

SUMMARY REPORT
40 WEST CARDINAL LANE (FORMERLY 1203 WEST CARDINAL LANE)
LAUREL BAY MILITARY HOUSING AREA
MARINE CORPS AIR STATION BEAUFORT
BEAUFORT, SC

Revision: 0
Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Mid-Atlantic
9324 Virginia Avenue
Norfolk, Virginia 23511-3095

and



Naval Facilities Engineering Command Atlantic
9324 Virginia Avenue
Norfolk, Virginia 23511-3095

JUNE 2021

SUMMARY REPORT
40 WEST CARDINAL LANE (FORMERLY 1203 WEST CARDINAL LANE)
LAUREL BAY MILITARY HOUSING AREA
MARINE CORPS AIR STATION BEAUFORT
BEAUFORT, SC

Revision: 0
Prepared for:

Department of the Navy
Naval Facilities Engineering Command, Mid- Atlantic
9324 Virginia Avenue
Norfolk, Virginia 23511-3095

and



Naval Facilities Engineering Command Atlantic

9324 Virginia Avenue
Norfolk, Virginia 23511-3095

Prepared by:



CDM - AECOM Multimedia Joint Venture
10560 Arrowhead Drive, Suite 500
Fairfax, Virginia 22030

Contract Number: N62470-14-D-9016
CTO WE52
JUNE 2021

Table of Contents

1.0	INTRODUCTION	1
1.1	BACKGROUND INFORMATION.....	1
1.2	UST ASSESSMENT PROCESS	2
2.0	SAMPLING ACTIVITIES AND RESULTS	4
2.1	SOIL GAS SAMPLING.....	4
2.2	SOIL GAS ANALYTICAL RESULTS	5
2.3	SOIL SAMPLING	5
2.4	SOIL ANALYTICAL RESULTS.....	6
2.5	GROUNDWATER SAMPLING.....	6
2.6	GROUNDWATER ANALYTICAL RESULTS	7
3.0	PROPERTY STATUS.....	7
4.0	REFERENCES	7

Tables

Table 1	Laboratory Analytical Results - Vapor
Table 2	Laboratory Analytical Results - Soil
Table 3	Laboratory Analytical Results - Groundwater

Appendices

Appendix A	Multi-Media Selection Process for LBMH
Appendix B	Laboratory Analytical Reports - Vapor
Appendix C	Laboratory Analytical Report - Soil
Appendix D	Laboratory Analytical Report - Groundwater
Appendix E	Regulatory Correspondence

List of Acronyms

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CTO	Contract Task Order
COPC	constituents of potential concern
ft	feet
GPR	ground penetrating radar
IDIQ	Indefinite Delivery, Indefinite Quantity
IGWA	Initial Groundwater Assessment
JV	Joint Venture
LBMH	Laurel Bay Military Housing
MCAS	Marine Corps Air Station
NAVFAC Mid-Lant	Naval Facilities Engineering Command Mid-Atlantic
NFA	No Further Action
PAH	polynuclear aromatic hydrocarbon
QAPP	Quality Assurance Program Plan
RBSL	risk-based screening level
SCDHEC	South Carolina Department of Health and Environmental Control
Site	LBMH area at MCAS Beaufort, South Carolina
UFP SAP	Uniform Federal Policy Sampling and Analysis Plan
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VI	vapor intrusion
VISL	vapor intrusion screening level

1.0 INTRODUCTION

The CDM - AECOM Multimedia Joint Venture (JV) was contracted by the Naval Facilities Engineering Command, Mid-Atlantic (NAVFAC Mid-Lant) to provide reporting services for the heating oil underground storage tanks (USTs) located in Laurel Bay Military Housing (LBMH) area at the Marine Corps Air Station (MCAS) Beaufort, South Carolina (Site). This work has been awarded under Contract Task Order (CTO) WE52 of the Indefinite Delivery, Indefinite Quantity (IDIQ) Multimedia Environmental Compliance Contract (Contract No. N62470-14-D-9016).

As of January 2014, the LBMH addresses were re-numbered to comply with the E-911 emergency response addressing system; however, in order to remain consistent with historical sampling and reporting for LBMH area, the residences will continue to be referenced with their original address numbers in sample nomenclature and reporting documents.

This report summarizes the results the environmental investigation activities associated with the storage of home heating oil and the potential release of petroleum constituents at the referenced property. Based on the results of the investigation, a No Further Action (NFA) determination has been made by the South Carolina Department of Health and Environmental Control (SCDHEC) for 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane). This NFA determination indicates that there are no unacceptable risks to human health or the environment for the petroleum constituents associated with the home heating oil USTs. The following information is included in this report:

- Background information;
- Sampling activities and results; and
- A determination of the property status.

1.1 Background Information

The LBMH area is located approximately 3.5 miles west of MCAS Beaufort. The area is approximately 970 acres in size and serves as an enlisted and officer family housing area. The area is configured with single family and duplex residential structures, and includes recreation, open space, and community facilities. The community includes approximately 1,300 housing units, including legacy Capehart style homes and newer duplex style homes. The housing area

is bordered on the west by salt marshes and the Broad River, and to the north, east and south by uplands. Forested areas lie along the northern and northeastern borders.

Capehart style homes within the LBMH area were formerly heated using heating oil stored in USTs at each residence. There were 1,100 Capehart style housing units in the LBMH area. The newer duplex homes within the LBMH area never utilized heating oil tanks. Heating oil has not been used at Laurel Bay since the mid-1980s. As was the accepted practice at the time, USTs were drained, filled with dirt, capped, and left in place when they were removed from service. Residential USTs are not regulated in the State of South Carolina (i.e., there are no federal or state laws governing installation, management, or removal).

In 2007, MCAS Beaufort began a voluntary program to remove the unregulated, residential USTs and conduct sampling activities to determine if, and to what extent, petroleum constituents may have impacted the surrounding environment. MCAS Beaufort coordinated with SCDHEC to develop removal procedures that were consistent with procedural requirements for regulated USTs. All tank removal activities and follow-on actions are conducted in coordination with SCDHEC. To date, all known USTs have been removed from all residential properties within the LBMH area.

MCAS Beaufort does not have documentation of the UST removal activities at 34 properties where it was discovered that a structure (i.e., home addition, garage, porch, or shed) had been historically constructed on top of the suspected former UST locations. The results of a historical document review and ground penetrating radar (GPR) survey at the 34 properties indicated there was no evidence that any of the former USTs remained in place beneath the structures and it was likely that the USTs were removed prior to 2007. The LBMH UST removal and assessment process is described below in Section 1.2. The LBMH multi-media investigation selection process tree, used to evaluate the environmental impact of USTs for most sites at LBMH, is presented in Appendix A. It should be noted that because soil and groundwater were not sampled following the UST removal and analytical results were not available for evaluation, the subject property of this report did not follow the typical multi-media investigation selection process presented in Appendix A.

1.2 UST Assessment Process

As stated above, the assessment process at this property did not follow the typical process presented in Appendix A. Instead the process consisted first of a vapor intrusion (VI) assessment

to evaluate the potential risk to residents at the property. Soil gas samples for the VI assessment were collected from beneath the structure in the vicinity of the suspected location of the former UST. The VI assessment was later followed by an assessment of soil and groundwater outside the footprint of the house and in the vicinity of the suspected location of the former UST to evaluate the impact, if any, to these media.

During the VI investigation, soil gas samples were analyzed for a predetermined list of constituents of potential concern (COPCs) associated with the petroleum compounds found in home heating oil. These COPCs are as follows:

- benzene, toluene, ethylbenzene, and xylenes (BTEX), and
- naphthalene.

In accordance with the SCDHEC approved *Uniform Federal Policy Sampling and Analysis Plan (UFP SAP) for Vapor Media, Revision 3* (Resolution Consultants, 2016), soil gas analytical results were compared to the United States Environmental Protection Agency (USEPA) vapor intrusion screening levels (VISLs) for soil gas (USEPA, 2016). The screening levels used for evaluation at each site were those levels that were in effect at the time of reporting and review by SCDHEC. The soil gas results were used to determine whether petroleum vapors existed due to former USTs and to assess the associated risk to human health.

Following the VI investigations, soil and initial groundwater assessment (IGWA) investigations were conducted adjacent to the former UST locations at the 34 properties as an additional precautionary measure. Soil and groundwater samples collected were analyzed for a predetermined list of COPCs associated with the petroleum compounds found in home heating oil. These COPCs, derived from the *Quality Assurance Program Plan (QAPP) for the Underground Storage Tank Management Division, Revision 3.1* (SCDHEC, 2016) and the *Underground Storage Tank Assessment Instructions for Permanent Closure and Change-In-Service*, (SCDHEC, 2018), are as follows:

- BTEX,
- naphthalene, and
- five select polynuclear aromatic hydrocarbon (PAHs): benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and dibenz(a,h)anthracene.

In accordance with SCDHEC's *QAPP for the UST Management Division* (SCDHEC, 2016), the soil screening levels consists of SCDHEC risk-based screening levels (RBSLs). The screening levels used for evaluation at each site were those levels that were in effect at the time of reporting and review by SCDHEC.

The results of the IGWA sampling were used to determine the presence or absence of the aforementioned COPCs in groundwater and identify whether former UST locations required additional delineation of COPCs in groundwater. Groundwater analytical results were compared to SCDHEC RBSLs for groundwater. The groundwater analytical results were also compared to the site specific groundwater VISLs as another line of evidence that VI is not a concern.

2.0 SAMPLING ACTIVITIES AND RESULTS

The following section presents the sampling activities and associated results for 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane). The sampling activities at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) comprised a VI investigation, a soil investigation and IGWA sampling. Details regarding the VI investigation at this site are provided in the *Letter Report Petroleum Vapor Intrusion Investigations – June 2016 and January 2017, Revision 1* (Resolution Consultants, 2017). The laboratory report that includes the pertinent soil gas analytical results for this site is presented in Appendix B. Details regarding the soil and IGWA sampling activities at this site are provided in the *Soil and Initial Groundwater Investigation Report – September and October 2017, Revision 1* (CDM-AECOM Multimedia JV, 2018). The laboratory reports that include the pertinent soil and IGWA analytical results for this site are presented in Appendices C and D, respectively.

2.1 Soil Gas Sampling

On June 28, 2016, a temporary near-slab subsurface implant was installed and sampled at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) in accordance with the SCDHEC approved *UFP SAP for Vapor Media, Revision 3* (Resolution Consultants, 2016). Soil gas sampling was conducted at this property to assess the potential risk for vapor intrusion associated with the suspected location of a former UST. The near-slab subsurface implant was placed in the same general location as the suspected former heating oil UST, as determined by review of historical documents and GPR analysis. The sampling strategy for this phase of the investigation required a one-time sampling event of the near-slab subsurface implant; however, follow-on soil gas sampling was required. Further details are provided in the *Letter Report Petroleum Vapor*

Intrusion Investigations – June 2016 and January 2017, Revision 1 (Resolution Consultants, 2017).

On January 9, 2017, a temporary sub-slab vapor pin was installed and sampled at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) in accordance with the SCDHEC approved *UFP SAP for Vapor Media, Revision 3* (Resolution Consultants, 2016). Additional soil gas sampling was conducted at this property to further assess the potential risk for vapor intrusion associated with the suspected location of a former UST. The sub-slab vapor pin was installed and sampled through the house slab, approximately in the center of the house. The sampling strategy for this phase of the investigation required a one-time sampling event of the sub-slab vapor pin. Further details are provided in the *Letter Report Petroleum Vapor Intrusion Investigations – June 2016 and January 2017, Revision 1* (Resolution Consultants, 2017).

The near-slab and sub-slab soil gas samples were collected and shipped to an offsite laboratory for analysis of the petroleum COPCs. Upon completion of soil gas sampling, the subsurface implant and vapor pin were abandoned in accordance with the *UFP SAP for Vapor Media, Revision 3* (Resolution Consultants, 2016). Field forms are provided in the *Letter Report Petroleum Vapor Intrusion Investigations – June 2016 and January 2017, Revision 1* (Resolution Consultants, 2017).

2.2 Soil Gas Analytical Results

A summary of the laboratory analytical results and USEPA VISLs is presented in Table 1. A copy of the laboratory analytical data reports are included in Appendix B.

The soil gas results collected in June 2016 from the near-slab subsurface implant at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) were above USEPA VISLs, which indicated further investigation was required. The soil gas results collected in January 2017 from the sub-slab vapor pin at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) were below USEPA VISLs, which indicated that the subsurface soil gas was not impacted by COPCs associated with the former UST at concentrations that present a potential risk to human health and the environment.

2.3 Soil Sampling

On September 18, 2017, a single soil boring was advanced near the suspected former UST location at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane). The soil boring location

is indicated on Figure 37 of the *Soil and Initial Groundwater Investigation Report – September and October 2017, Revision 1* (CDM-AECOM Multimedia JV, 2018) and was collocated with the temporary monitoring well discussed in Section 2.5. A single soil sample was collected at a depth of approximately 6 feet (ft) below ground surface (bgs). The soil sample was shipped to an offsite laboratory for analysis of the petroleum COPCs. Soil sampling was performed in accordance with the *UFP SAP for Soil and Groundwater Media* (CDM-AECOM Multimedia JV, 2017) and the applicable South Carolina regulation R.61-92, Part 280 (SCDHEC, 2017) and assessment guidelines. Field forms are provided in the *Soil and Initial Groundwater Investigation Report – September and October 2017, Revision 1* (CDM-AECOM Multimedia JV, 2018).

2.4 Soil Analytical Results

A summary of the laboratory analytical results and SCDHEC RBSLs is presented in Table 2. A copy of the laboratory analytical data report is included as Appendix C.

The soil results collected from 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) were less than the SCDHEC RBSLs (Table 2), which indicated that the soil was not impacted by COPCs associated with the former UST at concentrations that present a potential risk to human health and the environment.

2.5 Groundwater Sampling

On September 18, 2017, the soil boring was converted into a temporary monitoring well and then sampled at 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane), in accordance with the South Carolina Well Standards and Regulations (R.61-71.H-I, updated June 24, 2016). In order to provide data that can be used to determine whether COPCs are migrating to underlying groundwater, the monitoring well was placed near the suspected location of the former heating oil UST. Further details are provided in the *Soil and Initial Groundwater Investigation Report – September and October 2017, Revision 1* (CDM-AECOM Multimedia JV, 2018).

The sampling strategy for this phase of the investigation required a one-time sampling event of the temporarily installed monitoring well. Following well installation and development, groundwater samples were collected using low-flow methods and shipped to an offsite laboratory for analysis of the petroleum COPCs. Upon completion of groundwater sampling, the temporary well was abandoned in accordance with the South Carolina Well Standards and Regulations R.61-71 (SCDHEC, 2016). Field forms are provided in the *Soil and Initial Groundwater Investigation Report – September and October 2017, Revision 1* (CDM-AECOM Multimedia JV, 2018).

2.6 Groundwater Analytical Results

A summary of the laboratory analytical results and SCDHEC RBSLs is presented in Table 3. A copy of the laboratory analytical data report is included in Appendix D.

The groundwater results collected from 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) were less than the SCDHEC RBSLs and the site-specific groundwater VISLs (Table 3), which indicated that the groundwater was not impacted by COPCs associated with the former UST at concentrations that present a potential risk to human health and the environment.

3.0 PROPERTY STATUS

Based on the analytical results for soil and groundwater, SCDHEC made the determination that NFA was required for 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane). The NFA determination for soil and groundwater was obtained in a letter dated March 29, 2018. Based on the analytical results for soil gas, it was determined that there was not a VI concern at this property and a recommendation was made for no additional VI assessment activities. SCDHEC approved the no further VI investigation recommendation for 40 West Cardinal Lane (Formerly 1203 West Cardinal Lane) in a letter dated June 20, 2017. SCDHEC's letters are provided in Appendix E.

4.0 REFERENCES

CDM-AECOM Multimedia JV, 2017. *Uniform Federal Policy Sampling and Analysis Plan for Soil and Groundwater Media for Laurel Bay Military Housing Area, Marine Corps Air Station Beaufort, Beaufort, South Carolina*, July 2017.

CDM-AECOM Multimedia JV, 2018. *Soil and Initial Groundwater Investigation Report – September and October 2017 for Laurel Bay Military Housing Area, Revision 1, Multiple Properties, Laurel Bay Military Housing Area, Marine Corps Air Station Beaufort, Beaufort, South Carolina*, February 2018.

Resolution Consultants, 2016. *Uniform Federal Policy Sampling and Analysis Plan for Vapor Media for Laurel Bay Military Housing Area, Revision 3, Multiple Properties, Laurel Bay Military Housing Area, Marine Corps Air Station Beaufort, Beaufort, South Carolina*, May 2016.

Resolution Consultants, 2017. *Letter Report Petroleum Vapor Intrusion Investigations – June 2016 and January 2017 for Laurel Bay Military Housing Area, Revision 1, Multiple*

Properties, Laurel Bay Military Housing Area, Marine Corps Air Station Beaufort, Beaufort, South Carolina, June 2017.

South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management, 2013. *Quality Assurance Program Plan for the Underground Storage Tank Management Division, Revision 2.0*, April 2013.

South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management, 2015. *Quality Assurance Program Plan for the Underground Storage Tank Management Division, Revision 3.0*, May 2015.

South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management, 2016. *Quality Assurance Program Plan for the Underground Storage Tank Management Division, Revision 3.1*, February 2016.

South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management, 2017. *R.61-92, Part 280, Underground Storage Tank Control Regulations*, March 2017.

South Carolina Department of Health and Environmental Control Bureau of Land and Waste Management, 2018. *Underground Storage Tank Assessment Instructions for Permanent Closure and Change-In-Service*, March 2018.

South Carolina Department of Health and Environmental Control Bureau of Water, 2016. *R.61-71, Well Standards*, June 2016.

United States Environmental Protection Agency, 2016. *USEPA OSWER Vapor Intrusion Assessment, Vapor Intrusion Screening Level Calculator, Version 3.5.1*, May 2016.

Tables

Table 1
Laboratory Analytical Results - Vapor
40 West Cardinal Lane (Formerly 1203 West Cardinal Lane)
Laurel Bay Military Housing Area
Marine Corps Air Station Beaufort
Beaufort, South Carolina

Constituent	USEPA VISL ⁽¹⁾	Results Sample Collected 06/28/16 and 01/09/17	
		Near-Slab 06/28/16	Sub-Slab 01/09/17
Volatile Organic Compounds Analyzed by USEPA Method TO-15 (µg/m ³)			
Benzene	12	2.2	0.80
Toluene	17000	4.9	4.1
Ethylbenzene	37	2.1	0.83
m,p-Xylenes	350	1.4	3.4
o-Xylene	350	0.79	1.6
Naphthalene	2.8	3.4	ND

Notes:

⁽¹⁾ United States Environmental Protection Agency Exterior Soil Gas Vapor Intrusion Screening Level (VISL) from VISL Calculator (Version 3.5.1, May 2016).

VISLs are based on a residual exposure scenario and a target risk level of 1×10^{-6} and a hazard quotient of 0.1.

Bold font indicates the analyte was detected.

Bold font and shading indicates the concentration exceeds the residential VISL.

ND - not detected at the reporting limit (or method detection limit if shown on the laboratory report). The vapor laboratory report is provided in Appendix B.

USEPA - United States Environmental Protection Agency

µg/m³ - micrograms per cubic meter

VISL - Vapor Intrusion Screening Level

Table 2
Laboratory Analytical Results - Soil
40 West Cardinal Lane (Formerly 1203 West Cardinal Lane)
Laurel Bay Military Housing Area
Marine Corps Air Station Beaufort
Beaufort, South Carolina

Constituent	SCDHEC RBSLs ⁽¹⁾	Results Sample Collected 09/18/17
Volatile Organic Compounds Analyzed by EPA Method 8260B (mg/kg)		
Benzene	0.007	ND
Ethylbenzene	1.15	ND
Naphthalene	0.036	ND
Toluene	1.45	ND
Xylenes, Total	14.5	ND
Semivolatile Organic Compounds Analyzed by EPA Method 8270D (mg/kg)		
Benzo(a)anthracene	0.066	ND
Benzo(b)fluoranthene	0.066	ND
Benzo(k)fluoranthene	0.066	ND
Chrysene	0.066	ND
Dibenz(a,h)anthracene	0.066	ND

Notes:

⁽¹⁾ South Carolina Risk-Based Screening Levels from the Quality Assurance Program Plan for the Underground Storage Tank Management Division, Revision 3.1 (SCDHEC, February 2016).

Bold font indicates the analyte was detected.

Bold font and shading indicates the concentration exceeds the SCDHEC RBSL.

EPA - United States Environmental Protection Agency

mg/kg - milligrams per kilogram

ND - not detected at the reporting limit (or method detection limit if shown on the laboratory report). The soil laboratory report is provided in Appendix C.

RBSL - Risk-Based Screening Level

SCDHEC - South Carolina Department Of Health and Environmental Control

Table 3
Laboratory Analytical Results - Groundwater
40 West Cardinal Lane (Formerly 1203 West Cardinal Lane)
Laurel Bay Military Housing Area
Marine Corps Air Station Beaufort
Beaufort, South Carolina

Constituent	SCDHEC RBSLs ⁽¹⁾	Site-Specific Groundwater VISLs (µg/L) ⁽²⁾	Results Sample Collected 09/18/17
Volatile Organic Compounds Analyzed by EPA Method 8260B (µg/L)			
Benzene	5	16.24	ND
Ethylbenzene	700	45.95	ND
Naphthalene	25	29.33	ND
Toluene	1000	105,445	ND
Xylenes, Total	10,000	2,133	ND
Semivolatile Organic Compounds Analyzed by EPA Method 8270D (µg/L)			
Benzo(a)anthracene	10	NA	ND
Benzo(b)fluoranthene	10	NA	ND
Benzo(k)fluoranthene	10	NA	ND
Chrysene	10	NA	ND
Dibenz(a,h)anthracene	10	NA	ND

Notes:

⁽¹⁾ South Carolina Risk-Based Screening Levels from the Quality Assurance Program Plan for the Underground Storage Tank Management Division, Revision 3.1 (SCDHEC, February 2016).

⁽²⁾ Site-specific groundwater VISLs were calculated using the EPA JE Model Spreadsheets (Version 3.1, February 2004) and conservative modeling inputs representative of a small single-story house with an 8 foot ceiling. Site-specific groundwater VISLs were developed based on a target risk level of 1×10^{-6} , a target hazard quotient of 1 (per target organ), and a default residential exposure scenario, assuming exposure for 24 hours/day, 350 days/year, for 26 years. Modeling was performed for a range of depths to groundwater for application as appropriate in different areas of the Laurel Bay Military Housing Area. The most conservative levels are presented for comparison. Refer to Appendix H of the Uniform Federal Policy Sampling Analysis and Sampling Plan for Vapor Media, Revision 4 (Resolution Consultants, April 2017) for additional information.

Bold font indicates the analyte was detected.

Bold font and shading indicates the concentration exceeds the SCDHEC RBSL and/or the Site-Specific Groundwater VISL.

EPA - United States Environmental Protection Agency

JE - Johnson & Ettinger

NA - not applicable

ND - not detected at the reporting limit (or method detection limit if shown on the laboratory report). The groundwater laboratory report is provided in Appendix D.

RBSL - Risk-Based Screening Level

SCDHEC - South Carolina Department Of Health and Environmental Control

µg/L - micrograms per liter

VISL - Vapor Intrusion Screening Level

Appendix A
Multi-Media Selection Process for LBMH



Appendix A - Multi-Media Selection Process for LBMH

Appendix B
Laboratory Analytical Reports - Vapor

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: AECOM

Client Sample ID: BEALB1203NS01GS20160628

Client Project ID: WE75 -40 Cardinal Lane / 60492362.FI.WI

ALS Project ID: P1603324

ALS Sample ID: P1603324-001

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5975Binert/6890N/MS13

Analyst: Evelyn Alvarez

Sampling Media: 1.0 L Summa Canister

Test Notes:

Container ID: 1SC00202

Date Collected: 6/28/16

Date Received: 7/1/16

Date Analyzed: 7/5/16

Volume(s) Analyzed: 0.40 Liter(s)

Initial Pressure (psig): -1.44 Final Pressure (psig): 7.22

Canister Dilution Factor: 1.65

CAS #	Compound	Result µg/m ³	LOQ µg/m ³	LOD µg/m ³	MDL µg/m ³	Data Qualifier
71-43-2	Benzene	2.2	2.1	1.8	0.66	
108-88-3	Toluene	4.9	2.1	1.7	0.70	
100-41-4	Ethylbenzene	2.1	2.1	1.7	0.66	
179601-23-1	m,p-Xylenes	1.4	4.1	3.4	1.2	J
95-47-6	o-Xylene	0.79	2.1	1.7	0.62	J
91-20-3	Naphthalene	3.4	2.1	1.7	0.74	

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.

LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

ALS ENVIRONMENTAL

RESULTS OF ANALYSIS

Page 1 of 1

Client: AECOM

Client Sample ID: BEALB1203SS01GS20170109

Client Project ID: WE75 -40 W Cardinal Lane / 60492362.FI.WI

ALS Project ID: P1700136

ALS Sample ID: P1700136-001

Test Code: EPA TO-15

Instrument ID: Tekmar AUTOCAN/Agilent 5973inert/6890N/MS9

Analyst: Simon Cao

Sampling Media: 1.0 L Summa Canister

Test Notes:

Container ID: 1SC00088

Date Collected: 1/9/17

Date Received: 1/13/17

Date Analyzed: 1/16/17

Volume(s) Analyzed: 0.40 Liter(s)

Initial Pressure (psig): -0.48

Final Pressure (psig): 5.59

Canister Dilution Factor: 1.43

CAS #	Compound	Result µg/m ³	LOQ µg/m ³	LOD µg/m ³	MDL µg/m ³	Data Qualifier
71-43-2	Benzene	0.80	1.8	1.5	0.57	J
108-88-3	Toluene	4.1	1.8	1.5	0.61	
100-41-4	Ethylbenzene	0.83	1.8	1.5	0.57	J
179601-23-1	m,p-Xylenes	3.4	3.6	3.0	1.1	J
95-47-6	o-Xylene	1.6	1.8	1.5	0.54	J
91-20-3	Naphthalene	1.5	1.8	1.5	0.64	U

U = Undetected at the limit of detection: The associated data value is the limit of detection, adjusted by any dilution factor used in the analysis.

LOQ = Limit of Quantitation - The minimum quantity of a target analyte that can be confidently determined by the referenced method.

J = The result is an estimated concentration that is less than the LOQ but greater than or equal to the MDL.

Appendix C
Laboratory Analytical Report - Soil

Volatile Organic Compounds by GC/MS

Client: AECOM - Resolution Consultants	Laboratory ID: SI21025-002
Description: BEALB1203SB0106SO20170918	Matrix: Solid
Date Sampled: 09/18/2017 1225	% Solids: 78.0 09/21/2017 2237
Date Received: 09/21/2017	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5035	8260B	1	09/27/2017 1610	TML		52617

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	LOD	DL	Units	Run
Benzene	71-43-2	8260B	4.6	U	5.7	4.6	2.3	ug/kg	1
Ethylbenzene	100-41-4	8260B	4.6	U	5.7	4.6	2.3	ug/kg	1
Naphthalene	91-20-3	8260B	4.6	U	5.7	4.6	2.3	ug/kg	1
Toluene	108-88-3	8260B	4.6	U	5.7	4.6	2.3	ug/kg	1
Xylenes (total)	1330-20-7	8260B	8.8	U	11	8.8	4.5	ug/kg	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
Bromofluorobenzene		99	79-119
Dibromofluoromethane		98	78-119
1,2-Dichloroethane-d4		90	71-136
Toluene-d8		98	85-116

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
U = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis	LOD = Limit of Detection		S = MS/MSD failure

Shealy Environmental Services, Inc.
 106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Semivolatile Organic Compounds by GC/MS

Client: AECOM - Resolution Consultants

Laboratory ID: SI21025-002

Description: BEALB1203SB0106SO20170918

Matrix: Solid

Date Sampled: 09/18/2017 1225

% Solids: 78.0 09/21/2017 2237

Date Received: 09/21/2017

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch			
1	3550C	8270D (SIM)	1	09/29/2017 1718	JCG	09/21/2017 2154	52123			
Parameter	CAS Number	Analytical Method	Result	Q	LOQ	LOD	DL	Units	Run	
Benzo(a)anthracene	56-55-3	8270D (SIM)	2.5	U	4.2	2.5	0.75	ug/kg	1	
Benzo(b)fluoranthene	205-99-2	8270D (SIM)	1.3	U	4.2	1.3	0.64	ug/kg	1	
Benzo(k)fluoranthene	207-08-9	8270D (SIM)	1.3	U	4.2	1.3	0.61	ug/kg	1	
Chrysene	218-01-9	8270D (SIM)	1.3	U	4.2	1.3	0.57	ug/kg	1	
Dibenzo(a,h)anthracene	53-70-3	8270D (SIM)	2.5	U	4.2	2.5	0.65	ug/kg	1	
Surrogate	Q	Run 1 % Recovery	Acceptance Limits							
Fluoranthene-d10		58	37-135							
2-Methylnaphthalene-d10		58	17-119							

LOQ = Limit of Quantitation

B = Detected in the method blank

E = Quantitation of compound exceeded the calibration range

DL = Detection Limit

Q = Surrogate failure

U = Not detected at or above the LOQ

N = Recovery is out of criteria

P = The RPD between two GC columns exceeds 40%

J = Estimated result < LOQ and ≥ DL

L = LCS/LCSD failure

H = Out of holding time

W = Reported on wet weight basis

LOD = Limit of Detection

S = MS/MSD failure

Shealy Environmental Services, Inc.

106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Appendix D
Laboratory Analytical Report - Groundwater

Volatile Organic Compounds by GC/MS

Client: AECOM - Resolution Consultants	Laboratory ID: SI20018-004
Description: BEALB1203TW01WG20170918	Matrix: Aqueous
Date Sampled: 09/18/2017 1525	
Date Received: 09/20/2017	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	5030B	8260B	1	09/22/2017 0617	ECP		52152

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	LOD	DL	Units	Run
Benzene	71-43-2	8260B	0.80	U	1.0	0.80	0.40	ug/L	1
Ethylbenzene	100-41-4	8260B	0.80	U	1.0	0.80	0.40	ug/L	1
Naphthalene	91-20-3	8260B	0.80	U	1.0	0.80	0.40	ug/L	1
Toluene	108-88-3	8260B	0.80	U	1.0	0.80	0.40	ug/L	1
Xylenes (total)	1330-20-7	8260B	0.80	U	1.0	0.80	0.40	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
Bromofluorobenzene		95	85-114
Dibromofluoromethane		88	80-119
1,2-Dichloroethane-d4		96	81-118
Toluene-d8		92	89-112

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
U = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis	LOD = Limit of Detection		S = MS/MSD failure

Shealy Environmental Services, Inc.
 106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Semivolatile Organic Compounds by GC/MS

Client: AECOM - Resolution Consultants	Laboratory ID: SI20018-004
Description: BEALB1203TW01WG20170918	Matrix: Aqueous
Date Sampled: 09/18/2017 1525	
Date Received: 09/20/2017	

Run	Prep Method	Analytical Method	Dilution	Analysis Date	Analyst	Prep Date	Batch
1	3520C	8270D	1	09/26/2017 1218	CMP2	09/24/2017 1331	52281

Parameter	CAS Number	Analytical Method	Result	Q	LOQ	LOD	DL	Units	Run
Benzo(a)anthracene	56-55-3	8270D	0.10	U	0.20	0.10	0.040	ug/L	1
Benzo(b)fluoranthene	205-99-2	8270D	0.10	U	0.20	0.10	0.040	ug/L	1
Benzo(k)fluoranthene	207-08-9	8270D	0.10	U	0.20	0.10	0.040	ug/L	1
Chrysene	218-01-9	8270D	0.10	U	0.20	0.10	0.040	ug/L	1
Dibenzo(a,h)anthracene	53-70-3	8270D	0.10	U	0.20	0.10	0.040	ug/L	1

Surrogate	Q	Run 1 % Recovery	Acceptance Limits
Nitrobenzene-d5		57	44-120
2-Fluorobiphenyl		60	44-119
Terphenyl-d14		78	50-134

LOQ = Limit of Quantitation	B = Detected in the method blank	E = Quantitation of compound exceeded the calibration range	DL = Detection Limit	Q = Surrogate failure
U = Not detected at or above the LOQ	N = Recovery is out of criteria	P = The RPD between two GC columns exceeds 40%	J = Estimated result < LOQ and ≥ DL	L = LCS/LCSD failure
H = Out of holding time	W = Reported on wet weight basis	LOD = Limit of Detection		S = MS/MSD failure

Shealy Environmental Services, Inc.
 106 Vantage Point Drive West Columbia, SC 29172 (803) 791-9700 Fax (803) 791-9111 www.shealylab.com

Appendix E

Regulatory Correspondence



June 20, 2017

Commanding Officer
Attention: NREAO Mr. William A. Drawdy
United State Marine Corps Air Station
Post Office Box 55001
Beaufort, SC 29904-5001

RE: Approval Response to Comments and Draft Final Revision 1 Vapor Intrusion Report July 2015, January 2016 and May 2016, Laurel Bay Military Housing Area, Multiple Properties

RE: Approval Response to Comments and Draft Final Revision 1 Letter Report - Petroleum Vapor Intrusion Investigations - June 2016 and January 2017, Multiple Properties, Laurel Bay Military Housing Area

Dear Mr. Drawdy:

The South Carolina Department of Health and Environmental Control (DHEC) received the above referenced response to comments and errata pages on May 24 and June 7, 2017. The regulatory authority for the investigation and cleanup of releases from these tank systems is the South Carolina Pollution Control Act (S.C. Code Ann. §48-1-10 et seq., as amended).

DHEC has reviewed the response to comments and errata pages. Based on this review, DHEC did not generate any additional comments. Please note that the Department's decision is based on information provided by the Marine Corps Air Station (MCAS) to date. Any information found to be contradictory to this decision may require additional action. Furthermore, the Department retains the right to request further investigation if deemed necessary. If you have any questions, please contact me at petruslb@dhec.sc.gov or 803-898-0294.

Sincerely,

Laurel Petrus
Department of Defense Corrective Action Section

Cc: Russell Berry, EQC Region 8
Shawn Dolan, Resolution Consultants
Bryan Beck, NAVFAC MIDLANT



March 29, 2018

Commanding Officer
Attention: NREAO Mr. William A. Drawdy
United State Marine Corps Air Station
Post Office Box 55001
Beaufort, SC 29904-5001

RE: Approved Response to Comments
Draft Final Revision 1 Soil and Initial Groundwater Investigation Report
September and October 2017
Laurel Bay Military Housing Area

Dear Mr. Drawdy:

The South Carolina Department of Health and Environmental Control (DHEC) received the above referenced Response to Comments and change pages on February 27, 2018. The regulatory authority for the investigation and cleanup of releases from these tank systems is the South Carolina Pollution Control Act (S.C. Code Ann. §48-1-10 et seq., as amended).

DHEC has reviewed the responses and change pages. Based on this review, DHEC has not generated any additional comments. The Department agrees there is no indication of soil or groundwater contamination on 36 of the 37 properties and therefore no further investigation is required at this time on the 36 properties. (See attached list). Please note that DHEC's decision is based on information provided by the Marine Corps Air Station (MCAS) to date. Any information found to be contradictory to this decision may require additional action. Furthermore, DHEC retains the right to request further investigation if deemed necessary. If you have any questions, please contact me at petruslb@dhec.sc.gov or 803-898-0294.

Sincerely,

Laurel Petrus
Department of Defense Corrective Action Section

Cc: EQC Region 8
Shawn Dolan, Resolution Consultants
Bryan Beck, NAVFAC MIDLANT

Attachment

March 22, 2018

Draft Final Revision 1 Soil and Initial Groundwater Investigation Report
September and October 2017
Laurel Bay Military Housing Area

Properties recommended for NFA:

117	Banyan Drive	215	Balsam Street	521	Laurel Bay Blvd
138	Laurel Bay Blvd	217	Balsam Street	606	Dahlia Drive
146	Laurel Bay Blvd	266	Beech Street	620	Dahlia Drive
147	Laurel Bay Blvd	272	Birch Drive	680	Camelia Drive
149	Laurel Bay Blvd	307	Ash Street	685	Camelia Drive
157	Cypress Street	327	Ash Street	753	Althea Street
204	Balsam Street	365	Aspen Street	918	Barracuda Drive
205	Balsam Street	374	Aspen Street	932	Albacore Street
206	Balsam Street	393	Acorn Drive	942	Albacore Street
207	Balsam Street	406	Elderberry Drive	1203	Cardinal Lane
209	Balsam Street	438	Elderberry Drive	1229	Dove Lane
213	Balsam Street	461	Elderberry Drive	1313	Albatross Drive