APPENDICES

APPENDIX A

BEACON NOVEMBER 22, 2017 REPORT

Chesapeake GeoSciences, Inc.
5405 Twin Knolls Road, Suite 1
Columbia, MD 21045
Attn: Nancy Love and Meg Staines

Passive Soil Gas Survey – Analytical Report
Date: November 22, 2017
Beacon Project No. 3763

Project Reference:	AFRH-Main Campus, Washington, D.C.
Samplers Installed:	October 23 through 26, 2017
Samplers Retrieved:	November 7 and 8, 2017
Samples Received:	November 9, 2017
Analyses Completed:	November 15, 2017
Laboratory Data Issued:	November 17, 2017

EPA Method 8260C
All samples were analyzed using thermal desorption-gas chromatography/mass spectrometry (TD-GC/MS) instrumentation to target a custom compound list following EPA Method 8260C. Laboratory results are reported in nanograms (ng) of specific compound per sample.

Laboratory QA/QC procedures included internal standards, surrogates, and blanks based on EPA Method 8260C. Analyses and reporting were in accordance with BEACON's Quality Assurance Project Plan.

Reporting limits
The reporting limit (RL) is 10 nanograms (ng) for vinyl chloride, 1,1-dichloroethene, trans-1,2-dichloroethene, cis-1,2-dichloroethene, trichloroethene, and tetrachloroethene; 25 ng for the remaining individual compounds; and 5,000 ng for Total Petroleum Hydrocarbons (TPH). **Table 1** provides survey results in nanograms per sampler by sample-point number and compound name. For the six (6) compounds listed above, measurements below the limit of quantitation (10 ng) but above the limit of detection (5 ng) are flagged with a "J." The RLs represent a baseline above which results meet laboratory-determined limits of precision and accuracy. Any field sample measurements above the upper calibration standard are estimated; however, these values are reported without qualifiers because all reported measurements are relative to each other and are appropriate to meet the survey objectives of locating source areas and vapor intrusion pathways and defining the lateral extent of contamination.

Calibration Verification
The continuing calibration verification (CCV) values for the calibration check compounds were all within ±20% of the true values as defined by the initial five-point calibration and met the requirements specified in Beacon Environmental's Quality Assurance Project Plan.

Method Blanks/Trip Blanks
Laboratory method blanks are run with each sample batch to identify contamination present in the laboratory. If contamination is detected on a method blank, measurements of identical compounds in that sample batch are flagged in the laboratory report. The laboratory method blanks analyzed in connection with the present samples revealed no contamination.

The trip blank is a sampler prepared, transported, and analyzed with other samples but intentionally not exposed. Any target compounds identified on the trip blanks are reported in the laboratory data. The analysis of the trip blank (labeled Trip-1 in **Table 1**) reported none of the targeted compounds.

Passive Soil-Gas Survey Notes

When sample locations are covered with or near the edge of an artificial surface (*e.g.*, asphalt or concrete), the concentrations of compounds in soil gas are often significantly higher than the concentrations would be if the surfacing were not present. Thus, a reading taken below or near an impermeable surface is much higher than it would be in the absence of such a cap. Therefore, the sample location conditions should be evaluated when comparing results between locations.

Survey findings are exclusive to this project and when the spatial relationships are compared with results of other BEACON Surveys it is necessary to incorporate survey and site information from both investigations (*e.g.*, depth to sources, soil types, porosity, soil moisture, presence of impervious surfacing, sample collection times). BEACON recommends the guidelines stated in **Attachment 1** to establish a relationship between reported soil-gas measurements and actual subsurface contaminant concentrations, which will indicate those measurements representing significant subsurface contamination.

BEACON's passive soil-gas samplers are prepared with two sets of adsorbent cartridges for subsequent duplicate or confirmatory sample analysis. At the client's request, duplicate analysis was performed for two (2) field samples,
designated SV-D2 and SV-D3. When comparing quantitative results, a duplicate correspondence should be considered when the relative percent difference (RPD) between the two samples is less than or equal to 100%. For the purpose of calculating correspondences, all non-detections should be assigned, as a baseline value, the RL for the specific contaminant. Based on these assumptions, a 100% correlation was found between the field sample duplicates and their base samples.

Project Details

Samplers were deployed on October 23 through 26, 2017, and were retrieved on November 7 and 8, 2017. **Attachment 2** describes standard field procedures. Individual deployment and retrieval times will be found in the Chain of Custody Form (**Attachment 3**).

Forty-two (42) field samples, two (2) field sample duplicates, and one (1) trip blank were received by BEACON on November 9, 2017. Adsorbent cartridges from the passive samplers were thermally desorbed, then analyzed using gas chromatography/mass spectrometry (GC/MS) equipment, in accordance with EPA Method 8260C, as described in **Attachment 4**. BEACON's laboratory analyzed each sample for the targeted compounds; analyses were completed on November 15, 2017. Following a laboratory review, results were provided on November 17, 2017.

Sample locations are shown on **Figure 1**. The following table lists frequency of detections based on the number of field samples analyzed, the reporting limit, and the maximum value for each mapped compound. The table also includes the transformation and interpolation method for the compound distribution maps provided.

Figure No.	**2**	**3**		**4**
Compound	Tetrachloroethene	Naphthalene	TPH C_4-C_9	TPH C_{10}-C_{15}
Frequency	30	20	22	23
Reporting Limit (nanograms)	10	25	5,000	5,000
Max Value (nanograms)	4,919	11,914	106,328	135,153
Transformation Method	Log	Log	Log	Log
Interpolation Method	Kriging	Kriging	Kriging	Kriging

Attachments:

- **-1-** Applying Results From Passive Soil-Gas Surveys
- **-2-** Field Procedures
- **-3-** Chain-of-Custody Form
- **-4-** Laboratory Procedures

ALL DATA MEET REQUIREMENTS AS SPECIFIED IN THE BEACON ENVIRONMENTAL SERVICES, INC. QUALITY ASSURANCE PROJECT PLAN AND THE RESULTS RELATE ONLY TO THE SAMPLES REPORTED. BEACON ENVIRONMENTAL SERVICES IS ACCREDITED TO ISO/IEC 17025:2005, AND THE WORK PERFORMED WAS IN ACCORDANCE WITH ISO/IEC 17025:2005 REQUIREMENTS, WITH THE EXCEPTION THAT SAMPLES WERE ANALYZED WITHIN A 24-HOUR TUNE WINDOW AND TPH C_4-C_9 AND TPH C_{10}-C_{15} ARE NOT INCLUDED IN BEACON'S SCOPE OF ACCREDITATION. THIS REPORT SHALL NOT BE REPRODUCED EXCEPT IN FULL, WITHOUT THE WRITTEN APPROVAL OF THE LABORATORY. RELEASE OF THE DATA CONTAINED IN THIS DATA PACKAGE HAS BEEN AUTHORIZED BY THE LABORATORY DIRECTOR OR HIS SIGNEE, AS VERIFIED BY THE FOLLOWING SIGNATURES:

Steven C. Thornley
Laboratory Director

Patti J. Riggs
Quality Manager

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	LB171113s	Trip-1	SV-D1	SV-01	SV-02	SV-03
Project Number:		3763	3763	3763	3763	3763
Lab File ID:	S17111303	S17111319	S17111320	S17111321	S17111419	S17111323
Received Date:		11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/13/2017	11/13/2017	11/13/2017	11/13/2017	11/15/2017	11/13/2017
Analysis Time:	10:56	17:05	17:28	17:50	12:53	18:35
Matrix:			Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	<25	<25	<25	<25	<25	**33**
Trichloroethene	<10	<10	<10	<10	<10	<10
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	<25	<25	<25	**95**	**51**	**1,333**
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	<10	<10	<10	**55**	<10	**9 J**
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	<25	<25	<25	<25	<25	**52**
p & m-Xylene	<25	<25	<25	**40**	<25	**201**
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	<25	<25	<25	**80**	<25	**161**
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25	<25	<25
1,3,5-Trimethylbenzene	<25	<25	<25	**154**	<25	**88**
1,2,4-Trimethylbenzene	<25	<25	<25	**88**	<25	**163**
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	<25	<25	<25	**5,990**	<25	**3,076**
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	<25	**5,144**	**29**	**649**
TPH C_4-C_9	<5,000	<5,000	<5,000	<5,000	<5,000	**12,752**
TPH C_{10}-C_{15}	<5,000	<5,000	<5,000	**48,113**	<5,000	**9,798**

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-04	SV-05	SV-06	SV-07	SV-08	SV-09
Project Number:	3763	3763	3763	3763	3763	3763
Lab File ID:	S17111405	S17111325	S17111326	S17111327	S17111328	S17111329
Received Date:	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/14/2017	11/13/2017	11/13/2017	11/13/2017	11/13/2017	11/13/2017
Analysis Time:	16:20	19:21	19:44	20:06	20:29	20:52
Matrix:	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	<25	<25	**49**	<25	**33**	**30**
Trichloroethene	<10	<10	<10	<10	<10	<10
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	**29**	**27**	**43**	<25	**73**	**57**
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	<10	**5 J**	<10	<10	<10	<10
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	<25	<25	<25	<25	<25	<25
p & m-Xylene	<25	<25	**32**	<25	<25	<25
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	<25	<25	**42**	<25	<25	<25
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	**31**	<25	<25	<25
1,3,5-Trimethylbenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trimethylbenzene	<25	<25	**33**	<25	<25	<25
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	<25	<25	**74**	<25	<25	<25
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	**131**	<25	<25	<25
TPH C_4-C_9	<5,000	<5,000	**11,921**	<5,000	<5,000	**5,008**
TPH C_{10}-C_{15}	<5,000	<5,000	**104,018**	<5,000	**10,739**	**8,976**

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-10	SV-11	SV-12	SV-13	SV-14	SV-15
Project Number:	3763	3763	3763	3763	3763	3763
Lab File ID:	S17111330	S17111331	S17111332	S17111333	S17111334	S17111335
Received Date:	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/13/2017	11/13/2017	11/13/2017	11/13/2017	11/13/2017	11/13/2017
Analysis Time:	21:15	21:38	22:01	22:24	22:47	23:10
Matrix:	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	**6 J**	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	**61**	<10	<10	<10
Chloroform	<25	<25	**114**	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	<25	<25	<25	<25	<25	<25
Trichloroethene	<10	<10	**74**	<10	<10	<10
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	**123**	**315**	**172**	**36**	**890**	**7,061**
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	**6 J**	**7 J**	**1,990**	**230**	**14**	<10
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	<25	<25	<25	<25	<25	**384**
p & m-Xylene	<25	<25	<25	<25	**34**	**1,710**
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	<25	<25	<25	<25	<25	**879**
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25	<25	**32**
1,3,5-Trimethylbenzene	<25	<25	<25	<25	<25	**64**
1,2,4-Trimethylbenzene	<25	<25	<25	<25	<25	**139**
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	**36**	**60**	**26**	**82**	**27**	<25
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	**47**	<25	**31**	<25	<25
TPH C_4-C_9	<5,000	<5,000	<5,000	<5,000	<5,000	**42,084**
TPH C_{10}-C_{15}	**9,193**	<5,000	<5,000	<5,000	<5,000	**9,449**

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-16	SV-17	SV-18	SV-19	SV-20	SV-21
Project Number:	3763	3763	3763	3763	3763	3763
Lab File ID:	S17111336	S17111337	S17111338	S17111339	S17111340	S17111341
Received Date:	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/13/2017	11/13/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Analysis Time:	23:32	23:55	0:18	0:41	1:04	1:28
Matrix:	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	<25	<25	<25	<25	<25	<25
Trichloroethene	<10	<10	<10	**81**	**13**	**21**
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	**47**	**25**	<25	**320**	**746**	**934**
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	**24**	**27**	<10	**337**	**128**	**326**
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	**233**	<25	<25	<25	**35**	**64**
p & m-Xylene	<25	<25	<25	**67**	**154**	**275**
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	<25	<25	<25	**38**	**80**	**119**
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25	**44**	<25
1,3,5-Trimethylbenzene	<25	<25	<25	<25	**241**	<25
1,2,4-Trimethylbenzene	<25	<25	<25	<25	**336**	<25
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	<25	<25	<25	<25	**36**	**29**
1,2,3-Trichlorobenzene	**34**	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	<25	<25	**26**	<25
TPH C_4-C_9	<5,000	<5,000	<5,000	<5,000	**106,328**	**8,478**
TPH C_{10}-C_{15}	<5,000	<5,000	<5,000	<5,000	**123,198**	<5,000

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-22	SV-23	SV-24	SV-D3	SV-25	SV-26
Project Number:	3763	3763	3763	3763	3763	3763
Lab File ID:	S17111342	S17111343	S17111344	S17111345	S17111346	S17111347
Received Date:	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Analysis Time:	1:51	2:14	2:37	3:01	3:23	3:46
Matrix:	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25	**40**	**32**
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	<25	**48**	<25	<25	<25	<25
Trichloroethene	<10	**10**	**6 J**	**16**	**12**	**52**
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	**1,221**	**82**	**4,716**	**5,015**	**311**	**5,519**
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	<10	**92**	**422**	**424**	**85**	**3,425**
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	**42**	<25	**168**	**217**	<25	**285**
p & m-Xylene	**152**	**43**	**646**	**835**	**47**	**841**
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	**58**	<25	**348**	**430**	<25	**431**
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25	<25	<25
1,3,5-Trimethylbenzene	<25	<25	**28**	**31**	<25	**29**
1,2,4-Trimethylbenzene	<25	<25	**55**	**59**	<25	**45**
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	<25	<25	<25	<25	<25	<25
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	<25	<25	<25	<25
TPH C_4-C_9	**7,416**	<5,000	**25,440**	**26,009**	<5,000	**25,974**
TPH C_{10}-C_{15}	<5,000	**9,027**	**7,121**	**6,477**	<5,000	**5,070**

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-27	SV-28	SV-D2	SV-29	SV-30	SV-31
Project Number:	3763	3763	3763	3763	3763	3763
Lab File ID:	S17111348	S17111349	S17111350	S17111410	S17111352	S17111353
Received Date:	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Analysis Time:	4:09	4:32	4:55	18:16	5:42	6:05
Matrix:	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	<25	**216**	**228**	**138**	**146**	**91**
Trichloroethene	<10	**16**	**19**	**24**	**7 J**	<10
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	**3,424**	**277**	**248**	**143**	**799**	**194**
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	**54**	**4,059**	**4,118**	**4,919**	**138**	**18**
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	**196**	**42**	**40**	**27**	**69**	<25
p & m-Xylene	**880**	**267**	**240**	**158**	**413**	**111**
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	**464**	**267**	**257**	**141**	**441**	**73**
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	<25	**32**	**29**	<25	**32**	<25
1,3,5-Trimethylbenzene	**38**	**388**	**343**	**275**	**546**	**101**
1,2,4-Trimethylbenzene	**72**	**659**	**574**	**550**	**828**	**180**
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	<25	**9,167**	**8,758**	**8,076**	**9,457**	**4,483**
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	<25	**10,373**	**10,751**	**7,258**	**11,476**	**2,439**
TPH C_4-C_9	**28,030**	**16,184**	**15,750**	**18,659**	**11,452**	**6,290**
TPH C_{10}-C_{15}	**7,350**	**73,498**	**79,257**	**47,763**	**78,276**	**25,884**

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-32	SV-33	SV-34	SV-35	SV-36	SV-37
Project Number:	3763	3763	3763	3763	3763	3763
Lab File ID:	S17111414	S17111355	S17111356	S17111357	S17111358	S17111406
Received Date:	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017	11/9/2017
Analysis Date:	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Analysis Time:	19:48	6:51	7:14	7:37	8:00	16:44
Matrix:	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas	Soil Gas
Units:	ng	ng	ng	ng	ng	ng
COMPOUNDS						
Vinyl Chloride	<10	<10	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25	<25	<25
Benzene	**204**	**125**	**857**	**2,467**	**52**	<25
Trichloroethene	<10	<10	<10	<10	<10	<10
1,4-Dioxane	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25	<25	<25
Toluene	**291**	**275**	**555**	**1,813**	**188**	<25
1,2-Dibromoethane (EDB)	<25	<25	<25	<25	<25	<25
Tetrachloroethene	**21**	**19**	**9 J**	**306**	**15**	**9 J**
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25	<25	<25
Ethylbenzene	**69**	**37**	**43**	**266**	<25	<25
p & m-Xylene	**228**	**382**	**374**	**1,152**	**120**	<25
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25	<25	<25
o-Xylene	**176**	**357**	**329**	**892**	**119**	<25
1,2,3-Trichloropropane	<25	<25	<25	<25	<25	<25
Isopropylbenzene	**31**	**26**	<25	**128**	<25	<25
1,3,5-Trimethylbenzene	**258**	**456**	**296**	**1,013**	**151**	<25
1,2,4-Trimethylbenzene	**404**	**781**	**465**	**1,165**	**230**	<25
1,3-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25	<25	<25
Naphthalene	**11,914**	**8,731**	**7,593**	**10,930**	**4,271**	**72**
1,2,3-Trichlorobenzene	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene	**15,308**	**9,203**	**7,680**	**15,202**	**2,098**	**41**
TPH C_4-C_9	**5,664**	**19,286**	**15,746**	**39,724**	**10,509**	**5,216**
TPH C_{10}-C_{15}	**94,774**	**72,442**	**61,650**	**135,153**	**26,433**	<5,000

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.

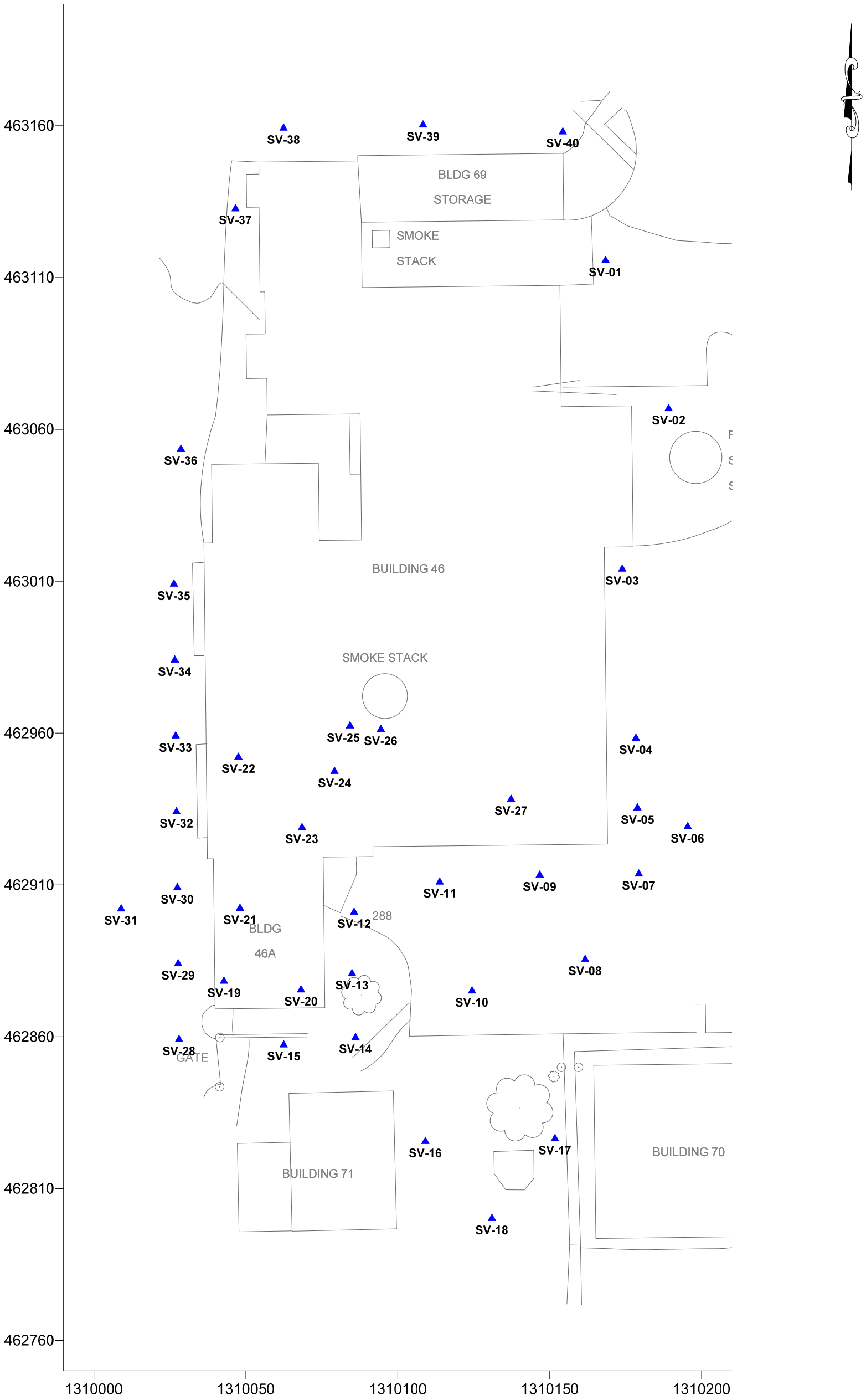
Table 1

Beacon Environmental Services, Inc.
2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA

Analysis by EPA Method 8260C

Client Sample ID:	SV-38	SV-39	SV-40	LB171114s
Project Number:	3763	3763	3763	
Lab File ID:	S17111407	S17111408	S17111409	S17111403
Received Date:	11/9/2017	11/9/2017	11/9/2017	
Analysis Date:	11/14/2017	11/14/2017	11/14/2017	11/14/2017
Analysis Time:	17:07	17:29	17:53	15:33
Matrix:	Soil Gas	Soil Gas	Soil Gas	
Units:	ng	ng	ng	ng
COMPOUNDS				
Vinyl Chloride	<10	<10	<10	<10
1,1-Dichloroethene	<10	<10	<10	<10
1,1,2-Trichlorotrifluoroethane (Fr.113)	<25	<25	<25	<25
trans-1,2-Dichloroethene	<10	<10	<10	<10
Methyl-t-butyl ether	<25	<25	<25	<25
1,1-Dichloroethane	<25	<25	<25	<25
cis-1,2-Dichloroethene	<10	<10	<10	<10
Chloroform	<25	<25	<25	<25
1,2-Dichloroethane	<25	<25	<25	<25
1,1,1-Trichloroethane	**41**	<25	<25	<25
Carbon Tetrachloride	<25	<25	<25	<25
Benzene	**64**	**33**	<25	<25
Trichloroethene	<10	<10	<10	<10
1,4-Dioxane	<25	<25	<25	<25
1,1,2-Trichloroethane	<25	<25	<25	<25
Toluene	**64**	**929**	**62**	<25
1,2-Dibromoethane (EDB)	<25	<25	<25	<25
Tetrachloroethene	**8 J**	**5 J**	<10	<10
1,1,1,2-Tetrachloroethane	<25	<25	<25	<25
Chlorobenzene	<25	<25	<25	<25
Ethylbenzene	<25	**36**	<25	<25
p & m-Xylene	<25	**158**	<25	<25
1,1,2,2-Tetrachloroethane	<25	<25	<25	<25
o-Xylene	<25	**110**	<25	<25
1,2,3-Trichloropropane	<25	<25	<25	<25
Isopropylbenzene	<25	<25	<25	<25
1,3,5-Trimethylbenzene	<25	<25	<25	<25
1,2,4-Trimethylbenzene	<25	<25	<25	<25
1,3-Dichlorobenzene	<25	<25	<25	<25
1,4-Dichlorobenzene	<25	<25	<25	<25
1,2-Dichlorobenzene	<25	<25	<25	<25
1,2,4-Trichlorobenzene	<25	<25	<25	<25
Naphthalene	<25	<25	<25	<25
1,2,3-Trichlorobenzene	<25	<25	<25	<25
2-Methylnaphthalene	<25	<25	<25	<25
TPH C_4-C_9	**8,213**	**14,596**	<5,000	<5,000
TPH C_{10}-C_{15}	**6,006**	**8,038**	<5,000	<5,000

Results in nanograms (ng). J = Values below limit of quantitation (LOQ) but above limit of detection (LOD). B = Detected in method blank.



LEGEND

SV-7 PASSIVE SOIL-GAS SAMPLE LOCATION

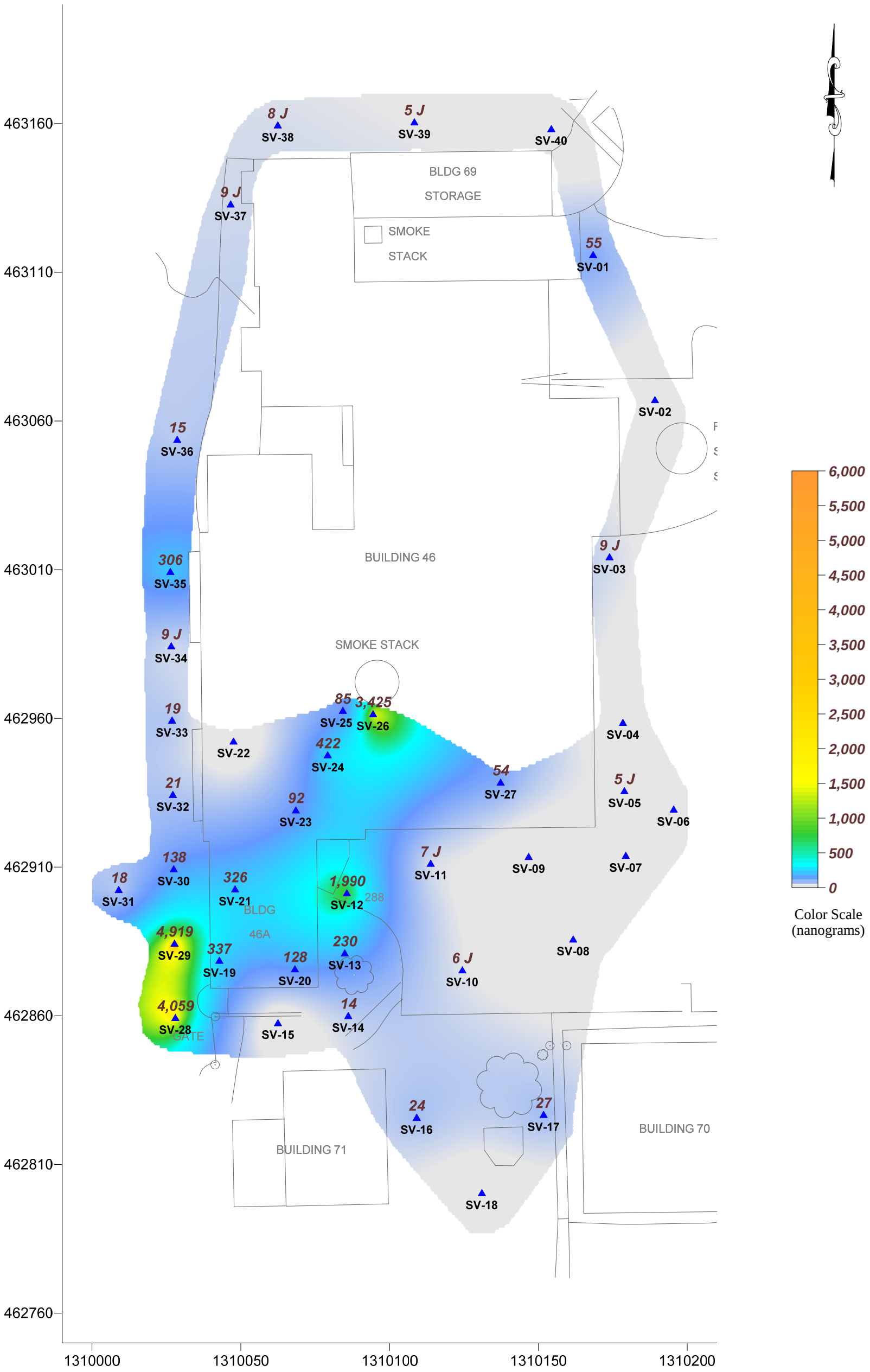
Scale in Feet

0 35 70

BEACON ENVIRONMENTAL SERVICES, INC.
2203A Commerce Road, Suite 1, Forest Hill, MD 21050 USA
www.Beacon-USA.com 1-410-838-8780
Beacon Project No. 3763, November 2017

Figure 1
Passive Soil-Gas Survey
Sample Locations

AFRH - Main Campus Site
Washington, DC



LEGEND

8 J — NANOGRAMS/SAMPLER (J=Estimated Value)

SV-7 — PASSIVE SOIL-GAS SAMPLE LOCATION

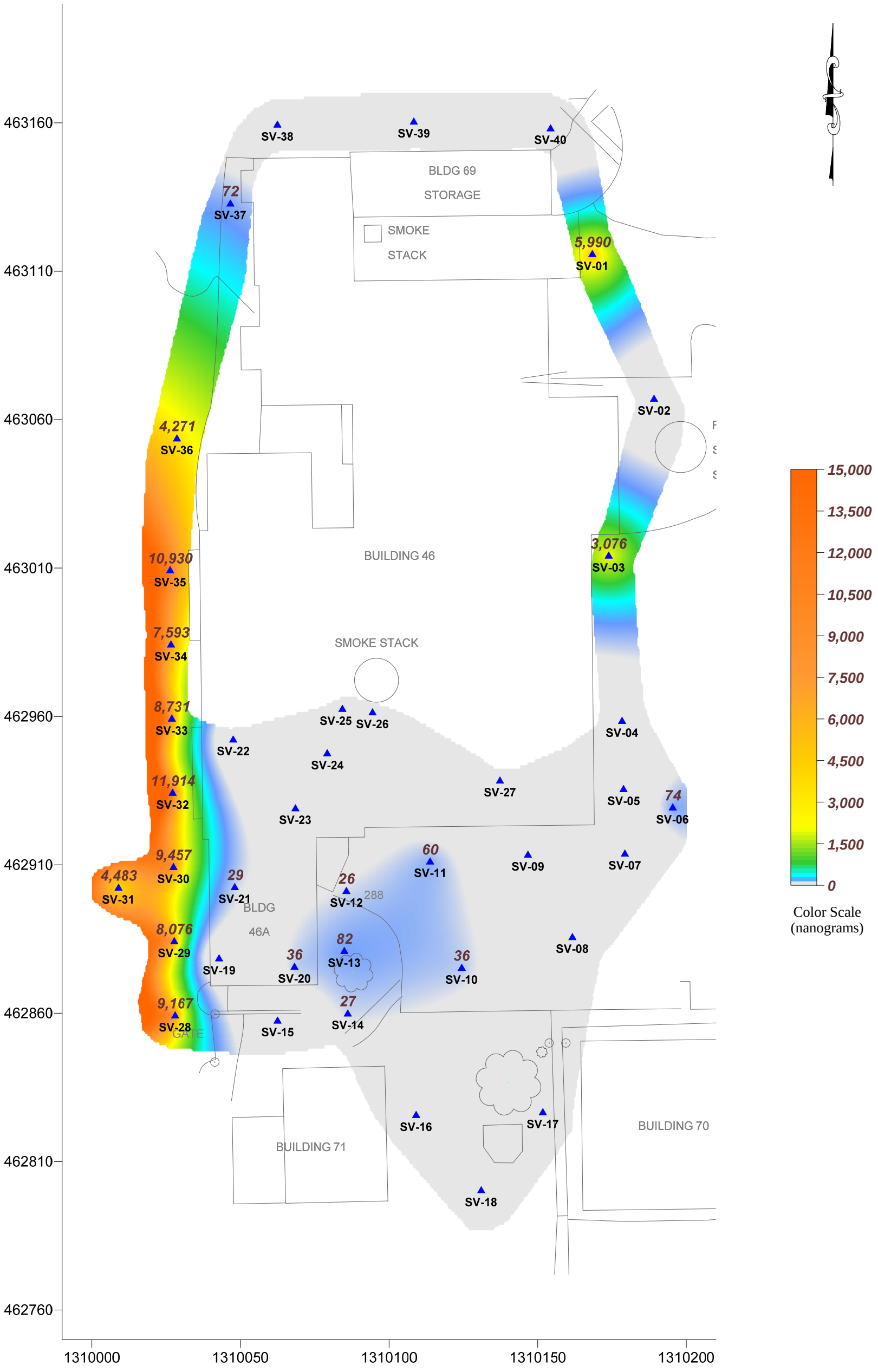
Scale in Feet

0 35 70

BEACON ENVIRONMENTAL SERVICES, INC.
2203A Commerce Road, Suite 1, Forest Hill, MD 21050 USA
www.Beacon-USA.com 1-410-838-8780
Beacon Project No. 3763, November 2017

Figure 2
Passive Soil-Gas Survey
Tetrachloroethene

AFRH - Main Campus Site
Washington, DC



LEGEND

1,000 NANOGRAMS/SAMPLER

SV-7 PASSIVE SOIL-GAS SAMPLE LOCATION

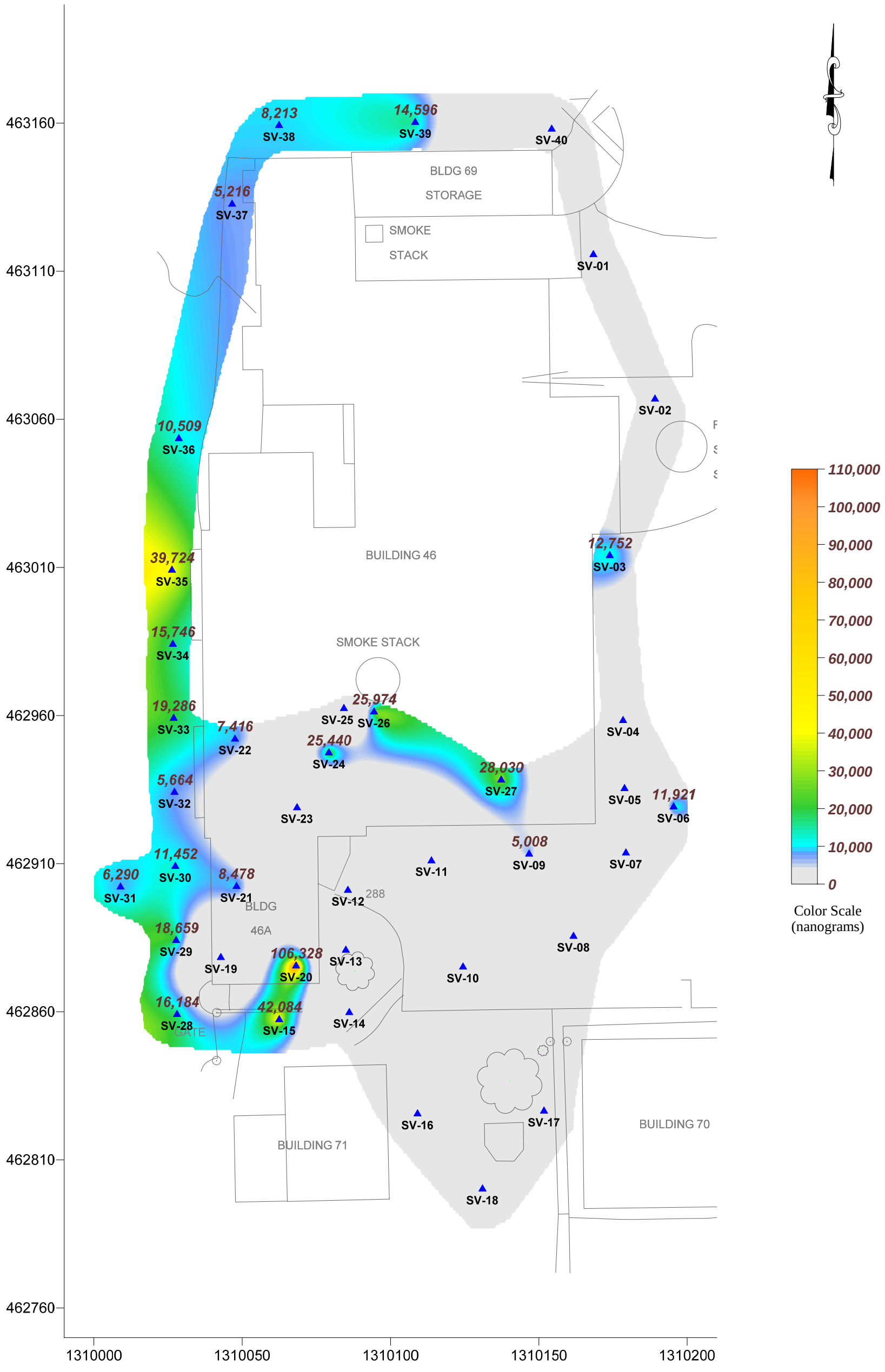
Scale in Feet

0 35 70

BEACON ENVIRONMENTAL SERVICES, INC.
2203A Commerce Road, Suite 1, Forest Hill, MD 21050 USA
www.Beacon-USA.com 1-410-838-8780
Beacon Project No. 3763, November 2017

Figure 3
Passive Soil-Gas Survey
Naphthalene

AFRH - Main Campus Site
Washington, DC



LEGEND

1,000 NANOGRAMS/SAMPLER

SV-7 PASSIVE SOIL-GAS SAMPLE LOCATION

Scale in Feet

0 35 70

BEACON ENVIRONMENTAL SERVICES, INC.
2203A Commerce Road, Suite 1, Forest Hill, MD 21050 USA
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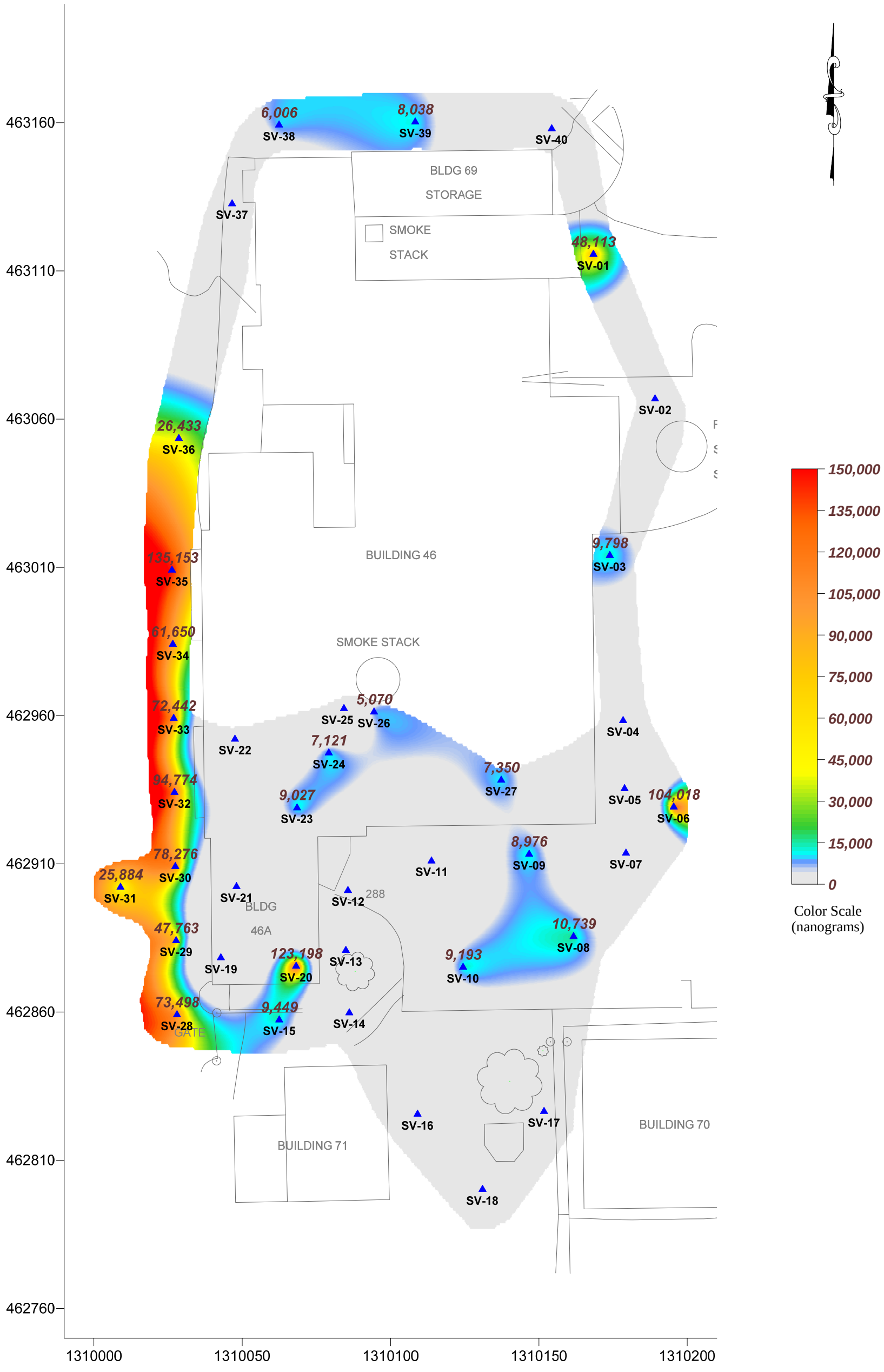
Beacon Project No. 3763, November 2017

Figure 4
Passive Soil-Gas Survey
TPH C4-C9

AFRH - Main Campus Site
Washington, DC



LEGEND

1,000 NANOGRAMS/SAMPLER

SV-7 PASSIVE SOIL-GAS SAMPLE LOCATION

Scale in Feet

0 35 70

BEACON ENVIRONMENTAL SERVICES, INC.
2203A Commerce Road, Suite 1, Forest Hill, MD 21050 USA
www.Beacon-USA.com 1-410-838-8780
Beacon Project No. 3763, November 2017

Figure 5
Passive Soil-Gas Survey
TPH C10-C15

AFRH - Main Campus Site
Washington, DC

Attachments

Attachment 1

APPLYING RESULTS FROM PASSIVE SOIL-GAS SURVEYS

The utility of soil-gas surveys is directly proportional to their accuracy in reflecting and representing changes in the subsurface concentrations of source compounds. Passive soil-gas survey results are the mass collected from the vapor-phase emanating from the source(s). The vapor-phase is merely a fractional trace of the source(s) and, as a matter of convenience, the units used in reporting detection values from passive soil-gas surveys are smaller than those employed for source-compound concentrations.

Passive soil gas data are reported in mass of compounds identified per sample location (e.g., nanograms (ng) or micrograms (µg) per sampler). Results from a passive soil gas survey typically are then used to guide where follow-on intrusive samples should be collected to obtain corresponding concentrations of the contaminants in soil, soil gas, and/or groundwater, as well as eliminate those areas where intrusive samples are not required. It is not practical to report passive soil gas data as concentration because the sampler's uptake rates of the compounds are often greater than the replenishment rates of the compounds around the sampler, which results in low bias measurements, and the replenishment rates will be dependent on several factors that include, at a minimum, soil gas concentrations, soil porosity and permeability, and soil moisture level.

Whatever the relative concentrations of source and associated soil gas, best results are realized when the ratio of soil-gas measurements to actual subsurface concentrations remains as close to constant as the real world permits. It is the reliability and consistency of this ratio, not the particular units of mass (*e.g.*, nanograms) that determine usefulness. Thus, BEACON emphasizes the necessity of conducting — at minimum — follow-on intrusive sampling in areas that show relatively high soil-gas measurements to obtain corresponding concentrations of soil and groundwater contaminants. These correspondent values furnish the basis for approximating a relationship. For extrapolating passive soil gas results to vapor intrusion evaluations, we recommend a minimum of three passive soil gas locations be converted to a shallow vapor well then sampled using an active soil gas method. Once a relationship is established, it can be used in conjunction with the remaining soil-gas measurements to estimate subsurface contaminant concentrations across the survey field. (See www.beacon-usa.com/passivesoilgas.html, Publication 1: *Mass to Concentration Tie-In for PSG Surveys* and Publication 4: *Groundwater and PSG Correlation*.) It is important to keep in mind, however, that specific conditions at individual sample points, including soil porosity and permeability, depth to contamination, and perched ground water, can have an impact on soil-gas measurements at those locations.

When passive soil-gas surveys are utilized as described above, the data provide information that can yield substantial savings in drilling costs and in time. They furnish, among other things, a checklist of compounds expected at each survey location and help to determine how and where drilling budgets can most effectively be spent. Passive soil-gas surveys can also be used as a remediation or general site monitoring tool that can be implemented on a quarterly, semi-annual or annual basis.

Attachment 2

FIELD PROCEDURES FOR PASSIVE SOIL-GAS SURVEYS

The following field procedures are routinely used during a BEACON Passive Soil-Gas Survey. Modifications can be and are incorporated from time to time in response to individual project requirements. In all instances, BEACON adheres to EPA-approved Quality Assurance and Quality Control practices.

A. Field personnel carry a BESURE Sample Collection Kit™ and support equipment to the site and deploy the passive samplers in a prearranged survey pattern. A passive sampler consists of a borosilicate glass vial containing hydrophobic adsorbent cartridges with a length of wire attached to the vial for retrieval. Although samplers require only one person for emplacement and retrieval, the specific number of field personnel required depends upon the scope and schedule of the project. Each Sampler emplacement generally takes less than two minutes.

B. At each survey point a field technician clears vegetation as needed and, using a hammer drill with a 1″- to 1½″-diameter bit, creates a hole 12 to 14 inches deep. [Note: For locations covered with asphalt, concrete, or gravel surfacing, the field technician drills a 1″- to 1½″-diameter hole through the surfacing to the soils beneath]. The technician then, using a hammer drill with a ½″ diameter bit, creates a hole three-feet deep. The hole is then sleeved with a 1″-diameter metal sleeve.

C. The technician then removes the solid plastic cap from a sampler and replaces it with a Sampling Cap (a plastic cap with a hole covered by screen meshing). The technician inserts the sampler, with the Sampling Cap end facing down, into the hole (**see attached figure**). The sampler is then covered with an aluminum foil plug and soils for uncapped locations or, for capped locations, an aluminum foil plug and a concrete patch. The sampler's location, time and date of emplacement, and other relevant information are recorded on the Field Deployment Form.

D. One or more trip blanks are included as part of the quality-control procedures.

E. Once all the samplers have been deployed, field personnel schedule sampler recovery and depart, taking all other equipment and materials with them.

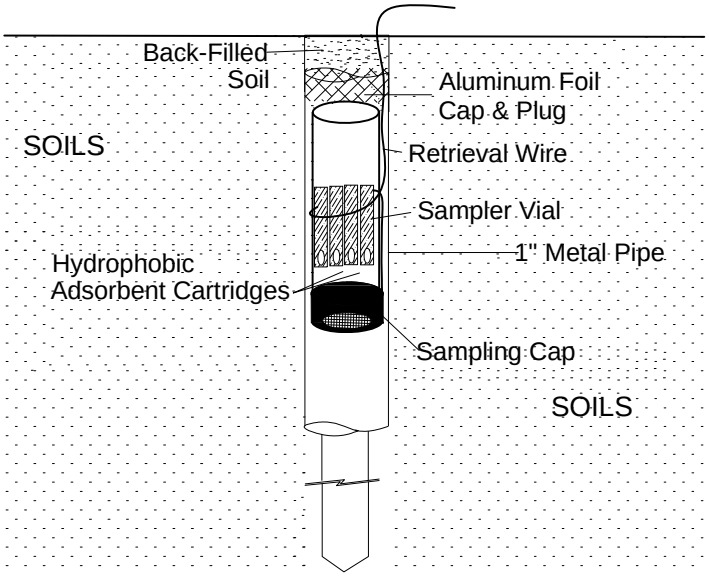
F. Field personnel retrieve the samplers at the end of the exposure period. At each location, a field technician withdraws the sampler from its hole, removes the retrieval wire, and wipes the outside of the vial clean using gauze cloth; following removal of the Sampling Cap, the threads of the vial are also cleaned. A solid plastic cap is screwed onto the vial and the sample location number is written on the label. The technician then records sample-point location, date, time, etc. on the Field Deployment Form.

G. Sampling holes are refilled with soil, sand, or other suitable material. If samplers have been installed through asphalt or concrete, the hole is filled to grade with a plug of cold patch or cement.

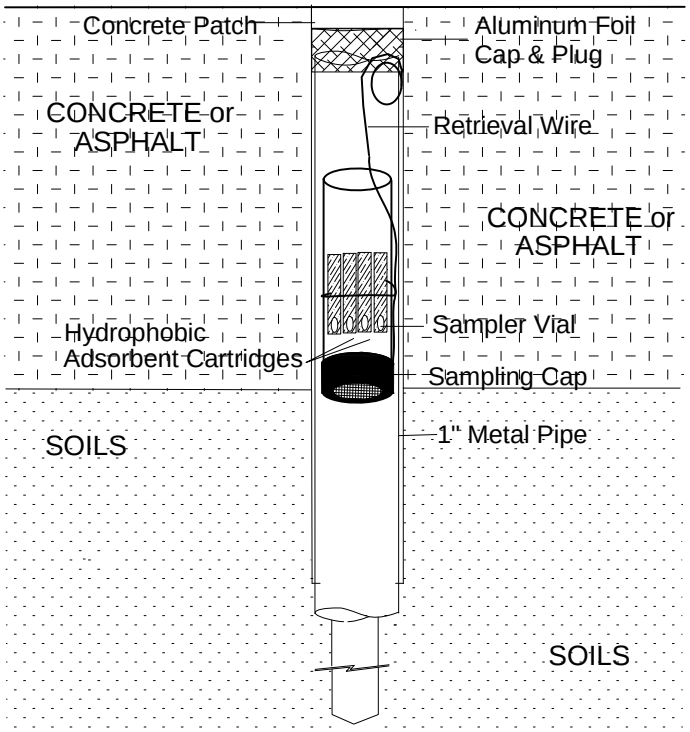
H. Following retrieval, field personnel ship or transport the passive samplers to BEACON’s laboratory.

BEACON'S PASSIVE SOIL-GAS SAMPLER

DEPLOYMENT THROUGH SOILS



DEPLOYMENT THROUGH AN ASPHALT/CONCRETE CAP



Attachment 3

Chain of Custody Form

BEACON ENVIRONMENTAL SERVICES, INC

CHAIN-OF-CUSTODY
PASSIVE SOIL-GAS SAMPLES

2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA
P: 1-410-838-8780 | F: 1-410-838-8740

Project Information		Client Information		
Beacon Project No.:	3763	Company Name:	Chesapeake Geo Sciences	Client PO No.: CG171111MS
Site Name:	Armed Forces Retirement Home	Office Location:	5405 Town Knolls Rd Ste 1	
Site Location	3700 N. Capitol St NW, WDC	Samples Submitted By:	Meg Staines	Expedited Turnaround Time
Analytical Method:	U.S. EPA Method 8260C	Contact Phone No.:	(410) 740-1911 X107	☐ Rush (Specify):____Days
Target Compounds:	VOCs			

Field Sample ID	Date Emplaced / Time Emplaced	Date Retrieved / Time Retrieved	Sampling Hole Depth (inches)	Type of Surface (Soil/Asphalt/ Concrete/Gravel)	Optional Sample Information (e.g., Description of Sample Location, Sample Condition, PID/FID Readings)
	10/23-10/26/17	11/7-11/8/17			
SV-01	10/23/17 0945	11/7/17 0805	3.3"	Asphalt on soil	LYB, damp Clayey SILT; 7,338 ppb
SV-02	1045	0830		Concrete on soil	YB, damp Silty CLAY; Ø ppb
SV-03	1115	0845		Asphalt on soil	RB, moist Silty CLAY; Ø ppb
SV-04	1140	0858		Asphalt	RB, damp Silty CLAY; Ø ppb
SV-05	1405	0907		Asphalt	RB, damp Silty CLAY; Ø ppb
SV-40	1500	1350		Grass/Soil	YB, damp Clayey SILT; 10.28 ppm
SV-39	1520	1303		Grass/Soil	Same as above; 7.1 ppm
SV-38	1611	1253		Asphalt on soil	LYB, damp Clayey SAND; 7.5 ppm
SV-37	1811	1245		Asphalt	LYB, damp Clayey SILT; 885 ppb
SV-06	10/24/17 0955	0917		Asphalt	BR, damp Silty CLAY; 15.4 ppm
SV-07	1020	0925		Asphalt	RB, damp Silty CLAY; 163 ppb
SV-D1	0000	0000		Asphalt	Same as above; Ø ppb
SV-08	1045	0935		Asphalt	RY, damp Clayey SILT; 2,154 ppb
SV-09	1140	0947		Asphalt	Same as above; 7,775 ppb
SV-10	1155	1019		Asphalt	Y, damp Clayey SILT; 10.33 ppm

Special Notes/Instructions:
All lithologies were Fill material; subsurface soil was v. stiff to hard.

Shipment of Field Kit to Laboratory - Custody Seal # 1045977 Intact? (Y) N

Relinquished By:	Date/Time	Courier	Received By:	Date/Time
Meg Staines	11/8/17 18:00	UPS 6460 1E	Angelo Benavides	11/10/17 9:54

BEACON ENVIRONMENTAL SERVICES, INC.

CHAIN-OF-CUSTODY
PASSIVE SOIL-GAS SAMPLES

2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA
P: 1-410-838-8780 | F: 1-410-838-8740

Project Information		Client Information		
Beacon Project No.:	3763	Company Name:	CGS	Client PO No.: CG171111MS
Site Name:	Armed Forces Retirement Home	Office Location:	Columbia, MD 21045	
Site Location	3700 N. Capitol St NW, WDC	Samples Submitted By:	Meg Staines	Expedited Turnaround Time
Analytical Method:	U.S. EPA Method 8260C	Contact Phone No.:	(410) 740-1911 X107	☐ Rush (Specify):____Days
Target Compounds:	VOCs			

Field Sample ID	Date Emplaced / Time Emplaced	Date Retrieved / Time Retrieved	Sampling Hole Depth (Inches)	Type of Surface (Soil/Asphalt/ Concrete/Gravel)	Optional Sample Information (e.g., Description of Sample Location, Sample Condition, PID/FID Readings)
SV-11	10/24/17 1217	11/7/17 1033	33"	Asphalt on soil	YB, damp Clayey SILT; Ø ppb
SV-12	1255	1045	33"	Asphalt/Concr	No cuttings-difficult Concr; Ø ppb
SV-13	1415	1057	27"	Ivy/Soil	No cuttings-1.5" bit 10"; 3.6 ppb
SV-14	1430	1110	33"	Asphalt on soil	LYB, damp Clayey SILT; Ø ppb
SV-15	1445	1135	33"	Asphalt/Grass	LBY, damp Clayey SILT; 31.52 ppm
SV-16	1510	1150	27"	Weeds/brambles	YB, Damp Clayey SILT; 1,176 ppb
SV-17	1540	1205	33"		No cuttings-V. hard soil; 1,036 ppb
SV-18	1555	1215			LBY, dry Silty CLAY; 3,367 ppb
SV-20	10/25/17 1001	11/8/17 0845		Concr/Gravel	LBY, dry Clayey SILT; 11.38 ppm
SV-19	1045	0822			LBY, damp Clayey SILT; 3 ppb
SV-21	1155	0900			VPB, damp Silty CLAY; 1,368 ppb
SV-24	1245	0912		Concrete on soil	VPB, dry Silty CLAY; 18.38 ppm
SV-25	1307	0921			RY, moist Silty CLAY; 268 ppb
SV-22	1332	0930			VPB, dry Clayey SILT; 1,280 ppb
SV-26	1450	1014			YB, sl moist Clayey SILT; 8,595 ppb
SV-27	1530	1117			RB, damp Silty CLAY; 18.18 ppm
SV-23	1700	1000			OG, moist Clayey SILT; 878 ppb
SV-28	10/26/17 0818	1240		Asphalt on soil	BR, damp Clayey SILT Brick; 138.3 ppm
SV-D2	0000	0000			Same as above Ø ppb
SV-29	0850	1308			YR, damp Clayey SILT; 174.5 ppm

Special Notes/Instructions: Subsurface soil lithologies were Fill material—very stiff to hard.
SV-23 1.5" bit did not get thru the concrete—Very hard—4.5" (0.75" bit did get deep though).

BEACON ENVIRONMENTAL SERVICES, INC.

CHAIN-OF-CUSTODY
PASSIVE SOIL-GAS SAMPLES

2203A Commerce Road, Suite 1
Forest Hill, MD 21050 USA
P: 1-410-838-8780 | F: 1-410-838-8740

Project Information		Client Information		
Beacon Project No.:	3763	Company Name:	CGS	Client PO No.:
Site Name:	Armed Forces Retirement Home	Office Location:	Columbia, MD 21045	CG171111MS
Site Location	3700 N. Capitol St NW, WDC	Samples Submitted By:	Meg Starkes	Expedited Turnaround Time
Analytical Method:	U.S. EPA Method 8260C	Contact Phone No.:	(410) 740-1911 X107	☐ Rush (Specify):____Days
Target Compounds:	VOCs			

Field Sample ID	Date Emplaced / Time Emplaced	Date Retrieved / Time Retrieved	Sampling Hole Depth (Inches)	Type of Surface (Soil/Asphalt/ Concrete/Gravel)	Optional Sample Information (e.g., Description of Sample Location, Sample Condition, PID/FID Readings)
SV-30	10/26/17 0910	11/8/17 1342	33"	Asphalt on soil	LBY, damp Clayey SILT; 74.6 ppm
SV-31	0925	1351			Same as above) 679 ppm
SV-32	1020	1419			YB, damp Clayey SILT; 115.1 ppm
SV-33	1040	1429			BY, damp Clayey SILT; 117.7 ppm
SV-34	1115	1439			LYB, damp Clayey SILT; 117.1 ppm
SV-35	1130	1454			Sleeve only 6" due to asphalt; 119.1 ppm
SV-36	1217	1509			LBY, damp Clayey SILT; 125.1 ppm
Trip #1	10/19/17 1210	1800			Trip Blank
SV+D3 AB 11/10/17					

Special Notes/Instructions: Subsurface soil lithologies were Fill material - v. stiff to hard
SV-35 PID reading at Asphalt string layer (base): 430 ppm.

Attachment 4

LABORATORY PROCEDURES FOR PASSIVE SOIL-GAS SAMPLES

Following are laboratory procedures used with BEACON Passive Soil-Gas Surveys, a screening technology for expedited site investigation. After exposure, adsorbent cartridges from the passive samplers are analyzed using U.S. EPA Method 8260C as a guidance document, a capillary gas chromatographic/mass spectrometric method, modified to accommodate high temperature thermal desorption of the adsorbent cartridges and to meet the objectives of reporting semi-quantitative data. This procedure is summarized as follows:

A. The adsorbent cartridges are loaded with internal standards and surrogates prior to loading the autosampler with the cartridges. The loaded cartridges are purged in a helium flow. Then the cartridges are thermally desorbed in a helium flow onto a focusing trap. Any analytes in the helium stream are adsorbed onto a focusing trap.

B. Following trap focusing, the trap is thermally desorbed onto a Rxi-624Sil MS 20m, 0.18 mm ID, 1.00 micron film thickness capillary column.

C. The GC/MS is scanned between 35 and 300 Atomic Mass Units (AMU) at 3.12 scans per second.

D. BFB tuning criteria and the initial five-point calibration procedures are those stated in method SW846-8260C. System performance and calibration check criteria are met prior to analysis of samples. A laboratory method blank is analyzed after the daily standard to determine that the system is contaminant-free.

E. The instrumentation used for these analyses includes:

- Agilent 7890-5975c Gas Chromatograph/Mass Spectrometer; and
- Markes TD100 thermal desorption system.

APPENDIX B

UST CONTENTS SAMPLE WASTE CHARACTERIZATION LABORATORY ANALYTICAL REPORT

Maryland spectral Services

Analytical Chemistry Services

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com
VELAP ID 460040

27 October 2017

Nancy Love
Chesapeake GeoSciences, Inc.
5405 Twin Knolls Rd, Suite I
Columbia, MD 21045
RE: AFRH ADDITIONAL PHASE II ESA

Enclosed are the results of analyses for samples received by the laboratory on 10/20/17 17:00.

A more detailed report format is available upon request, which lists the accreditation status for all analytical methods performed.

Please visit our website at www.mdspectral.com for a complete listing of our accreditations.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Rabecka Koons
Quality Assurance Specialist

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

Client Sample ID	Alternate Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
UST-EAST		7102016-01	Nonpotable Water	10/20/17 11:30	10/20/17 17:00
UST-WEST		7102016-02	Nonpotable Water	10/20/17 11:45	10/20/17 17:00

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Rabecka Koons, Quality Assurance Specialist

As a NELAP accredited laboratory, MSS can provide a certification list upon request.

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

UST-EAST

7102016-01 (Nonpotable Water)
Sample Date: 10/20/17

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:17	GM
tert-Amyl alcohol (TAA)	ND		ug/L	20.0	20.0	1	10/23/17	10/23/17 16:17	GM
tert-Amyl methyl ether (TAME)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Benzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Bromobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Bromochloromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Bromodichloromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Bromoform	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Bromomethane	ND		ug/L	5.0	5.0	1	10/23/17	10/23/17 16:17	GM
tert-Butanol (TBA)	ND		ug/L	15.0	15.0	1	10/23/17	10/23/17 16:17	GM
2-Butanone (MEK)	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:17	GM
n-Butylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
sec-Butylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
tert-Butylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Carbon disulfide	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Carbon tetrachloride	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Chlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Chloroethane	ND		ug/L	5.0	5.0	1	10/23/17	10/23/17 16:17	GM
Chloroform	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Chloromethane	ND		ug/L	5.0	5.0	1	10/23/17	10/23/17 16:17	GM
2-Chlorotoluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
4-Chlorotoluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Dibromochloromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2-Dibromo-3-chloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2-Dibromoethane (EDB)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Dibromomethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2-Dichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,3-Dichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,4-Dichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Dichlorodifluoromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1-Dichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2-Dichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1-Dichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
cis-1,2-Dichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM

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Rabecka Koons, Quality Assurance Specialist

As a NELAP accredited laboratory, MSS can provide a certification list upon request.

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

UST-EAST

7102016-01 (Nonpotable Water)
Sample Date: 10/20/17

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
trans-1,2-Dichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Dichlorofluoromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2-Dichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,3-Dichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
2,2-Dichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1-Dichloropropene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
cis-1,3-Dichloropropene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
trans-1,3-Dichloropropene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Diisopropyl ether (DIPE)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Ethyl tert-butyl ether (ETBE)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Ethylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Hexachlorobutadiene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
2-Hexanone	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:17	GM
Isopropylbenzene (Cumene)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
4-Isopropyltoluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Methyl tert-butyl ether (MTBE)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
4-Methyl-2-pentanone	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:17	GM
Methylene chloride	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:17	GM
Naphthalene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
n-Propylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Styrene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1,1,2-Tetrachloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1,2,2-Tetrachloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Tetrachloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Toluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2,3-Trichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2,4-Trichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1,1-Trichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,1,2-Trichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Trichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Trichlorofluoromethane (Freon 11)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2,3-Trichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,2,4-Trimethylbenzene	**2.5**	J	ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
1,3,5-Trimethylbenzene	**2.4**	J	ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM

Rabecka Koons, Quality Assurance Specialist

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Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

UST-EAST

7102016-01 (Nonpotable Water)
Sample Date: 10/20/17

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
Vinyl chloride	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
o-Xylene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
m- & p-Xylenes	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:17	GM
Surrogate: 1,2-Dichloroethane-d4			*75-120*	*97 %*	*10/23/17*		*10/23/17 16:17*		
Surrogate: Toluene-d8			*84-110*	*99 %*	*10/23/17*		*10/23/17 16:17*		
Surrogate: 4-Bromofluorobenzene			*78-110*	*100 %*	*10/23/17*		*10/23/17 16:17*		
GASOLINE RANGE ORGANICS BY EPA 8015B									
Gasoline-Range Organics	ND		ug/L	100	100	1	10/23/17	10/23/17 18:42	GM
DIESEL RANGE ORGANICS BY EPA 3510/8015B									
Diesel-Range Organics	**0.31**		mg/L	0.20	0.20	1	10/23/17	10/27/17 15:43	CMK
Surrogate: o-Terphenyl			*60-120*	*78 %*	*10/23/17*		*10/27/17 15:43*		

Rebecka Koons

Rabecka Koons, Quality Assurance Specialist

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

UST-WEST

7102016-02 (Nonpotable Water)
Sample Date: 10/20/17

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS)									
Acetone	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:41	GM
tert-Amyl alcohol (TAA)	ND		ug/L	20.0	20.0	1	10/23/17	10/23/17 16:41	GM
tert-Amyl methyl ether (TAME)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Benzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Bromobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Bromochloromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Bromodichloromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Bromoform	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Bromomethane	ND		ug/L	5.0	5.0	1	10/23/17	10/23/17 16:41	GM
tert-Butanol (TBA)	ND		ug/L	15.0	15.0	1	10/23/17	10/23/17 16:41	GM
2-Butanone (MEK)	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:41	GM
n-Butylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
sec-Butylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
tert-Butylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Carbon disulfide	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Carbon tetrachloride	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Chlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Chloroethane	ND		ug/L	5.0	5.0	1	10/23/17	10/23/17 16:41	GM
Chloroform	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Chloromethane	ND		ug/L	5.0	5.0	1	10/23/17	10/23/17 16:41	GM
2-Chlorotoluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
4-Chlorotoluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Dibromochloromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2-Dibromo-3-chloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2-Dibromoethane (EDB)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Dibromomethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2-Dichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,3-Dichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,4-Dichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Dichlorodifluoromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1-Dichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2-Dichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1-Dichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
cis-1,2-Dichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM

Rebecka Koons

Rabecka Koons, Quality Assurance Specialist

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Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

UST-WEST

7102016-02 (Nonpotable Water)
Sample Date: 10/20/17

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
trans-1,2-Dichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Dichlorofluoromethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2-Dichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,3-Dichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
2,2-Dichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1-Dichloropropene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
cis-1,3-Dichloropropene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
trans-1,3-Dichloropropene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Diisopropyl ether (DIPE)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Ethyl tert-butyl ether (ETBE)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Ethylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Hexachlorobutadiene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
2-Hexanone	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:41	GM
Isopropylbenzene (Cumene)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
4-Isopropyltoluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Methyl tert-butyl ether (MTBE)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
4-Methyl-2-pentanone	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:41	GM
Methylene chloride	ND		ug/L	10.0	10.0	1	10/23/17	10/23/17 16:41	GM
Naphthalene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
n-Propylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Styrene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1,1,2-Tetrachloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1,2,2-Tetrachloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Tetrachloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Toluene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2,3-Trichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2,4-Trichlorobenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1,1-Trichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,1,2-Trichloroethane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Trichloroethene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Trichlorofluoromethane (Freon 11)	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2,3-Trichloropropane	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,2,4-Trimethylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
1,3,5-Trimethylbenzene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM

Rebecka Koons

Rabecka Koons, Quality Assurance Specialist

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Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Reported:
10/27/17 17:19

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

UST-WEST

7102016-02 (Nonpotable Water)
Sample Date: 10/20/17

Analyte	Result	Notes	Units	Reporting Limit (MRL)	Quantitation Limit (LOQ)	Dilution	Prepared	Analyzed	Analyst
VOLATILE ORGANICS BY EPA METHOD 8260B (GC/MS) (continued)									
Vinyl chloride	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
o-Xylene	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
m- & p-Xylenes	ND		ug/L	5.0	2.0	1	10/23/17	10/23/17 16:41	GM
Surrogate: 1,2-Dichloroethane-d4			*75-120*	*99 %*	*10/23/17*		*10/23/17 16:41*		
Surrogate: Toluene-d8			*84-110*	*96 %*	*10/23/17*		*10/23/17 16:41*		
Surrogate: 4-Bromofluorobenzene			*78-110*	*98 %*	*10/23/17*		*10/23/17 16:41*		
GASOLINE RANGE ORGANICS BY EPA 8015B									
Gasoline-Range Organics	ND		ug/L	100	100	1	10/23/17	10/23/17 19:19	GM
DIESEL RANGE ORGANICS BY EPA 3510/8015B									
Diesel-Range Organics	ND		mg/L	0.20	0.20	1	10/23/17	10/27/17 16:10	CMK
Surrogate: o-Terphenyl			*60-120*	*91 %*	*10/23/17*		*10/27/17 16:10*		

Rebecka Koons

Rabecka Koons, Quality Assurance Specialist

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Analytical Results

1500 Caton Center Dr Suite G
Baltimore MD 21227
410-247-7600
www.mdspectral.com

Project: AFRH ADDITIONAL PHASE II ESA

Project Number: CG-17-1111
Project Manager: Nancy Love

Reported:
10/27/17 17:19

Notes and Definitions

J	Detected but below the reporting limit; therefore, result is an estimated concentration (CLP J-Flag).
E	The concentration indicated for this analyte is an estimated value above the calibration range of the instrument. This value is considered an estimate (CLP E-flag).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference

Rebecka Koons

Rabecka Koons, Quality Assurance Specialist

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CHAIN-OF-CUSTODY RECORD

Company Name: Chesapeake GeoSciences, Inc.	Project Manager: Nancy Love
Project Name: AFRH Additional Phase II ESA	Project ID: CG-17-1111
Sampler(s): Devin Glancey	P.O. Number: CG171111NL

Maryland Spectral Services, Inc.
1500 Caton Center Drive, Suite G
Baltimore, MD 21227
410–247–7600 • Fax 410–247–7602
labman@mdspectral.com

Matrix Codes: NW (nonpotable water)
PW (potable water)

Field Sample ID	Date	Time	Water	Soil	Other	No. of Containers	VOCs via EPA 8260	TPH-GRO via EPA 8015M	TPH-DRO via EPA 8015M	Preservative: 1+1 HCL, H_2SO_4, Methanol, $Na_2S_2O_3$, $NaHCO_3$	Field pH, Residual Chlorine, QC Request, Trip Blank, Field Blank	MSS Lab ID
UST-East	10/20/17	11:30	X			7	X	X	X	1+1 HCL		71020l6-01
UST-West	10/20/17	11:45	X			7	X	X	X	1+1 HCL		-02

Analysis Requested

Relinquished by: (Signature)	Date/Time	Received by: (Signature)	Relinquished by: (Signature)	Date/Time	Received by: (Signature)
Devin Glancey	10/20/17 17:00				
(Printed) Devin Glancey		(Printed)	(Printed)		(Printed)
Relinquished by: (Signature)	Date/Time	Received by Lab: (Signature)			
	10/20/17 17:00	S HAMNA			
(Printed)		(Printed)			

Turn Around Time:

- X Normal (7 day)
- ☐ 5 day
- ☐ 4 day
- ☐ 3 day
- ☐ Rush (2 day)
- ☐ Next Day
- ☐ Other: _____
- ☐ Specific Due Date: _____

Lab Use:
Temp: 9.6 °C
- ☑ Received on Ice
- ☑ Received same day
- ☑ Preservation Appropriate

Delivery Method:
- Courier
- Client
- UPS
- FedEx
- USPS
- Other: _____

Special Instructions/QC Requirements & Comments:

Sample Disposal:
- ☐ Return to Client
- ☐ Disposal by lab
- ☐ Archive for _____ days

APPENDIX C

UST CONTENTS DISPOSAL MANIFEST

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	1	410 368 9178	11617

5. Generator's Name and Mailing Address: Armed Forces Retirement Home
3700 N. Capitol ST NW
Washington DC 20011

Generator's Site Address (if different than mailing address): Same

Generator's Phone:

6. Transporter 1 Company Name: Clean Venture Inc — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address: Spirit Services
15801 Lockwood Road
Williamsport, MD 21795

Facility's Phone: 301 223 1251

U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1.	NON DOT / Non RCRA Liquid (oily water)	1	TT	530	G
2.					
3.					
4.					

D17331
53391

13. Special Handling Instructions and Additional Information

Job # 50547

Vac #164

GENERATOR

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: X Shawn Servais — Signature — Month: 11 Day: 6 Year: 17

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: X William Schopbach — Signature — Month: 11 Day: 6 Year: 17

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Jared Blickenstaff — Signature — Month: 11 Day: 6 Year: 17

APPENDIX D

STRUCTURAL ENGINEER NOVEMBER 17, 2017 REPORT

CARSON K. C. MOK, CONSULTING ENGINEER, P.A.

9001 OTTAWA PLACE, SILVER SPRING, MARYLAND 20910

TEL: (301) 588-0008 (301) 587-3448 FAX: (301) 495-0120
E-mail: ckm9001@aol.com

Chesapeake Geosciences, Inc.
5405 Twin Knolls Road, Suite 1
Columbia, MD 21045
Attn: Mr. Kevin W. Howard, PG, President

November 17, 2017

Re: US Armed Forces Retirement Home
3700 N Capitol St. NW, Washington, DC 20011

Subject: Structural Engineering Assessment of the Two Underground Storage Tanks, the Adjacent Steam Tunnel, Retaining Ramp Wall, and Building No. 46 Foundation.

By your request, we have performed a structural engineering assessment for the removal of the two existing underground storage tanks and their structural impact on the adjacent structures which include the foundation of the adjacent laundry building No. 46, the alignment of a central heating plant steam tunnel, and a maximum 6 feet high reinforced concrete retaining wall between the upper driving ramp and the lower entrance areaway of building No. 46.

I. Description of the Two Existing Underground Storage Tanks (UST):

Based on the site exploration and probing, the two existing USTs are 4 feet in diameter and 5 feet deep and spaced at 6 feet o. c. The two tanks are apparently resting on a concrete pad. The tanks are covered with a 3 feet earth. The diameter of the exposed metal cover (of the manhole) is 1' -4''.

II. The Location of The Two Underground Storage Tanks in Relationship with the Underground Steam Pipe Tunnel System of the Adjacent Central Heating Plant:

We had inspected the existing underground steam pipe tunnel located under the first-floor level of the laundry building No. 46. The underground steam tunnel is about 4 to 5 feet wide and 5 to 6 feet high. It is large enough for pedestrian traffic.

Apparently, the tunnel is covered with 3 feet or more of earth leading from the central heating plant to the other buildings in the campus.

The alignment of the steam tunnel is running in the NE to SW direction diagonally under the west portion of the laundry building No. 46. The two existing USTs were installed apparently to serve the laundry building now are being abandoned. Currently the laundry is being done by outside contractors.

Reportedly, the two-story high laundry building was built later as an annex on the south side to the central heating plant. The structural foundation of the laundry

building was constructed around and over the existing steam tunnel. The footing foundation of the newer laundry building should be lowered to match with the older steam tunnel foundation.

The bottom elevation of the steam tunnel is estimated at a minimum of 8 to 9 feet deep from the first floor slab elevation of the laundry building.

Based on the site survey and exploration record, the two USTs are located at about 11 feet away from the underground steam tunnel. The bottom elevation of the two USTs is about 8 feet deep from the finished grade of the 8 feet wide building entrance areaway and same elevation as the first-floor elevation of the laundry building.

In comparison, the bottom elevation of the two USTs is about the same bottom elevation of the existing steam tunnel. Therefore, the excavation and removal of the two USTs at 11 feet away should not impact the structural integrity and the stability of the existing steam tunnel of the central heating plant.

III. The Location of the Two Underground Storage Tanks (UST) in Relationship with the Existing Adjacent Laundry Building No. 46:

By the survey of the existing site conditions, the centerline of the two USTs are located at 6 feet away from the south exterior vertical brick wall of the adjacent laundry building No. 46. The two USTs alignment is parallel to the south exterior wall of the laundry building and also parallel to the retaining ramp wall along the 8-foot wide building entrance areaway.

As stated above, the foundation of the newer laundry building was built later around the older underground pipe tunnel foundation with a minimum of 8 to 9 feet deep below the first floor of the laundry building.

In comparison, the bottom elevation of the two USTs at 6 feet away is about the same bottom elevation of the south exterior wall of the adjacent laundry building.

Therefore, the excavation and the removal of the two USTs should not impact the structural integrity and the stability of the adjacent laundry building No. 46.

However, based on any customary structural foundation design, the bottom elevation of the south exterior wall (about 38 feet long) could be stepped up toward

the east direction where deep foundation to match the underground steam tunnel elevation would no longer be required.

A 2 to 1 slope stepping up to the minimum 2'-6'' frost line level might be the case at this wall.

But with a clear distance of about 3' from the 4 feet diameter tank, the south wall footing should not be undermined by the two tanks.

IV. The Location of the Two Existing USTs in Relationship with the Retaining Ramp Wall:

The two tanks are located near the east (lower) end of the existing reinforced concrete retaining ramp wall which is 13'' thick and is 2 to 3 feet high exposed above grade. The retaining ramp wall is about 26 feet long.

Based on the site probing record of the depth of the inverted T-shape concrete retaining ramp wall footing, the bottom elevation of the heel and the toe of the retaining wall footing was probed to be placed only at a 2'-6'' minimum shallow depth just below the required frost line in the Washington, D.C. weather region.

It was found that the top of the 8 feet deep tanks is positioned immediately below the retaining wall footing. (See attached drawings)

It appears that the two 8-foot deep tanks were installed later after the retaining wall, the driving ramp and the areaway were constructed in place.

We estimated that to excavate and remove the two tanks, a strip of a minimum 12 feet long by 6 feet wide by 10 feet deep excavation pit is required right under the region of the maximum toe pressure of the retaining ramp wall.

The retaining ramp wall would collapse under the earth pressure together with the truck traffic ramp surcharge load pressure behind the retaining wall stem.

The ten-foot deep excavated pit must be sheeted and shored under the OSHA Safety requirements.
It would be extremely difficult to install sheeting along and under the retaining wall footing toe of the pit.

Any heavy construction or sheeting equipment are not allowed to operate on the top side of the retaining wall at the upper driving ramp while the USTs deep excavation is in progress particularly under the footing toe area of the retaining wall.

The existing driving ramp must be maintained to move heavy construction equipment and to haul away dirt. The existing earth retaining ramp wall will also retain the truck traffic loads of a minimum 250 PSF surcharge load immediately behind the ramp wall.

With a continuous strip of 12 feet long and 10 feet deep excavation pit open to rain water infiltration unprotectedly waiting for the removal of the two tanks under the weight and pressure of the retaining wall located at the edge of the open pit would be structurally unstable and unpredictable even being left overnight.

After the removal of the two tanks, the earth backfilling operation under the retaining wall footing (cannot be braced) with vibratory plate dampers operating would be dangerous. The collapse of the entire retaining ramp wall (without any toe pressure reaction) and safety of the earth work workers would be imminent.

To fill the excavated deep pit with lean concrete grout is an option. But the concrete drum trucks are not allowed to use the driving ramp before the excavated pit is filled solid with concrete. To remove and to rebuild the retaining ramp wall after the removal of the two tanks would be extremely costly beyond the practical means and value engineering principles.

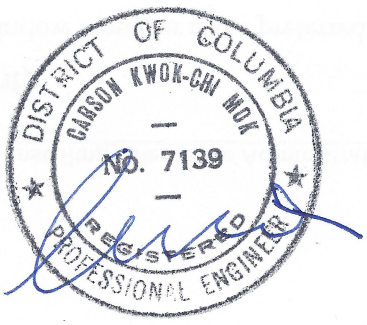
V. Conclusion and Recommendation:

Based on our structural engineering investigation, analysis, and assessment, we highly recommend that the two existing 4-foot diameter and 5 feet deep underground storage tanks be permanently entombed.

Please feel free to contact us should you have any questions concerning this project.

Sincerely,

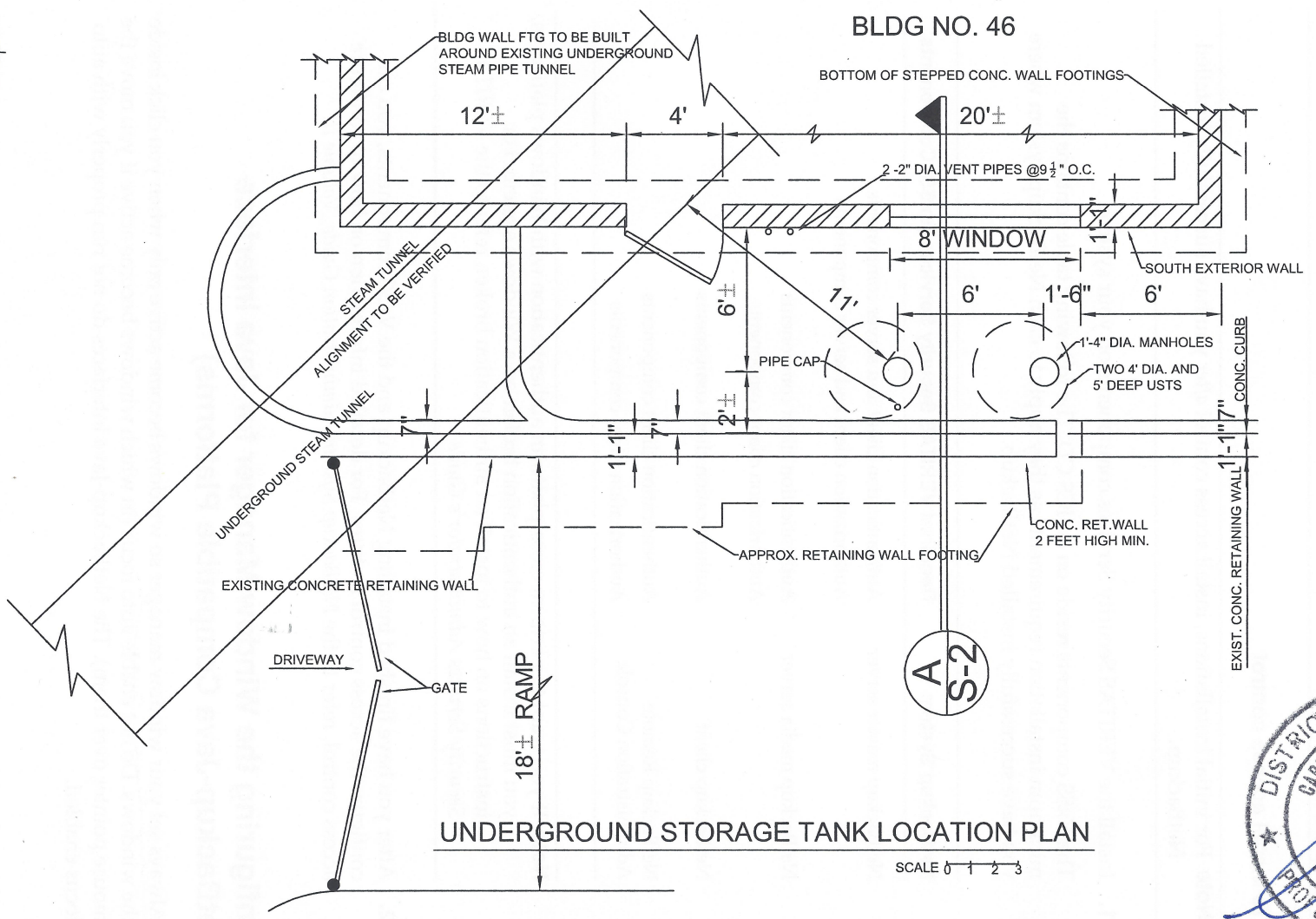
Carson K.C. Mok, Consulting Engineer, P.A.



Carson K.C. Mok, PE, DC No.7139 Civil/Structural

President

LAUNDRY BUILDING NO. 46

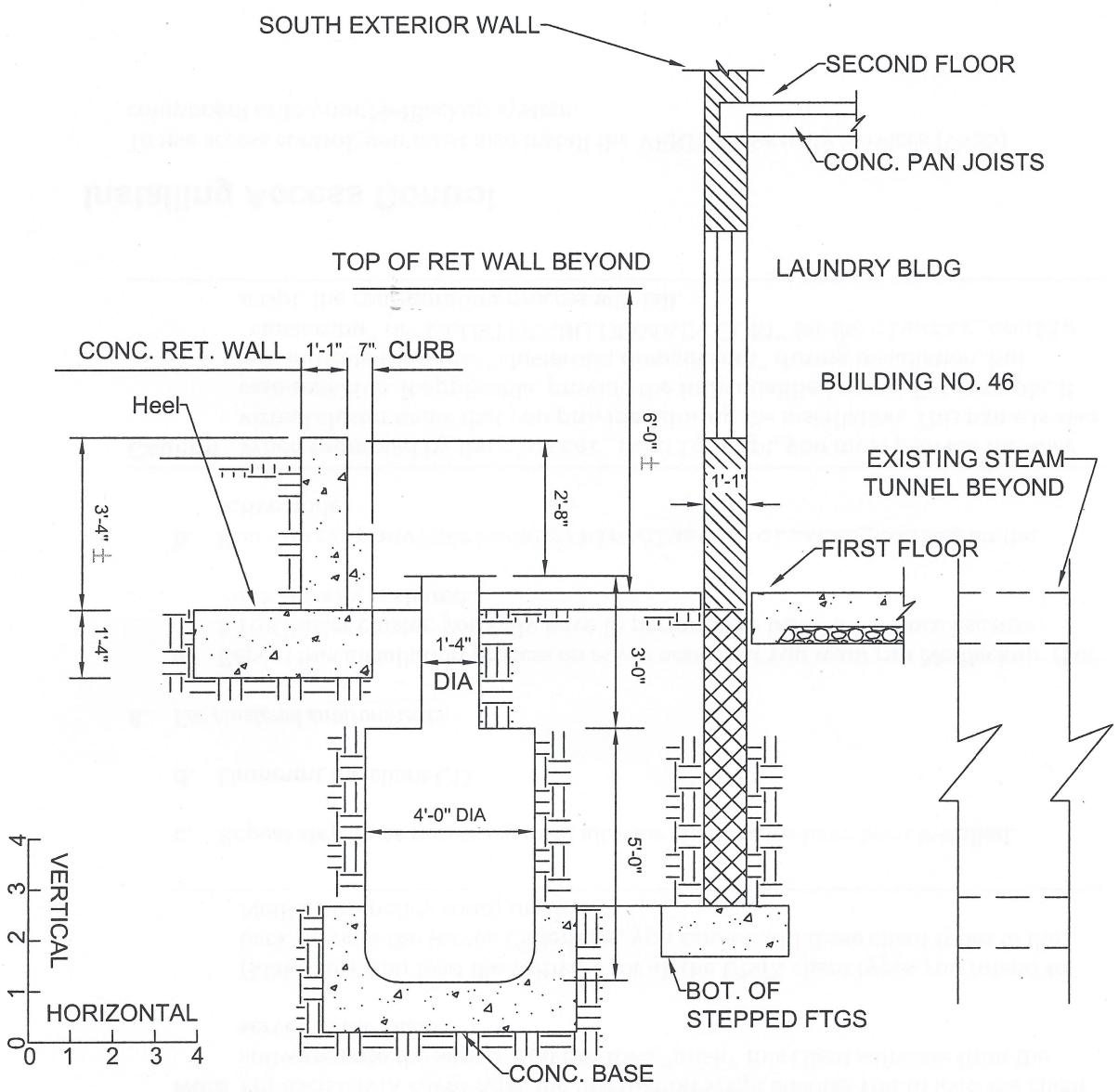


UNDERGROUND STORAGE TANK LOCATION PLAN

SCALE 0 1 2 3

DISTRICT OF COLUMBIA
CARSON KWOK-CHI MOK
No. 7139
REGISTERED PROFESSIONAL ENGINEER

REVISIONS			UNDERGROUND STORAGE TANK LOCATION PLAN	CARSON K.C MOK CONSULTING ENGINEER, P.A.	DESIGNED: C.M DRAWN: KY.Z CHECKED: C.M DATE: 11/18/2017	DRAWING NO.
DATE	BY	DESCRIPTION				
			US ARMED FORCES RETIREMENT HOME 3700 N.CAPITAL STREET, NW WASHINGTON D.C. 20011	9001 OTTAWA PLACE, SILVER SPRING, MD 20910 301-588-0008 e-mail: ckm9001@aol.com FAX: 301-495-0120		S - 1



A S-2 CROSS SECTION THRU TANK

SCALE AS NOTED

DISTRICT OF COLUMBIA
CARSON KWOK-CHI MOK
No. 7139
REGISTERED
PROFESSIONAL ENGINEER

CROSS SECTION THRU TANK	CARSON K.C MOK CONSULTING ENGINEER, P.A.	DESIGNED: C.M DRAWN: KY.Z CHECKED: C.M DATE: 11/18/2017	DRAWING NO. S - 2
US ARMED FORCES RETIREMENT HOME 3700 N.CAPITAL STREET, NW WASHINGTON D.C. 20011	9001 OTTAWA PLACE, SILVER SPRING, MD 20910 301-588-0008 e-mail: ckm9001@aol.com FAX: 301-495-0120		