Supplemental Soil Investigation at the Southern Property Boundary Area (SPBA)
Former York Naval Ordnance Plant
1425 Eden Road, Springettsbury Township
York, Pennsylvania

March 17, 2017

Prepared by:
Groundwater Sciences Corporation
2601 Market Place Street, Suite 310
Harrisburg, PA 17110-9340

Introduction and Purpose

The United States Environmental Protection Agency (EPA) provided comments on the Supplemental Remedial Investigation (RI) Groundwater Report (Part 2) dated August 2016, and the Supplemental RI Soil Report dated December 2009 and approved in 2010, for the former York Naval Ordinance Plant (fYNOP) in a letter dated January 27, 2017. USEPA comment number 16 stated the following:

> *"The Supplemental Remedial Investigations Soil Report, December 1, 2009, includes MIPs data from the SPBA (Table 3.4-2), and indicate TCE and PCE in some of the borings to a depth of 15 feet (still above the water table) with the highest detections at the deepest samples. There was apparently no follow up soil analytical work done, so there is no way to assess soil to groundwater or direct contact pathways. It appears there is at least an on-going source to groundwater based on groundwater data, so the lack of soil data represents a data gap. Further characterization should be conducted to quantify risks and to determine whether a soil remedy is needed either for direct contact or to address an ongoing source to groundwater."*

This work scope was developed to further investigate the soil quality conditions in the Southern Property Boundary Area (SPBA) based on the above USEPA comment and supplements the Groundwater RI (Part 2).

Background

The SPBA is located along the southern property boundary of the fYNOP site (**Figure 1**). Historical accounts indicate that liquid waste was used to control weeds along the perimeter road at the SPBA in the past, and oils were used to reduce the dust on the road. Soil quality in the SPBA was investigated previously using backhoe pits (1986), active soil gas sampling (1998), and membrane interface probe (MIP) and soil vapor sampling (2003).

No positive results were discovered as a result of the backhoe pit investigation. **Figure 2** illustrates the results of the active soil gas sampling, which indicated no significant photoionization detector (PID)

measurements in shallow soil along the Perimeter Road in the SPBA, and therefore no indication of a specific location to search for an ongoing source to groundwater.

Figure 3 illustrates the MIP sample locations, depth intervals sampled and the gas chromatograph area count results for 1,1-Dichloroethane (1,1-DCA), 1,2-Dichloroethane (1,2-DCA), tetrachloethene (PCE) and trichloroethene (TCE). The highest MIP results were detected in the borings located in the southeast corner of the Site (SESB07 through SESB10).

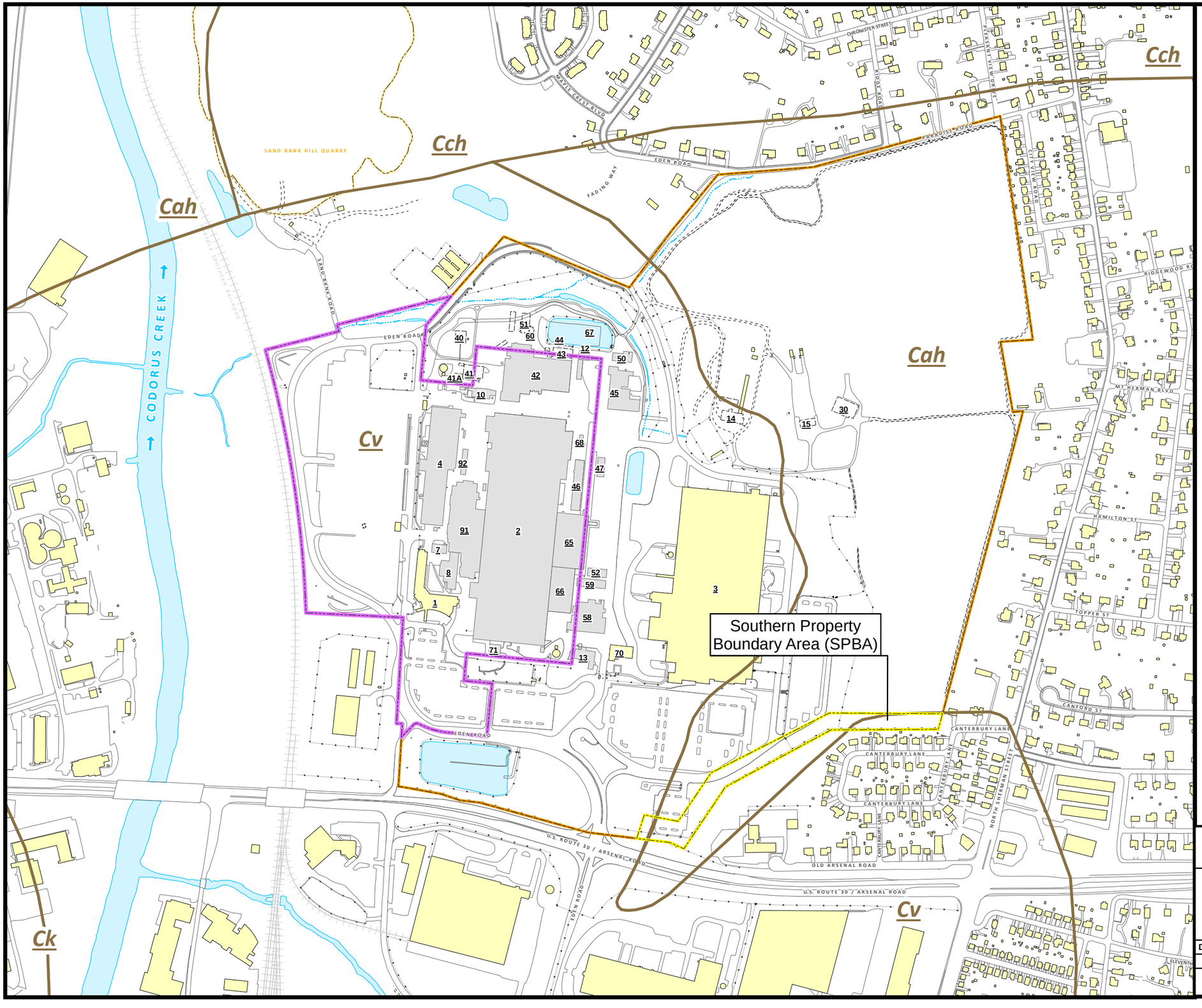
Figure 4 shows the analytical results of groundwater samples collected from monitoring wells during the SPBA Vapor Intrusion (VI) Investigation along with the MIP locations for reference. The highest concentrations of volatile organic compounds (VOCs) in groundwater are coincident with the highest concentrations in the MIP locations in the southeast corner of the property (i.e., MW-64S, MW-64D, MW-161 and MW-162).

Work Scope

The work scope below was developed to further investigate the unsaturated soil quality conditions in the southeast corner of the SPBA to address USEPA's comments.

- Soil samples will be collected at the four boring locations illustrated on **Figure 5**. Three of the borings will be positioned in close proximity to MIP samples SESB08, 09 and 10. The fourth boring will be located approximately 20 feet north (somewhat up gradient) of monitoring well MW-162, to assess the source of the PCE and TCE detections in groundwater because MIP sampling point SESB06, located adjacent to MW-162, had no detections. Sampling will be completed using the following procedure:
    - Drilling and sampling procedures will be conducted in accordance with the Health and Safety Plan (HASP) for Site Investigation and Remedial Activities.
    - Sample locations will be marked on the ground using white spray paint prior to utility line identification through the PA ONE Call system, and the Harley-Davidson "Subsurface Protocol and Utility Clearance, Work Instruction (WI) YS2.03.300" will be followed prior to the commencement of the drilling activities.
    - Each boring will be manually cleared for underground utilities to a minimum depth of 5 feet below ground surface (bgs) as an additional precaution to identify and avoid subsurface utilities not identified and marked through the PA ONE Call and utility clearance protocol. Vacuum excavation equipment will be employed if refusal is encountered during the manual utility clearance activities.
    - Soil sampling will be conducted using a direct-push drill rig (i.e., Geoprobe®) in accordance with Subsection 4.2.4.5 of the Part 2 Field Sampling Plan (FSP).
    - Samples will be collected continuously downward from the ground surface to refusal or the water table, whichever is encountered first.
    - Samples will be screened in the field following collection at 0.5-foot depth intervals using a PID for total VOCs.

  - Discrete samples from each of the borings will be collected for laboratory analysis to accurately characterize the soil quality conditions at each location. One sample will be collected from a depth of 0 to 2 feet bgs to assess the direct contact pathway for surface soil using a clean stainless steel bucket auger or equivalent sampling devise during the subsurface utility clearing activities. In addition, samples will be collected at 5-foot depth intervals starting at a depth of 5 feet bgs to the bottom of the borings (i.e., 5, 10, 15 feet bgs, etc.) using the Geoprobe® sampling system. One soil sample will be selected for laboratory analysis from a 0.5-foot long depth interval within each of the target sample depth profiles based on the field screening results using a Terra Core™ disposable soil sampling tool. For example, samples will be selected from predetermined depths of 0.5 to 1 feet bgs, 5 to 5.5 feet bgs, 10 to 10.5 feet bgs, etc., if no elevated PID measurements are detected above background measurements during the field screening. If elevated PID measurements are detected, samples from each target depth profile will still be submitted for laboratory analysis; however, the sample will be selected from the 0.5-inch thick depth interval that exhibits the highest PID measurement.
  - The soil samples will be submitted for laboratory analysis by TestAmerica for VOCs in accordance with the Quality Assurance Project Plan (QAPP).
- Following the completion of sampling, the boreholes will be filled with bentonite pellets or chips, and the top of the hole restored to original conditions.
- Drill cuttings, decontamination fluids and all investigation-derived waste will be managed in accordance with the Subsection 4.2.5 of the Part 2 FSP.
- A report will be prepared following the investigation for submittal to the EPA and Pennsylvania Department of Environmental Protection (PADEP). Analysis of the results of the investigation, and recommendations as appropriate, will be included in the report based on the analytical results of the soil samples.



LEGEND

- Southeastern Property Boundary Area (SPBA)
- Cah — Antietam & Harpers Formation, undiv.
- Cv — Vintage Formation
- Ck — Kinzers Formation
- Cl — Ledger Formation
- West Campus Property Line
- Harley-Davidson Property Boundary (East Campus)
- Railroad
- Road (Paved)
- Road Curb
- Road (Unpaved)
- Walkway
- Fenceline
- Existing Water Feature
- Existing Building
- Demolished
- Demolished/Slab Removed

N
W E
S

Scale (feet)
0 125 250 500

Figure 1

Former York Naval Ordnance Plant
1425 Eden Road, York, PA 17402

Southern Property Boundary Area
Location Map

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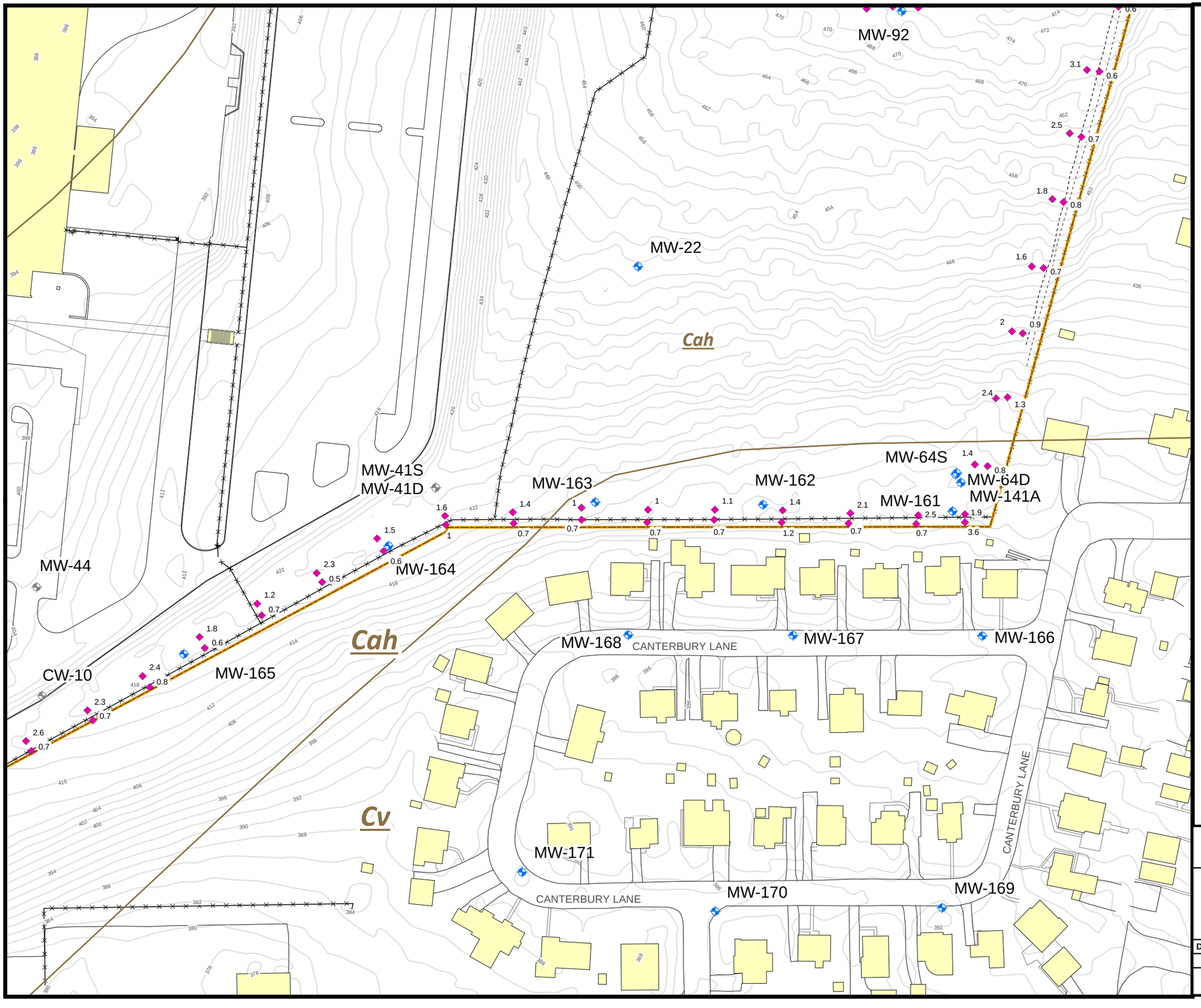

LEGEND

- RI Active Soil Gas (PID Results in PPM)
- Abandoned Well
- Monitoring Well
- Cah — Antietam & Harpers Formation, undiv.
- Cv — Vintage Formation
- Harley-Davidson Property Boundary (East Campus)
- Road (Paved)
- Road Curb
- Road (Unpaved)
- Walkway
- Fenceline
- Existing Building
- Surface Contour (2' Intervals)

N
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Scale (feet)
0 25 50 100

Figure 2

Former York Naval Ordnance Plant

1425 Eden Road, York, PA 17402

Southern Property Boundary Area
Active Soil Gas Results

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MW-92

MW-22

Cah

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB011	5-10	NA	NA	NA	NA	NA
SESB011	10-15	NA	NA	NA	NA	NA

SESB11

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB010	0-5	0	0	0	819.2	12/4/2003
SESB010	5-10	0	0	15.6	1197.5	12/4/2003
SESB010	10-15	0	0	191.3	2377.9	12/4/2003

SESB10

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB009	0-5	0	0	1571.8	562.5	12/4/2003
SESB009	5-10	0	0	1691.8	349.6	12/4/2003
SESB009	10-15	11.1	0	136	241	12/4/2003

SESB09

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB004	0-5	0	0	79.6	0	12/3/2003
SESB004	5-10	24.8	0	0	29.1	12/3/2003
SESB004	10-15	0	0	0	0	12/4/2003

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB007	0-5	0	24.4	0	0	12/4/2003
SESB007	5-10	0	0	0	0	12/4/2003
SESB007	10-15	0	0	0	1470.3	12/4/2003

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB005	0-5	0	0	0	0	12/4/2003
SESB005	5-10	0	0	0	0	12/4/2003
SESB005	10-15	0	0	0	0	12/4/2003

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB003	0-5	119.9	0	51.8	72.9	12/3/2003
SESB003	5-10	52.8	0	111	0	12/3/2003
SESB003	10-15	22.4	30	0	0	12/3/2003

MW-41S
MW-41D
SESB03
MW-163
SESB05
SESB06
MW-162
SESB07
MW-64S
SESB08
MW-64D
MW-141A
MW-161

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB008	0-5	0	0	0	482.9	12/4/2003
SESB008	5-10	0	0	0	1123.3	12/4/2003
SESB008	10-15	0	0	0	2897	12/4/2003

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB002	0-4.5	0	0	74.7	156.9	12/3/2003
SESB002	6-7	123	0	40.5	45.4	12/3/2003
SESB002	10-11	209.3	215.9	0	0	12/3/2003

SESB02

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB006	0-5	0	0	0	0	12/4/2003
SESB006	5-10	0	0	0	0	12/4/2003
SESB006	10-15	0	0	0	0	12/4/2003

Location	Depth	1,1 DCA	1,2 DCA	TCE	PCE	Date
SESB001	0-5	504.2	716.2	0	413.3	12/3/2003
SESB001	5-7	24.7	11.8	37.7	0	12/3/2003

SESB01

MW-44
MW-164
MW-165
CW-10
Cah
Cv
MW-168
CANTERBURY LANE
MW-167
MW-166
MW-171
CANTERBURY LANE
MW-170
MW-169
CANTERBURY LANE

LEGEND

- MIP Stations and Area Counts (Langan, 2003)
- Abandoned Well
- Monitoring Well
- Cah — Antietam & Harpers Formation, undiv.
- Cv — Vintage Formation
- Harley-Davidson Property Boundary
- Road (Paved)
- Road Curb
- Road (Unpaved)
- Walkway
- Fenceline
- Existing Building

Notes:
1. MIP area counts for each constituent are unitless and provide qualitative indications of constituents relative to calibration standards analyzed daily using the field gas chromatograph.

2. Sample depth in feet BGS- Below ground surface.

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Scale (feet)
0 25 50 100

Figure 3

Former York Naval Ordnance Plant
1425 Eden Road, York, PA 17402

Southern Property Boundary Area
MIP Stations and Results

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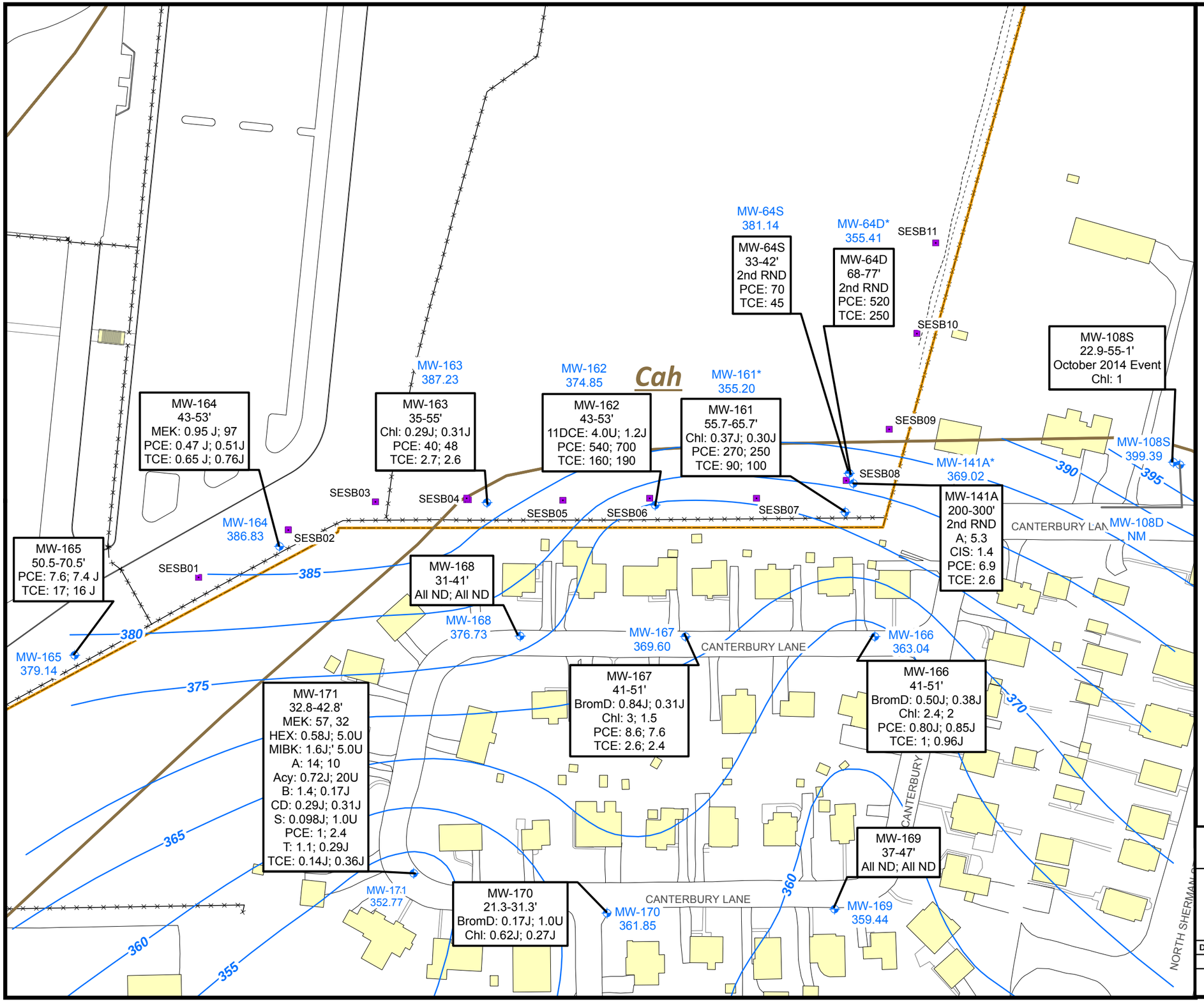

LEGEND

- Monitoring Well
- MIP Stations (Langan, 2003)
- Groundwater Contour
- Groundwater Contour (Inferred)
- Cah — Antietam & Harpers Formation, undiv.
- Cv — Vintage Formation
- Harley-Davidson Property Boundary
- Road (Paved)
- Road Curb
- Road (Unpaved)
- Walkway
- Fenceline
- Existing Building

Well ID
Top of Open Interval FBGS and Bottom of Open Interval FBGS
1st Result Rnd 1 (March and April 2015): 2nd Result Rnd 2 (October 2015)
11DCE: 1,1-Dichloroethene
MEK: 2-Butanone
HEX: 2-Hexanone
MIBK: 4-Methyl-2-pentanone
MTBE: Methyl tert-butyl ether
A: Acetone
Acy: Acrylonitrile
B: Benzene
Bromch: Bromochloromethane
BromD: Bromodichloromethane
CD: Carbon disulfide
Chl: Chloroform
CIS: cis-1,2-Dichloroethene
Dibro: Dibromochloromethane
S: Styrene
PCE: Tetrachloroethene
T: Toluene
TCE: Trichloroethene

NOTES:
FBGS = Feet Below Ground Surface
Chemistry results in µg/L.
NM = Not measured.
ND = Not detected.
J = Estimated concentration.
U = Not detected above reported value.
Water levels measured 4/14/2015.
Contours are in Feet Above Mean Sea Level.
Water levels for deeper wells marked with * not used in contouring.

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Scale (feet)
0 25 50 100

Figure 4

Former York Naval Ordnance Plant
1425 Eden Road, York, PA 17402

Southern Property Boundary Area
Shallow Groundwater Quality

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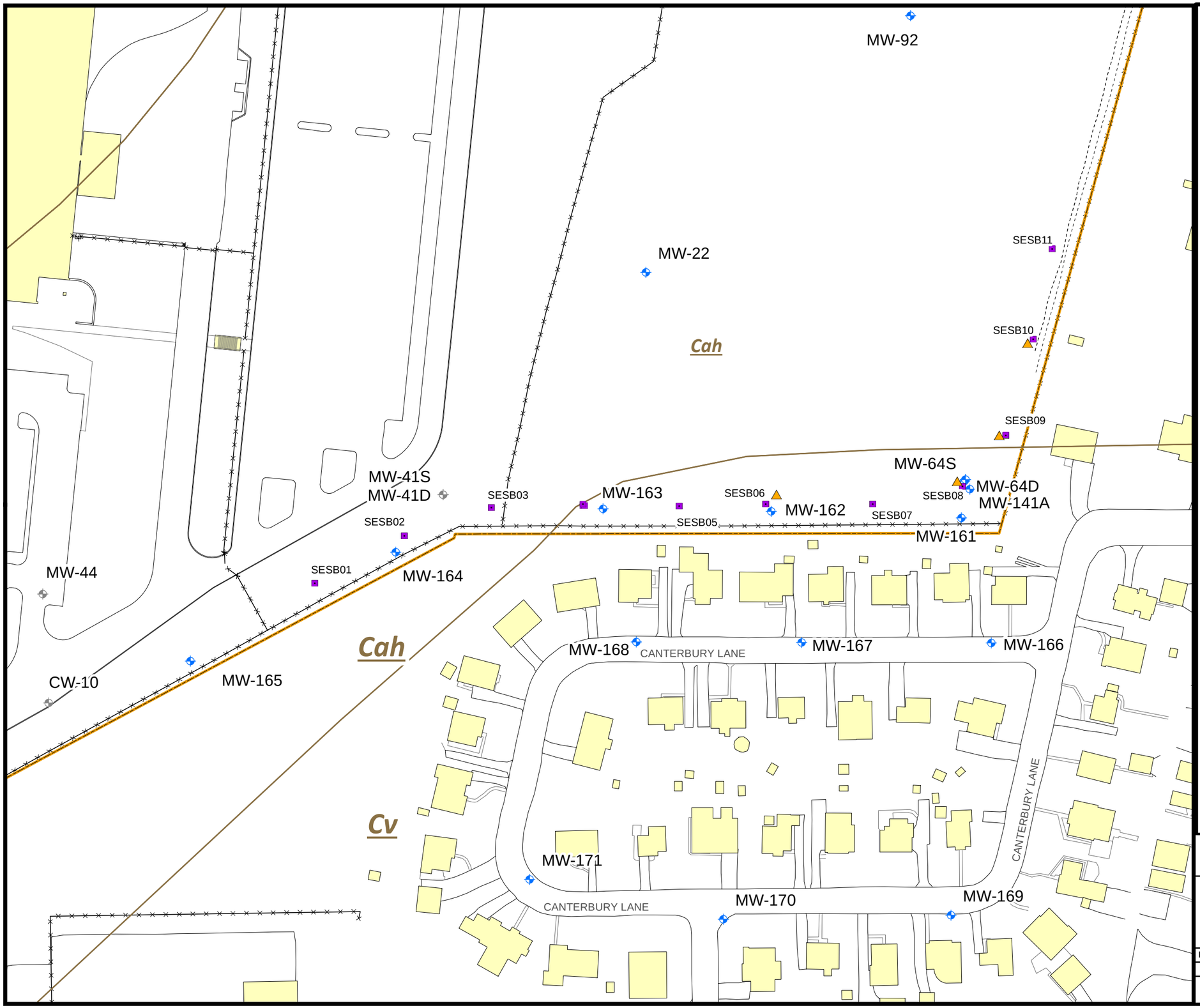

LEGEND

- Proposed Soil Boring Location
- MIP Stations (Langan, 2003)
- Abandoned Well
- Monitoring Well
- Cah — Antietam & Harpers Formation, undiv.
- Cv — Vintage Formation
- Harley-Davidson Property Boundary
- Road (Paved)
- Road Curb
- Road (Unpaved)
- Walkway
- Fenceline
- Existing Building

N
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Scale (feet)
0 25 50 100

Figure 5

Former York Naval Ordnance Plant
1425 Eden Road, York, PA 17402

Southern Property Boundary Area
Proposed Soil Boring Locations

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