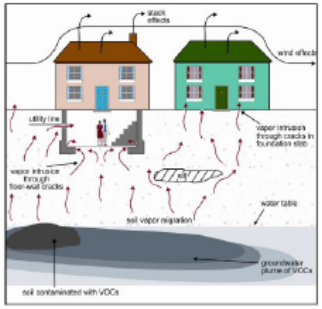
VI Investigation Timeline

- **Feb. 2012**: Site wide soil gas investigation - collected soil gas samples biased over LNAPL areas
- **June 2014**: VI Taps team meeting
- **Oct. 2014**: YAM soil gas investigation
- **Nov. 2014**: Collected soil, GW, and LNAPL samples under YAM
- **Spring 2015**: Determined COCs, worked with DEQ on VI sampling protocol
- **March 2015**: Hands on dry run of sampling training with Lab, GHD, and DEQ
- **March 2015**: YAM soil gas investigation (TO-15 and TO-17), TAPs team reps onsite to observe field work

DEQ/EPA PVI Guidance

Guidance Document
FOR THE VAPOR INTRUSION PATHWAY

MAY 2013
REMEDIATION AND REDEVELOPEMENT DIVISION



Prepared by:
Michigan Department of Environmental Quality
Remediation and Redevelopment Division
525 West Allegan Street
Lansing, Michigan 48933

Protecting Michigan's Environment. Ensuring Michigan's Future.

United States Environmental Protection Agency

EPA 510-R-15-001

Technical Guide For Addressing Petroleum Vapor Intrusion At Leaking Underground Storage Tank Sites

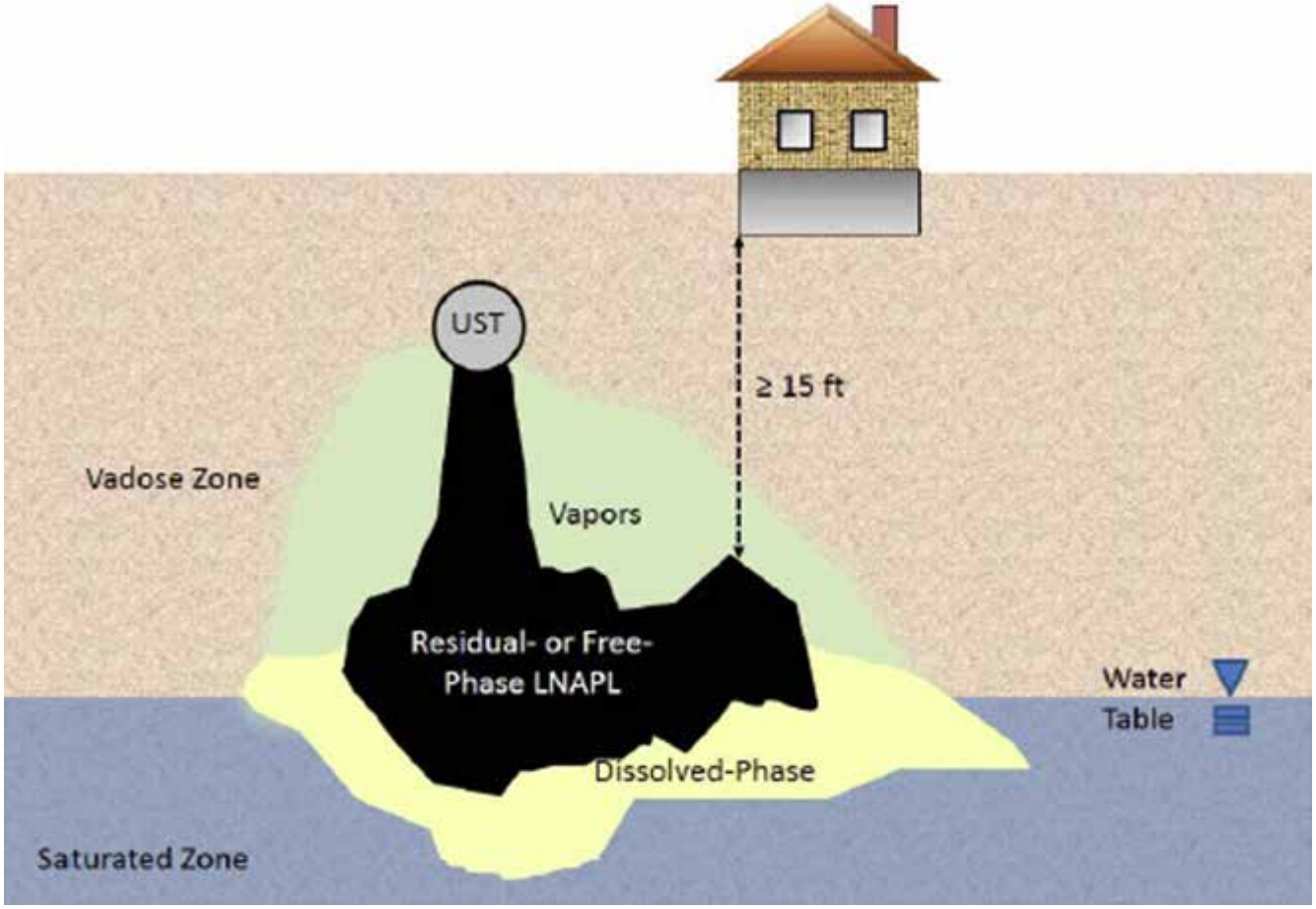
U.S. Environmental Protection Agency
Office of Underground Storage Tanks
Washington, D.C.

June 2015

Petroleum VI Guide Rationale and Applicability

- PHCs are aerobically biodegradable (in contrast to chlorinated solvents)
- Focused on typical gas station sites
- May be helpful understanding PHC releases at other sites
- ITRC PVI Guidance Document (Oct. 2014) provides several other applicable sites

PVI Guide Rationale and Applicability



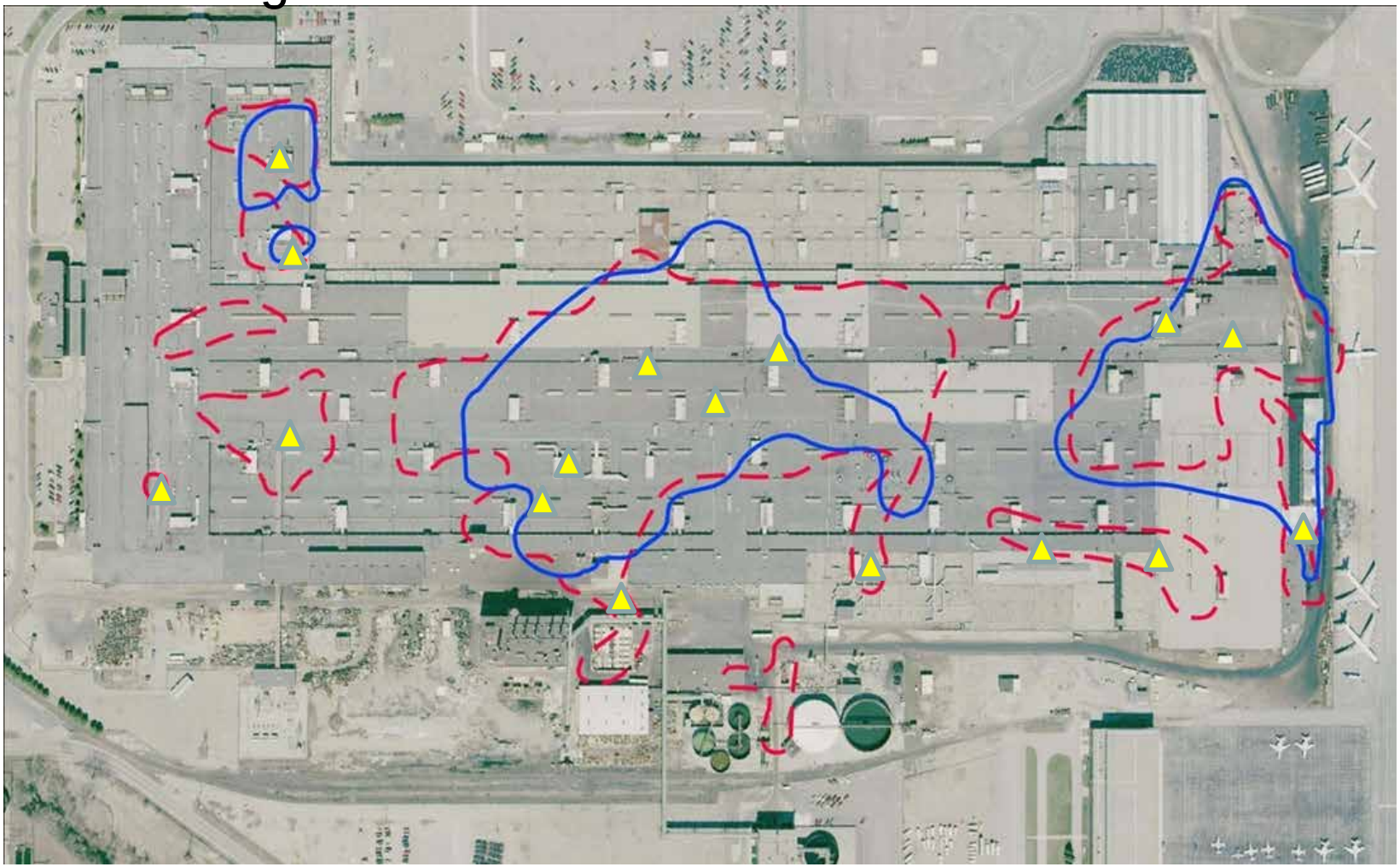
U.S. Environmental Protection Agency

Previous Investigation Results

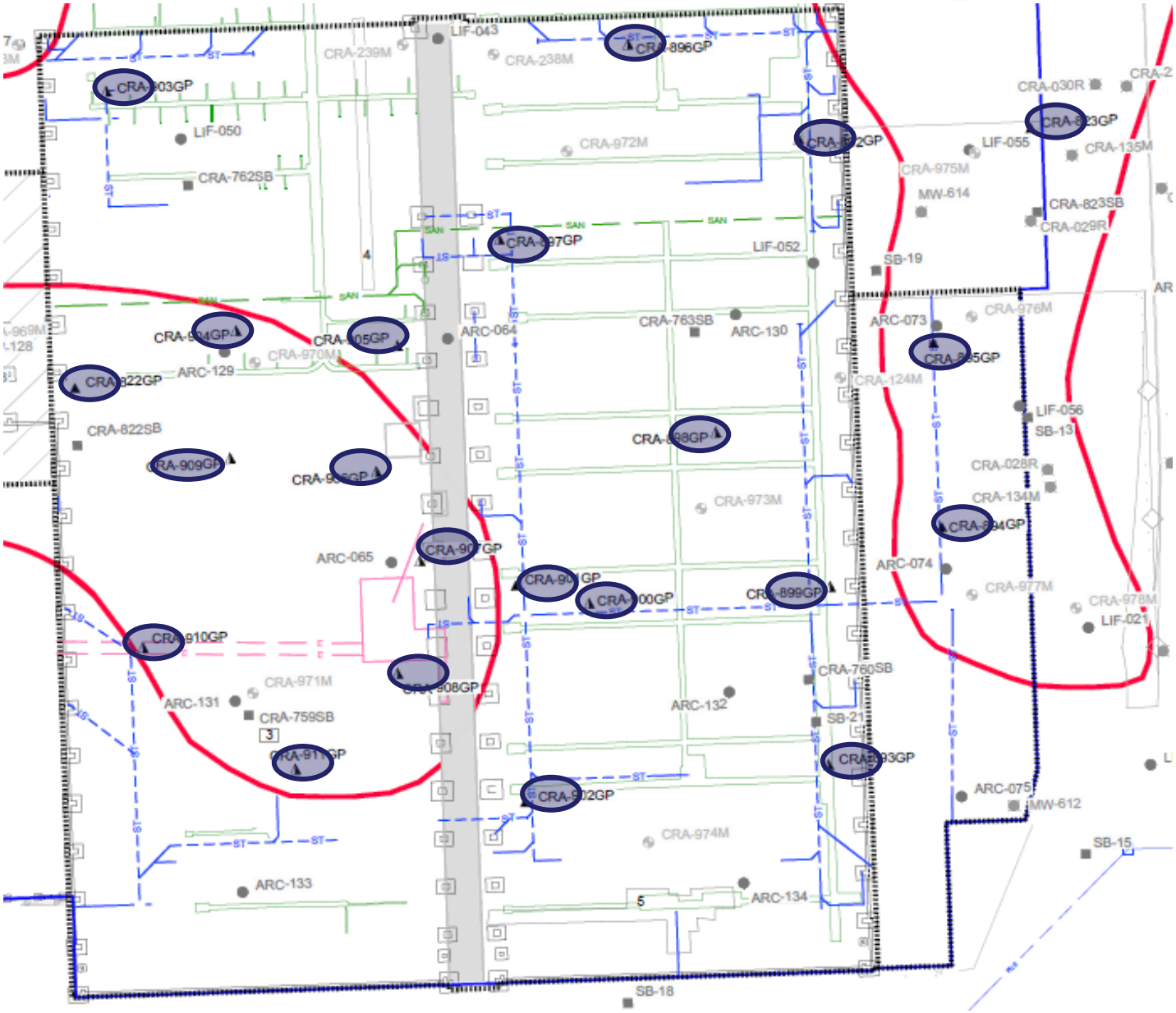
- Previous sub slab soil gas investigations at the site have been conducted for VOCs (TO-15)
  - 2012: Site wide sub slab soil gas investigation
  - 2014: First round of sub slab soil gas investigation in YAM
  - No VOC concentrations were present above generic non-residential screening levels during any of the previous investigations
- Due to the presence of the LNAPL, additional investigation to evaluate other compounds other than VOCs was recommended

2012 Soil Gas – Site wide

- 16 Locations sampled across the site
- No individual VOCs exceeded non-residential sub slab screening levels



2014 YAM VI Investigation



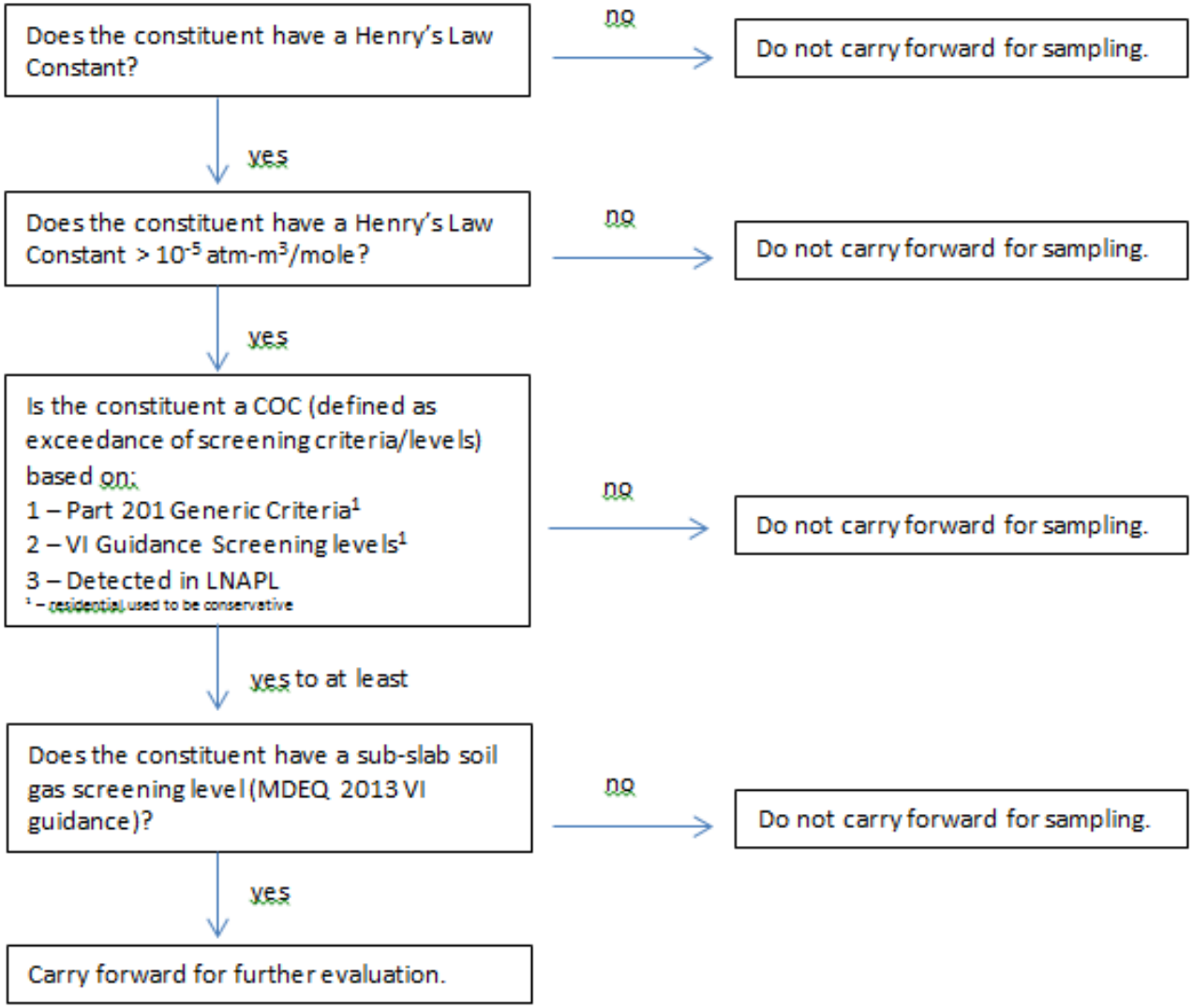
2014 YAM VI Investigation

- 22 locations selected and biased near potential sources (LNAPL), utilities etc.
- All locations screened with GEM, PID and sampled for laboratory analysis (TO-15)
- No individual VOCs exceeded non-residential sub slab screening levels
- Methane detected at two locations, one >25% LEL (1.25% by volume in air)
  - Concentrations of methane from lab analysis from the two locations below 1.25%
  - 2 Additional rounds of field monitoring did not confirm methane > 1.25%

Basis for Post Demo YAM Investigation

- VI assessment vs Presumptive Mitigation
- Multiple lines of evidence
- Historical analytical results of biased (worst case) soil, groundwater, soil gas, and LNAPL data were used to determine constituents of concern (COCs)
- Evaluation included review and comparison of the MDEQ and USEPA published Henry's law constant, Michigan Part 201 screening levels, Michigan VI Guidance screening values, detections of constituents in LNAPL, and EPA COCs for VI

Flow Chart Evaluation



RCRA Work Plan Addendum No. 4, GHD, March 2015

COC Selection

Using the flow chart evaluation, 25 constituents were identified to be carried forward for sampling

Gas
Methane
SVOCs
1,2,4-Trichlorobenzene
2-Methylnaphthalene
Dibenzofuran
Fluorene
Naphthalene
Phenanthrene
Pyrene
VOCs
1,1,1-Trichloroethane
1,1-Dichloroethane
1,1-Dichloroethene
1,2,4-Trichlorobenzene
1,2-Dichlorobenzene
Benzene
Chloroethane
cis-1,2-Dichloroethene
Cyclohexane
Ethylbenzene
Isopropyl benzene
Methylene chloride
Tetrachloroethene
Toluene
Trichloroethene
Vinyl chloride
Xylenes (total)

Sampling Methodology

- TO-15: VOCs collected and analyzed utilizing the MDEQ recommended method using Bottle-Vacs
- TO-17: SVOCs collected and analyzed utilizing absorbent tubes

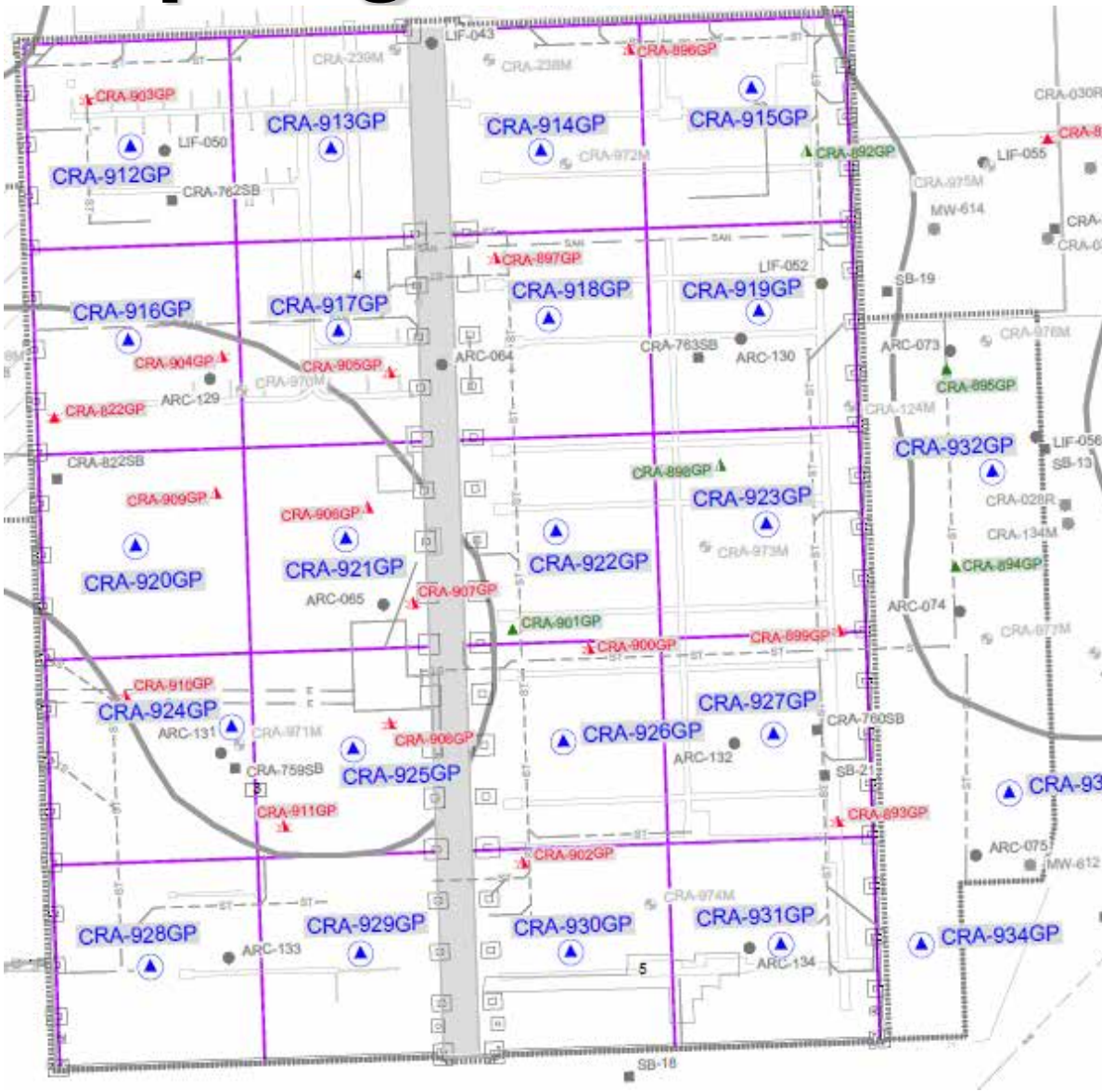
Although a specific list of COCs was identified using the flow chart, after the analysis, RACER and DEQ agreed that **all** of the sample locations would report a full laboratory specific list of VOCs and SVOCs – including all site specific COCs.

Sampling Plan

- MDEQ May 2013 Guidance Document for the Vapor Intrusion Pathway was utilized to prepare the sample plan for the YAM portion of the Site
- Given the large size and open area of the YAM building (approximately 138,900 ft^2), the ceiling height, and the thick concrete slab the big building model approach was used to develop the overall VI Sampling Strategy

Sampling Plan

- A sample grid of 80 ft by 80 ft was selected
- This grid size is referenced in the big building model as the largest suggested grid size

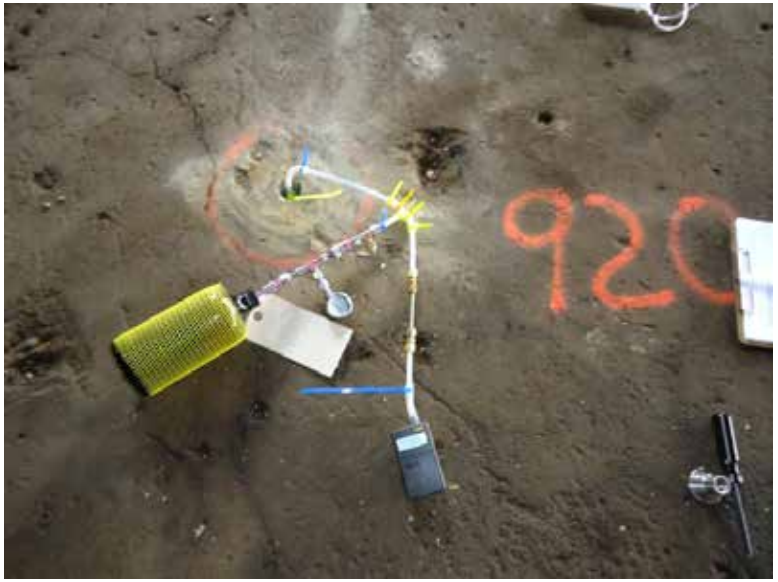


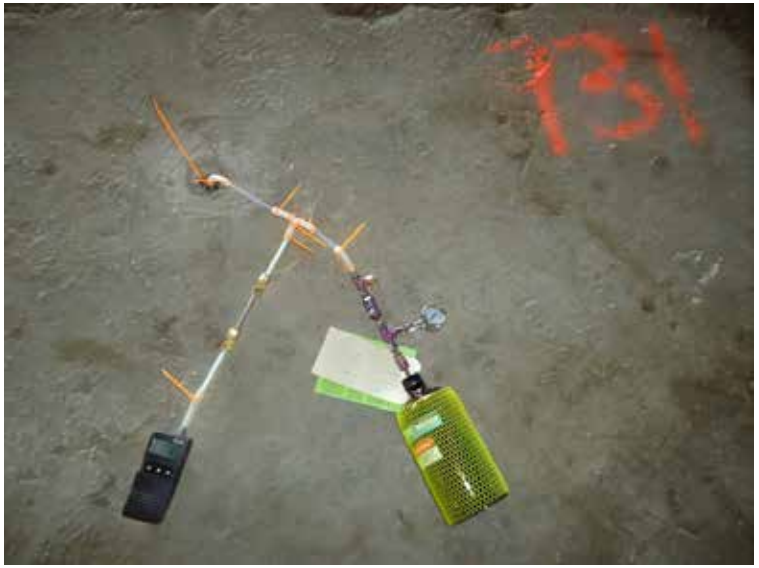
Sub-slab Soil Gas Probe Installation

- No Deep Soil Gas Probes
- Vapor Pins installed
- During the installation process, each location was field monitored for methane and VOCs.
- No methane or VOCs were detected during the installation of the vapor pins.
- The vapor pin installation followed the standard operating procedure (SOP) presented in the MDEQ VI guidance

Sample Locations

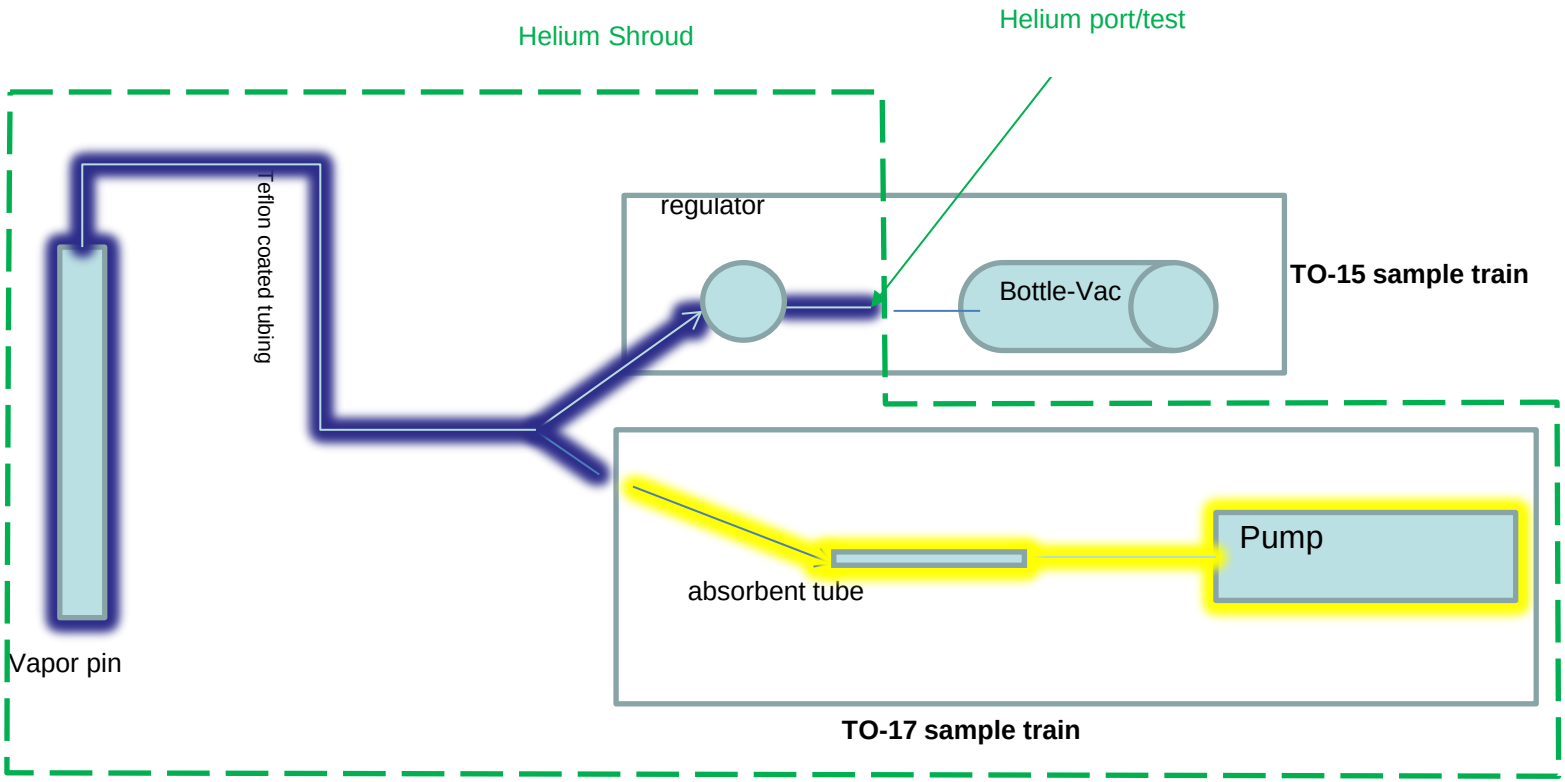
27 Locations were sampled for VOCs and SVOCs utilizing TO-15 and TO-17





Sampling Procedures

Schematic of the sample train/set up that was utilized at each location

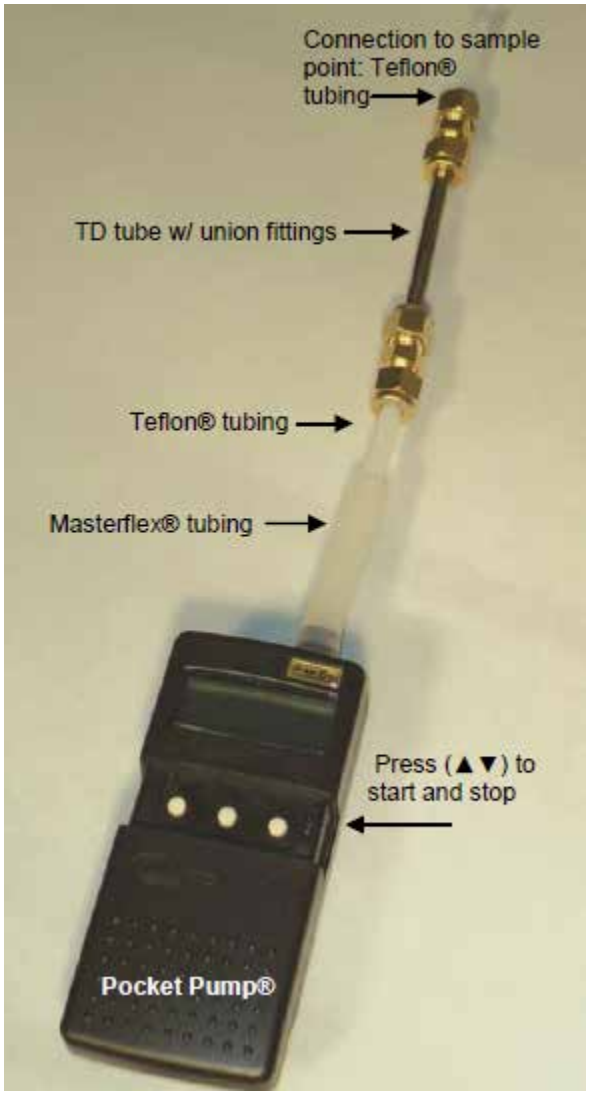


Sampling Procedures

- T0-15: A Bottle-Vac with flow regulator was used at each location to collect the sample.
- A helium shroud was set up at each location to test each sample set up for leaks before the sample was collected
- The TO-15 sampling activities followed the SOP for VOCs presented in the MDEQ VI guidance

Sampling Procedures

- TO-17: A small sample pump and thermal desorption tube was used at each location to collect the sample
- Leak test for the TO-17 tubes for each location



Results

- A total of 27 locations
- TO-15 and TO-17 Analysis
- Compared to residential and non-residential shallow soil gas screening levels (MDEQ, 2013)

Results

<u>VOCs</u>

- 22 VOCs were detected at various sample locations
- No samples exceeded non-residential screening levels for VOCs.
- Three sample locations had VOC detections above the residential screening levels

Results

<u>SVOCS</u>

- 5 SVOCs detected at various sample locations
- No sample locations exceeded residential or non-residential screening levels for SVOCs.

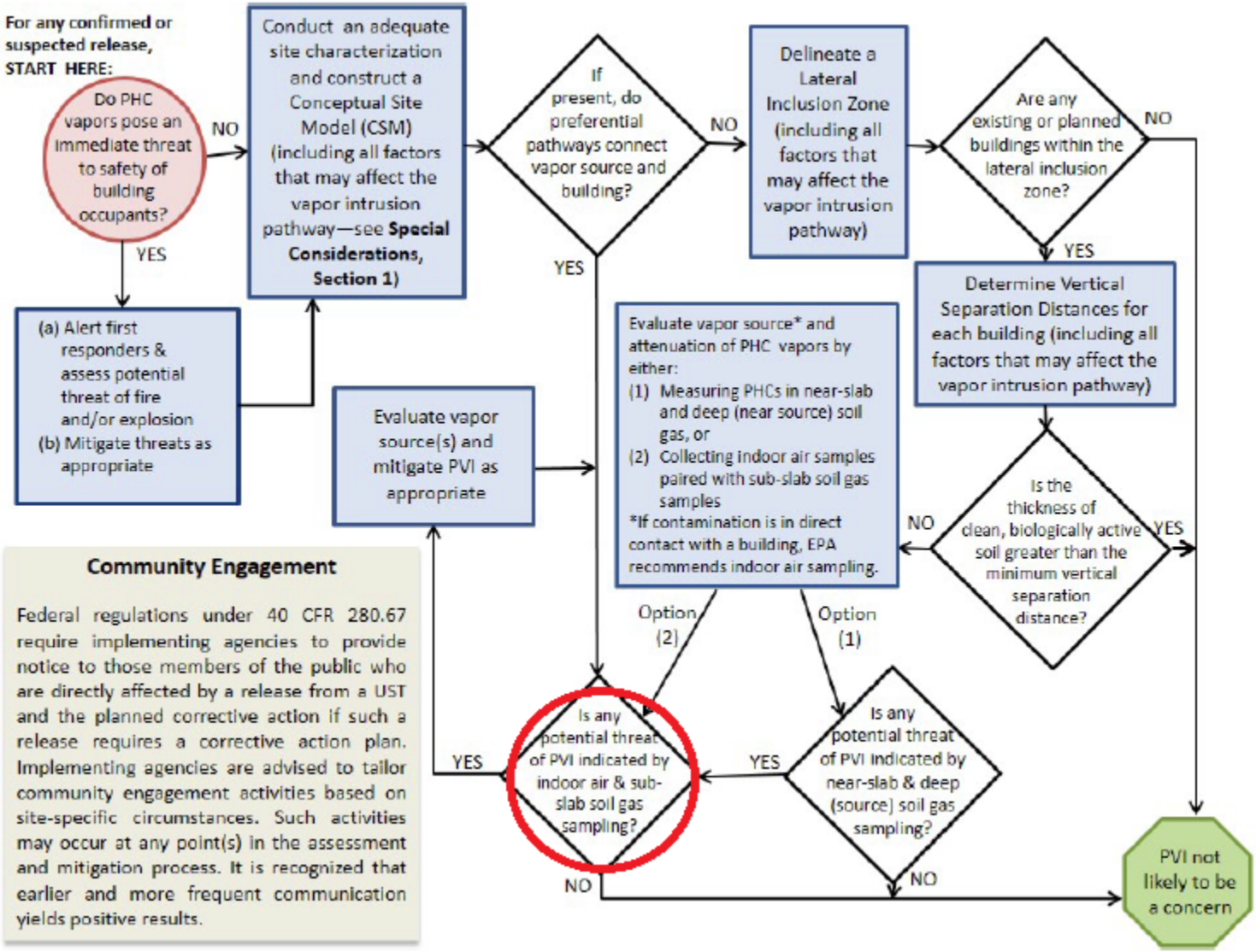
Results

<u>Methane</u>

All sample locations were field screened for methane during the post demo sampling event in YAM

- No concentrations of methane were detected at any of the 27 sample locations

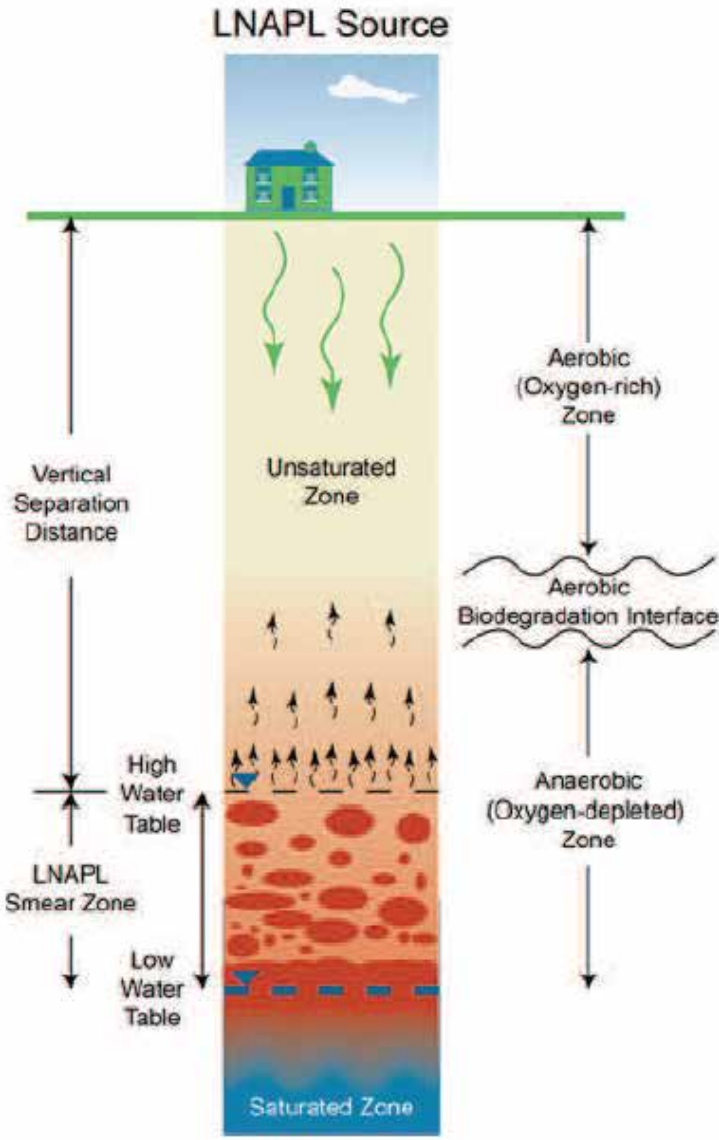
Conclusion



Reference: U.S. Environmental Protection Agency

Summary

- Shallow LNAPL present, do not have 15-feet vertical separation
- Three rounds of soil gas completed, we do not exceed screening levels
- Based on these events, PVI not likely to be a concern



Questions or Comments?

"YAM is very happy with environmental team (RACER/DEQ)"
Dennis Norton YAM President

Kevin Lund, PE, CPG
Michigan Department of Environmental Quality
lundk@michigan.gov
517.780.7846

Tom Kinney, CPG
GHD (Formerly CRA)
Tom.kinney@GHD.com
734.357.5510