



# **Building 1037 Vapor Intrusion Study**

## **Approach to Conducting a Vapor Intrusion Study**

*Presented by:*  
Charles Spurr, P.G. – Leidos

**April 19, 2023**



# *Purpose of Meeting*



- Present the Project Team
- What is Vapor Intrusion (VI)
- Discuss Reasoning for the VI Study at Building 1037 including Remedial Investigation (RI) for Building 1048 Fire Station results.
- Discuss Building 1037 Background
- How VI sampling points are installed
- How VI sampling is performed
- Discuss the Path Forward Dependent on Results





- Army National Guard (lead agency)
- Ohio Army National Guard
- U.S. Army Corps of Engineers
- Ohio Environmental Protection Agency
- Leidos (performing contractor)



# Building 1037 VI Study

## Vapor Intrusion



### What is Vapor Intrusion?

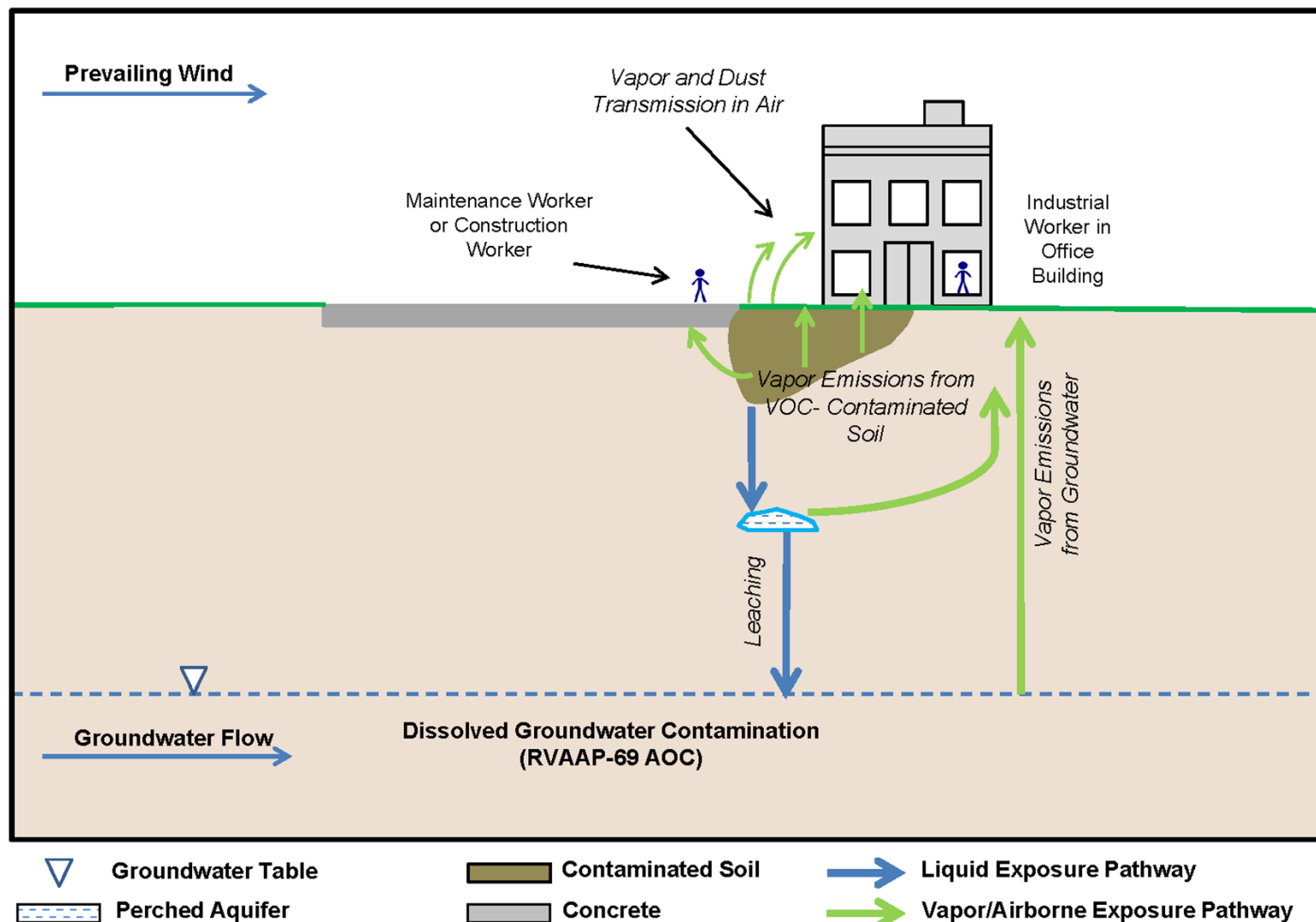
- The migration of harmful gases from the subsurface into the occupational space of structures above.
- The gases are typically derived from vapor forming chemicals such as volatile organic compounds (chlorinated solvents, hydrocarbons, and firefighting agents).
- The source of contamination can be found in groundwater and/or soil due to leaks or spills.

### Purpose of Vapor Intrusion Investigation?

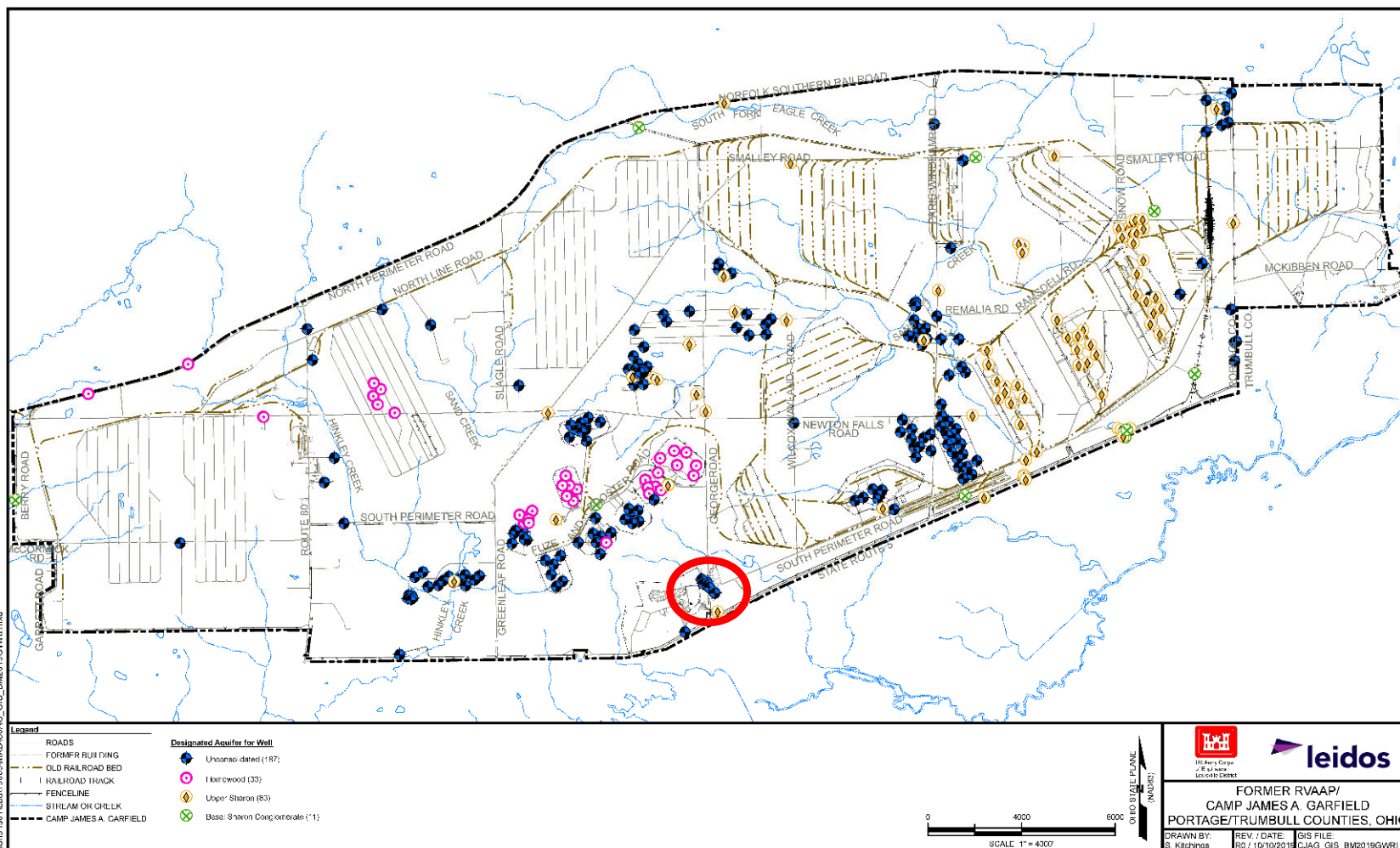
- To evaluate whether people's health might be harmed from exposures to indoor air contamination that may have resulted from vapor intrusion into buildings.
- Determine what areas have unacceptable human health risk and need to be further evaluated within a Feasibility Study.
- Assess the potential transport of contaminant migration that may require evaluation in a Feasibility Study.
- Establish what areas do not pose unacceptable human health or ecological risk from exposure to groundwater at CJAG.

# Building 1037 VI Study

## VI Conceptual Site Model



# Building 1037 VI Study Former RVAAP/CJAG



Camp James A. Garfield 2019 Facility-wide Groundwater RI

# Building 1037 VI Study

## Location of Buildings 1048 and 1037



Path: E:\ES\Shared\Power\4\Database\918001\CC-69\_RI\_Fig-1\_Top.mxd

# *Building 1037 VI Study*

## *Reason for the Study*



### Carbon Tetrachloride releases from former Building 1048 Fire Station

- Fire fighters would clean out fire extinguishers on the west side of the building and allow contents to spill onto the ground.
- Former storage tank possibly contained Carbon Tetrachloride.

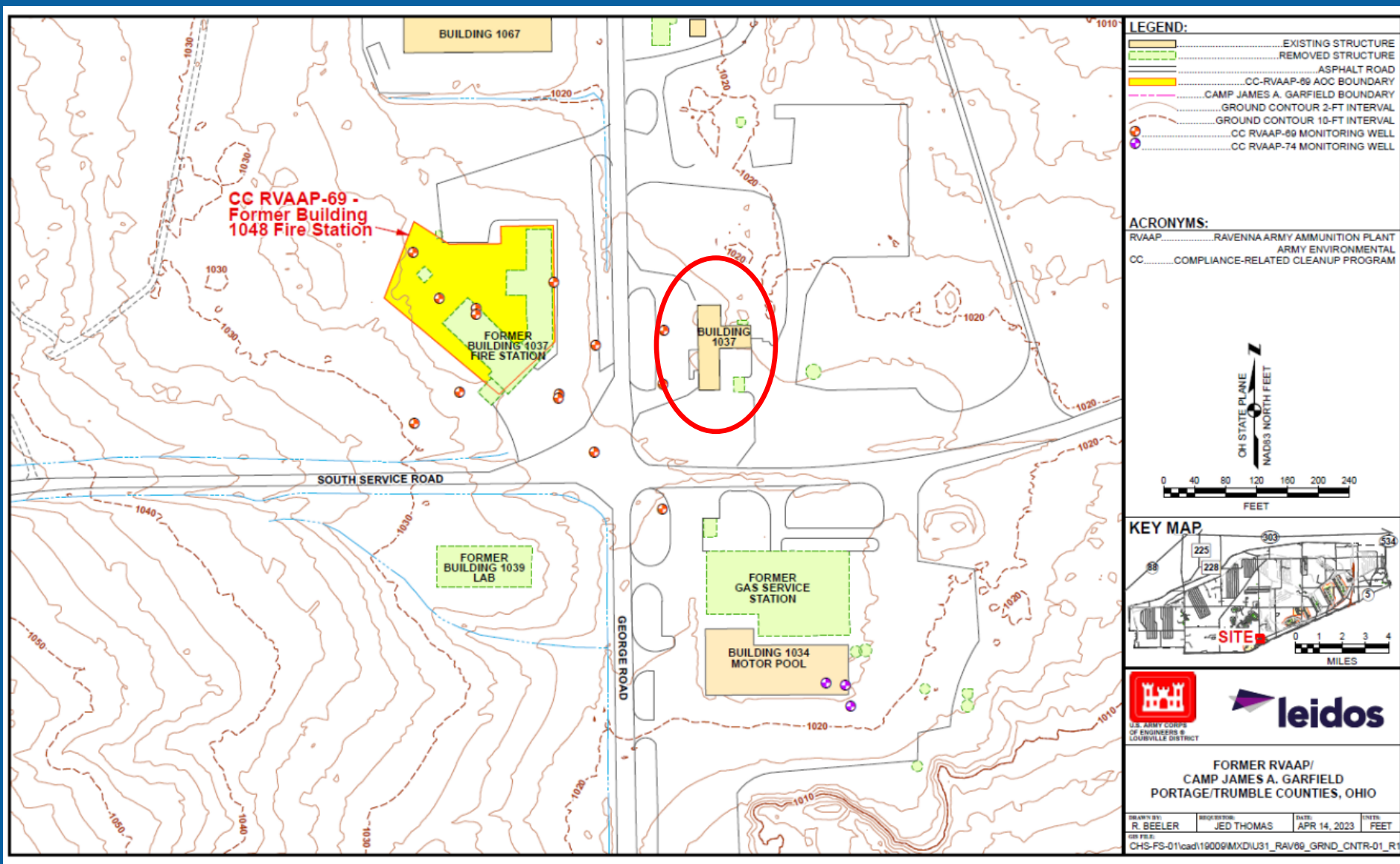
### Remedial Investigation (RI) for Building 1048 Fire Station

- Carbon Tetrachloride (CCl<sub>4</sub>) and Chloroform (CHCl<sub>3</sub>) were both contaminants of potential concern (COPCs) identified by the RI.
- Detected in soil and groundwater at the former Building 1048 site.
  - CCl<sub>4</sub> in 4 monitoring wells and CHCl<sub>3</sub> in 1 monitoring well.
  - CCl<sub>4</sub> in 069MW-005 which is directly west of Building 1037.
- Both greater than vapor intrusion screening levels (VISL) and maximum contaminant levels (MCL).
- Groundwater flow was determined to be to the southeast which puts Building 1037 in the path of flow.

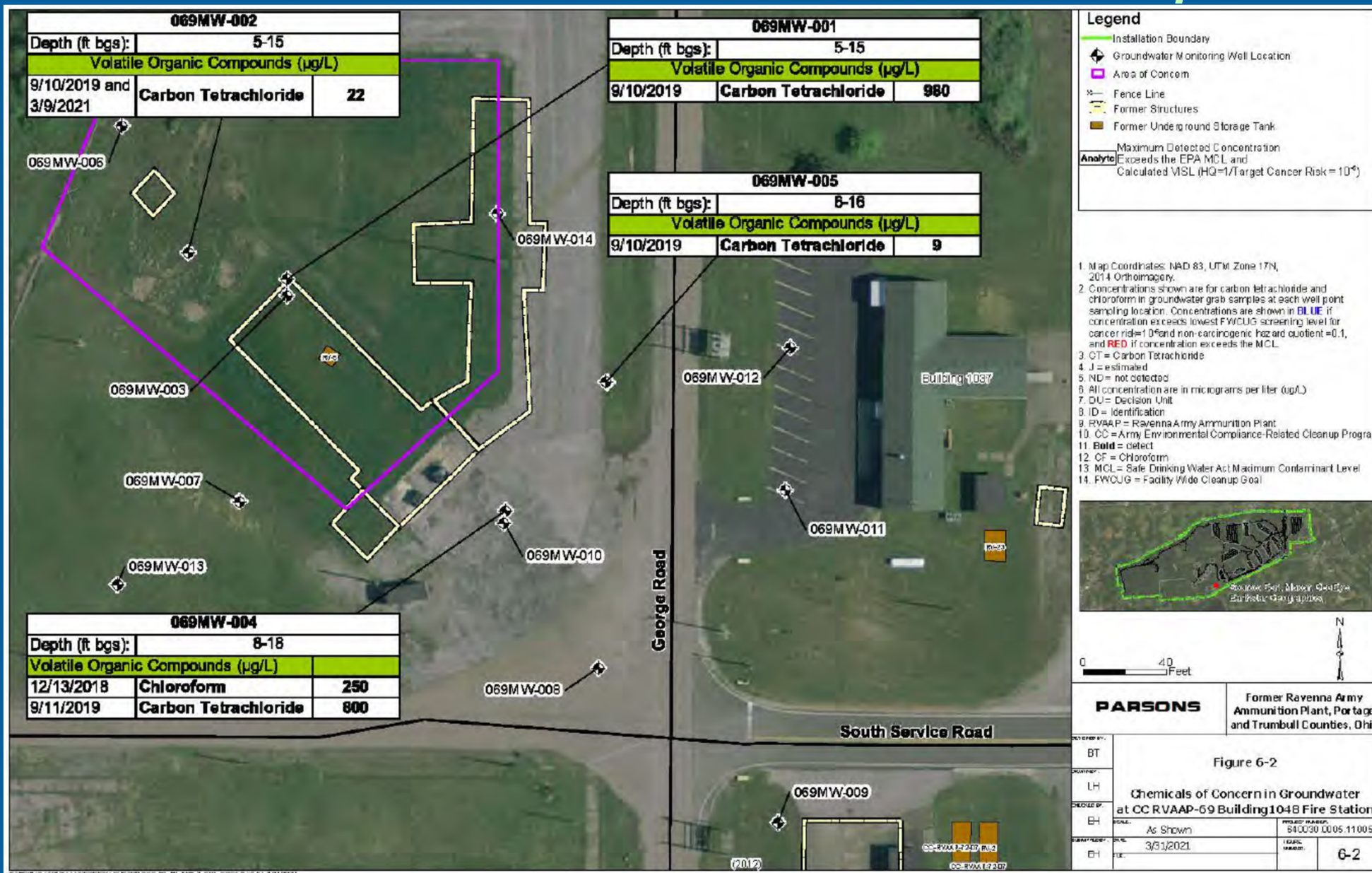


# Building 1037 VI Study

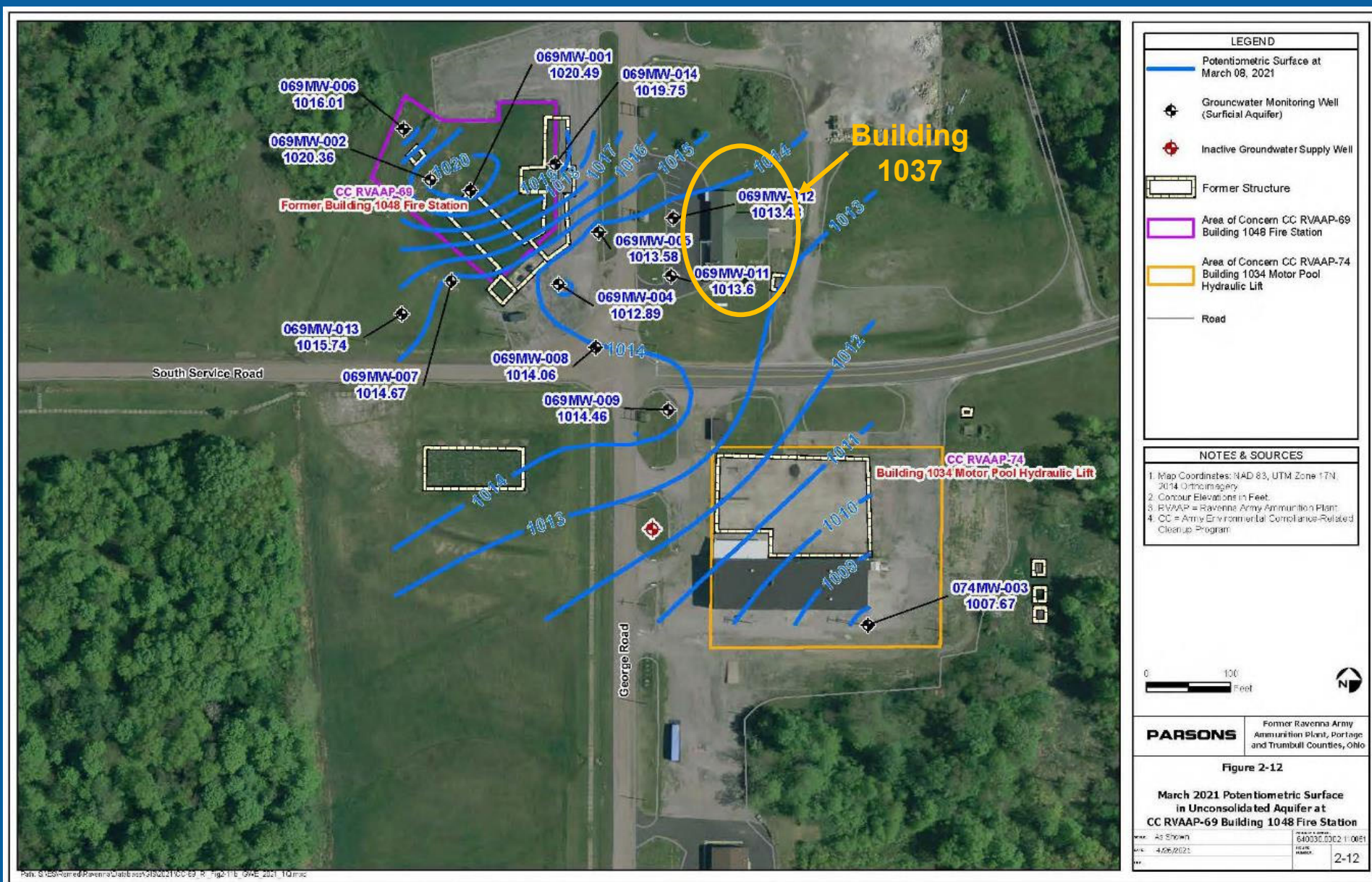
## Local Monitoring Well Network



# Building 1037 VI Study Chemicals of Concern in Groundwater Map



# Building 1037 VI Study Groundwater Flow Map



# *Building 1037 VI Study*

## *Building 1037 and Site Background*



### Building 1037

- Built in 1941 as part of the RVAAP administration area and is located on the northeast corner of George Rd. and South Service Rd.
- Originally used a laundry facility during RVAAP operations.
- Currently used for CJAG Range Control Operations.

### Building 1048 Fire Station

- Built in 1941 and previously located in the RVAAP administration area at the northwest corner of George Rd. and South Service Rd.
- Carbon Tetrachloride was a common firefighting chemical housed and used by the fire station.
- Building 1048 was demolished in 2008.
- Currently a grassy field covering approximately 0.74 acres.

# *Building 1037 VI Study*

## *Area of Former Building 1048*



# *Building 1037 VI Study*

## *Current Building 1037 “Range Control”*



# *Building 1037 VI Study*

## *Vapor Intrusion Sampling*



Vapor intrusion is assessed with a combination of sub-slab sampling and indoor and ambient air monitoring.

- Sub-slab vapor points are installed directly into the building's floor.
  - The point is installed as low profile as possible.
  - Points are sealed when not being sampled.
- Indoor and ambient air samples are collected concurrently when sub-slab sampling is performed.
  - These are usually collected as a time weighted average (i.e. 8 hour).
  - Collected on the same day and within the same time frame that sub-slab samples are collected.
  - Additional days of sub-slab sampling would require additional indoor and ambient monitoring.
- Two separate seasonal sampling events.

# Building 1037 VI Study Vapor Intrusion Sub-slab Sampling





# *Building 1037 VI Study*

## *Vapor Intrusion Sampling Point Installation*



Vapor intrusion sampling points consist of small holes that penetrate the foundation or “slab” of a building.

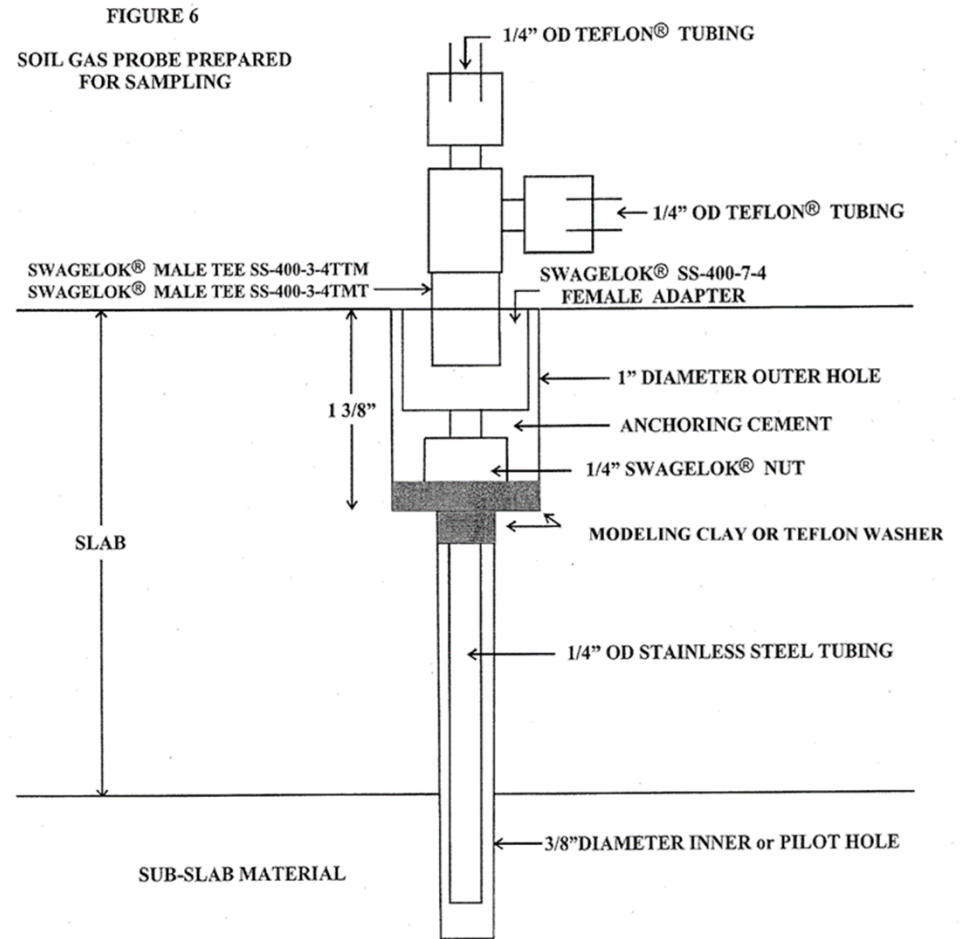
- Known as “Sub-slab Vapor Points” or “Vapor Wells”.
- The holes are drilled using power tools such as a rotary hammer drill.
- Hardware is installed inside the holes which allows for direct, unobstructed sampling of gases beneath the slab.
  - New stainless-steel tubing and fittings are typically used.
- The hardware is sealed into the hole with inert clay and/or hydraulic cement to prevent leaks and cross-contamination of the sample (i.e. drawing in air from the surface).
- The hardware can be capped at the surface.
  - No gases may leak into the buildings and buildings air does not enter the hole.
- The points are very small (~1” diameter) and barely noticeable once sealed.

# Building 1037 VI Study

## Vapor Intrusion Sub-slab Sampling



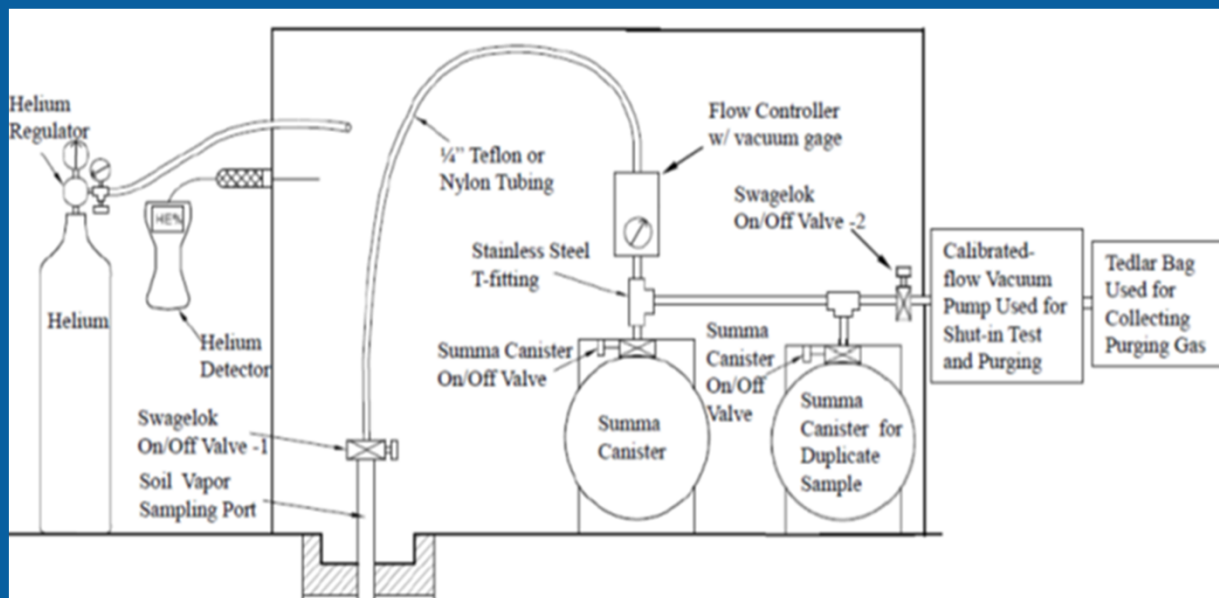
CONSTRUCTION AND INSTALLATION OF PERMANENT SUB-SLAB SOIL GAS WELLS



# Building 1037 VI Study

## Vapor Intrusion Field Sampling

- Each Sub-slab point requires its own dedicated sampling setup.
- New, lab cleaned and certified stainless-steel summa canisters.
  - New, stainless-steel fittings (Swagelok) and tubing.
  - Specific equipment is required for each sampling event.
    - Calibrated sampling pump with tubing and tedlar bags (helium testing).
    - Helium detector and lab grade helium with regulator.
    - A helium testing shroud.
  - Samples take ~30 minutes to collect 6 liters.
  - Duplicates (split) take ~1 hour at the same rate.
  - Ambient and indoor take 8 hours to complete.



# Building 1037 VI Study Vapor Intrusion Sub-slab Sampling

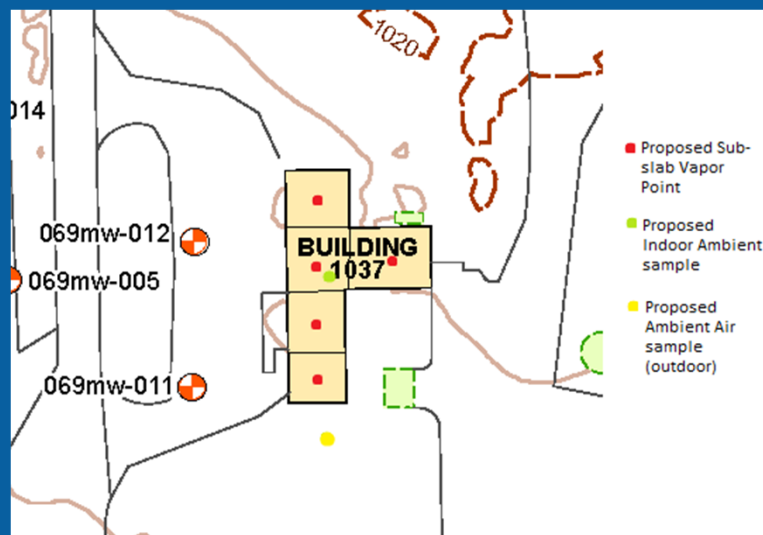


# Facility-wide Groundwater Path Forward

Detections in sub-slab sampling?

Detections in indoor and/or ambient air?

- Additional investigation would be required.
- Install more monitoring points to delineate area of high concentrations.
- Continue to perform routine sampling.
- Consider mitigation or remedial alternatives.



# Questions?