

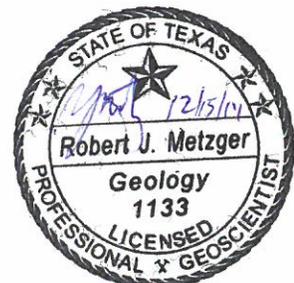
**FINAL REPORT  
LIMITED PHASE II  
ENVIRONMENTAL SITE ASSESSMENT  
FOR WATER LINE REPLACEMENT IN  
IMPERIAL VALLEY AREA PACKAGE II,  
HOUSTON, TEXAS  
CITY OF HOUSTON WBS No. S-000035-0197-3**

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**AEC Project No. E111-14**

**December 15, 2014**



**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Imperial Valley Area Package II, Houston, Texas  
City of Houston WBS No. S-000035-0197-3**

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**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Imperial Valley Area Package II, Houston, Texas  
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**1.0 EXECUTIVE SUMMARY**

The City of Houston plans to replace approximately 34,500 feet of water lines in existing City of Houston street rights-of-way in the Imperial Valley Package II area (referred to herein as the Subject Right-of-Way). Figures 1 and 2 show the location of the Subject Right-of-Way. Aviles Engineering Corporation (AEC) performed a Phase I Environmental Site Assessment (refer to AEC ESA-I report number E107-13 dated December 26, 2013) that identified the following recognized environmental condition (REC) in connection with the Subject Right-of-Way (refer to attached Figure 3):

- **Leaking Petroleum Storage Tank and associated plugged monitor wells at the N-1 Airline Food Store at 11703 Airline Drive.**

The ESA-I recommended that a limited Phase II Environmental Site Assessment (ESA-II) investigation be conducted with the installation of soil borings and a temporary groundwater monitor well to investigate and assess if petroleum products contaminated the Subject Right-of-Way adjacent to or near the REC.

AEC performed the limited ESA-II in general accordance with Chapter 11 – Geotechnical and Environmental Infrastructure Requirements of the City of Houston Department of Public Works and Engineering Design Manual and ASTM Standard Practice E1903. During the limited on-site ESA-II investigation on October 20, 2014, soil boring B-1 was advanced to 24 feet below pavement surface (bps), and B-2 and B-3 were each advanced to 14 feet bps. B-1 was converted to a temporary groundwater monitor well. Each soil boring was placed in the best practicable location as close as possible to the water line alignment adjacent to the REC considering on-site conditions and utilities.

Soils encountered during drilling were clays and sandy clays. No petroleum product odors were detected in the soil cores. A soil sample was collected from each boring. The soils encountered during drilling were dry, but water was present in B-1 at 21.64 feet bps after about one-half hour after drilling was completed, so a temporary groundwater monitor well was installed. The three soil samples collected from B-1 through B-3 and the groundwater sample collected from B-1 were analyzed by a laboratory to determine the concentrations of benzene, toluene, ethylbenzene and total xylenes (collectively known as BTEX), methyl tertiary butyl ether (MTBE), and total petroleum hydrocarbons (TPH). The BTEX, MTBE, and TPH concentrations in each of the collected soil samples and groundwater sample were less than their respective laboratory sample detection limits.

Since the laboratory analysis report indicated that the soil and wastewater concentrations were below laboratory detection levels, the composited waste soil and wastewater were disposed as solid waste.

The ESA-II investigation was limited by the number and location of the soil borings and the number of soil and groundwater samples collected and the specific sample analyses. Additional ESA-II investigations are not recommended in the Subject Right-of-Way.

## **2.0 INTRODUCTION**

### **2.1 Project Background and Location**

The City of Houston plans to replace approximately 34,500 feet of water lines in existing City of Houston street rights-of-way in the Imperial Valley Package II area (referred to herein as the Subject Right-of-Way). Figures 1 and 2 (refer to Appendix A) show the location of the Subject Right-of-Way. Aviles Engineering Corporation (AEC) performed a Phase I Environmental Site Assessment (refer to AEC ESA-I report number E107-13 dated December 26, 2013) that identified the following recognized environmental condition (REC) in connection with the Subject Right-of-Way (refer to attached Figure 3 in Appendix A):

- **Leaking Petroleum Storage Tank and associated plugged monitor wells at the N-1 Airline Food Store at 11703 Airline Drive.**

The ESA-I recommended that a limited Phase II Environmental Site Assessment (ESA-II) investigation be conducted with the installation of soil borings and a temporary groundwater monitor well to investigate and assess if petroleum products contaminated the Subject Right-of-Way adjacent to or near the REC. AEC submitted a proposal on September 11, 2014 to perform the limited ESA-II.

### **2.2 Authorization**

Texas American Engineering, LLC. authorized the limited ESA-II of the Subject Right-of-Way in an email dated September 19, 2014.

## **3.0 ON-SITE INVESTIGATIONS**

AEC has performed a limited ESA-II investigation of the Subject Right-of-Way near the REC on Airline Drive for the water line replacement in the Imperial Valley Package II area. The limited ESA-II was performed in general accordance with Chapter 11 – Geotechnical and Environmental Requirements of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual and ASTM Standard Practice E1903. Prior to conducting the limited ESA-II on-site investigations, City of Houston maps were reviewed to determine the location of water and sewer utilities and coordination was conducted with Texas811 utility locate service to mark other subsurface utilities in the Subject Right-of-Way.

Following site preparation activities, three soil borings (B-1 through B-3) were drilled and one temporary monitor well at B-1 was installed on October 20, 2014. Each soil boring was placed in the best practicable location, considering the location of utilities and other site-specific conditions. Figures 2 and 3 show the locations of the soil borings. Boring B-1 was drilled to 24 feet below pavement surface (bps) and B-2 and B-3 were each drilled to 14 feet bps. B-1 was drilled directly across from the pump island and tankfield of the REC.

The concrete pavement at each boring location was cored prior to drilling (refer to Photograph 1 in Appendix B). The pavement thickness ranged from 8.5 inches in B-3 to 9.5 inches in B-2. Cement stabilized base material consisting of crushed limestone, sand and in some cases gravel were encountered beneath the concrete pavement. The base material thickness at the boring locations ranged from 5.5 inches in B-2 to 12 inches in B-1 (refer to Table 1 below for specifics concerning the concrete and base thicknesses).

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**Table 1 – Soil Boring, Sampling and Sample Analysis Information**

<b>Boring No.</b>	<b>Pavement and Base/Fill</b>	<b>Total Depth, feet*</b>	<b>Soil Sample Interval, feet*</b>	<b>Predominant Soil Type</b>	<b>Wet Zones, feet *</b>	<b>Ground-water Sampled</b>	<b>Analyses</b>
<b>B-1</b>	9 inches of concrete & 12 inches of cement stabilized sand, crushed limestone and gravel	24	21 to 22 (above groundwater)	Sandy Clay	None; however groundwater was present at a depth of 21.64 feet one-half hour after drilling ceased.	Yes	BTEX, MTBE, and TPH for soil and groundwater.
<b>B-2</b>	9.5 inches of concrete & 5.5 inches of cement stabilized crushed limestone and sand	14	13 to 14 (total depth of boring)	Clay	None	Not Applicable	BTEX, MTBE, and TPH for soil
<b>B-3</b>	8.5 inches of concrete & 9.5 inches of cement stabilized crushed limestone and sand	14	13 to 14 (total depth of boring)	Clay	None	Not Applicable	BTEX, MTBE, and TPH for soil

\*below pavement surface

After pavement coring, a continuous direct-push soil boring machine was used to obtain a soil core from the base of the base material to the total depth of the boring (refer to Photographs 2 and 3 in Appendix B). Soil cores were collected in 4-foot long acetate liners within the 2-inch diameter direct push corer. The recovered core was logged. All of the soil encountered during drilling was either clay or sandy clay (refer to the soil borings in Appendix C and summary of the borings in Table 1). A representative section of soil was cut from each one-foot section of core and placed in a zip-lock type sandwich bag for 10 minutes. After that time period, the

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headspace concentration of volatile organic vapors from each section of soil was analyzed by inserting the probe tip of a calibrated PID into a narrow opening of the bag seal. The resultant PID readings are listed on the boring logs in Appendix C. All of the PID readings were 0.0 parts per million (refer to the boring logs in Appendix C for specific PID readings). No petroleum product odors were detected in the soil cores during the limited ESA-II investigation.

As shown in Table 1 and the boring logs of Appendix C, a soil sample for laboratory analysis was collected from just above the groundwater depth in boring B-1, and from the total depth of each of borings B-2 and B-3. Each soil sample was placed into a clean, laboratory-provided sample container, labeled with the date and time of sample collection, the soil boring number and the interval that was sampled, the requested analyses, and the initials of the sample collector.

No groundwater was encountered during drilling in any of the soil borings. Borings B-2 and B-3 did not have any groundwater in the boreholes after one-quarter hour after drilling ceased. Boring B-1 had groundwater in the borehole at a depth of 21.64 feet bps after one-half hour after drilled stopped (refer to soil boring logs in Appendix C and Table 1). Boring B-1 was converted into a temporary groundwater monitor well (refer to Photograph 4 in Appendix B). The well consisted of 15 feet of new 1-inch diameter polyvinyl chloride (PVC) casing and 10 feet of new 1-inch diameter PVC screen. The groundwater in the temporary groundwater monitor well was purged prior to sampling but the well went dry after approximately 1.25 quarts of water were retrieved. The well was allowed to recharge and then a groundwater sample was collected for analysis. The groundwater sample did not exhibit any petroleum product odor. The groundwater sample was placed into clean, laboratory-provided sample containers, labeled with the date and time of sample collection, the well number, the requested analyses, and the initials of the sample collector. The groundwater sample and each of the previously collected soil samples were preserved on ice and transported to A&B Environmental Services, Inc. commercial analytical laboratory with a completed chain-of-custody form (refer to the analytical laboratory report in Appendix E).

Following groundwater sampling, the temporary monitor well was removed from B-1 and each of the three boreholes was grouted from the total depth to the base of the street pavement (refer to Photograph 5 in Appendix B). The pavement at each soil boring location was patched with concrete.

#### **4.0 LABORATORY ANALYSES**

Each of the three soil samples and the groundwater sample was analyzed by A&B Environmental Services, Inc. laboratory to determine BTEX and MTBE concentrations by analytical method SW-846 8021B and TPH concentrations by Texas Commission on Environmental Quality (TCEQ) TX Method 1005. The moisture content of each of the soil samples was also determined as required for the analyses. The results of the soil and groundwater sample analyses are summarized in Table 2 in Appendix D. Appendix E contains the laboratory analysis report, quality control certificate, and chain-of-custody.

As shown in Table 2 in Appendix D, each of the BTEX, MTBE, and TPH concentrations in the soil samples from B-1 through B-3 and the groundwater sample from B-1 were below laboratory detection limits.

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### **5.0 WASTE DISPOSAL**

Waste soil and wastewater generated during the limited ESA-II on-site investigation were composited in separate 5-gallon plastic buckets and capped with a lid manufactured to fit the container. Each bucket of waste was properly transported to and stored at AEC's property at 5790 Windfern in Houston until sample analyses were completed. Since the laboratory analysis report indicated that the soil and wastewater concentrations were below laboratory detection levels, the composited waste soil and wastewater were appropriately disposed of as solid waste.

### **6.0 SUMMARY**

AEC performed the limited ESA-II in general accordance with Chapter 11 – Geotechnical and Environmental Requirements of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual and ASTM Standard Practice E 1903 to investigate and assess if petroleum products contaminated the Subject Right-of-Way in the area of the REC identified in the ESA-I report.

Three soil borings, B-1 through B-3 were drilled to either 24 or 14 feet bps in the Subject Right-of-Way as close as practicable to the planned water line alignment in the area adjacent to or near the REC. The soil encountered during drilling was either clay or sandy clay. PID readings of soil removed from each one foot interval of the soil core were 0.0 parts per million. No petroleum odors were detected in any of the soil cores in the borings. Groundwater was present in boring B-1 approximately one-half hour after drilling was completed. No petroleum odors were detected in the groundwater. A soil sample was collected from each boring and a groundwater sample was collected from a temporary monitor well installed in B-1. Each sample was analyzed for BTEX, MTBE, and TPH. Each of the BTEX, MTBE, and TPH concentrations in the soil and groundwater samples were below laboratory detection limits.

### **7.0 CONCLUSION AND RECOMMENDATIONS**

Based on the field and laboratory analysis results, additional Phase II Environmental Site Assessment investigations are not recommended for the Subject Right-of-Way.

### **8.0 LIMITATIONS**

The information and conclusions provided in this report are based on a general knowledge of the Subject Right-of-Way in the Imperial Valley Package II area and water line alignment, and the limited ESA- II investigation. This report documents the concentrations of petroleum products detected in the respective soil samples and groundwater sample collected and analyzed during the limited ESA-II investigation near the REC identified in the ESA-I report. There is a possibility that soil and/or groundwater contaminated by petroleum products may exist in the Subject Right-of-Way and water line alignment that were not detected during the limited ESA-II investigation due to the limited number and location of the soil borings and temporary groundwater sampling wells, samples collected, contaminants analyzed, and the cost and time constraints of the project.

This investigation was performed using the standard level of care and diligence normally practiced by recognized professional environmental and engineering firms in this area, presently performing similar services under similar circumstances. This report has been prepared

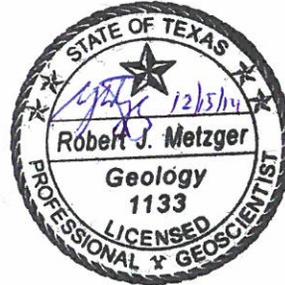
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specifically to investigate potential contamination of the Subject Right-of-Way near the REC and is intended to be used in its entirety. The conclusions presented in this report should not be relied upon for other sites without additional evaluation and/or investigation. This document is not intended to constitute or substitute for legal counsel or guidance in connection with contamination in the Subject Right-of-Way, nor does it constitute a toxicological report on health effects from potential exposure to contamination during construction in the Subject Right-of-Way.

**9.0 QUALIFICATIONS OF ENVIRONMENTAL PROFESSIONAL**

Robert J. Metzger, CAPM, P.G., AEC Senior Geologist, conducted the limited ESA-II investigations in general accordance with in general accordance with Chapter 11 – Geotechnical and Environmental Requirements of the City of Houston Department of Public Works and Engineering Design Manual (07-01-2011) and ASTM Standard Practice E1903 and prepared this report. He has conducted ESA-IIs for numerous City of Houston Department of Public Works and Engineering projects. His qualifications are further described in his resume in Appendix F.

  
Prepared by:  
Robert J. Metzger, CAPM, P.G.



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**APPENDIX A**

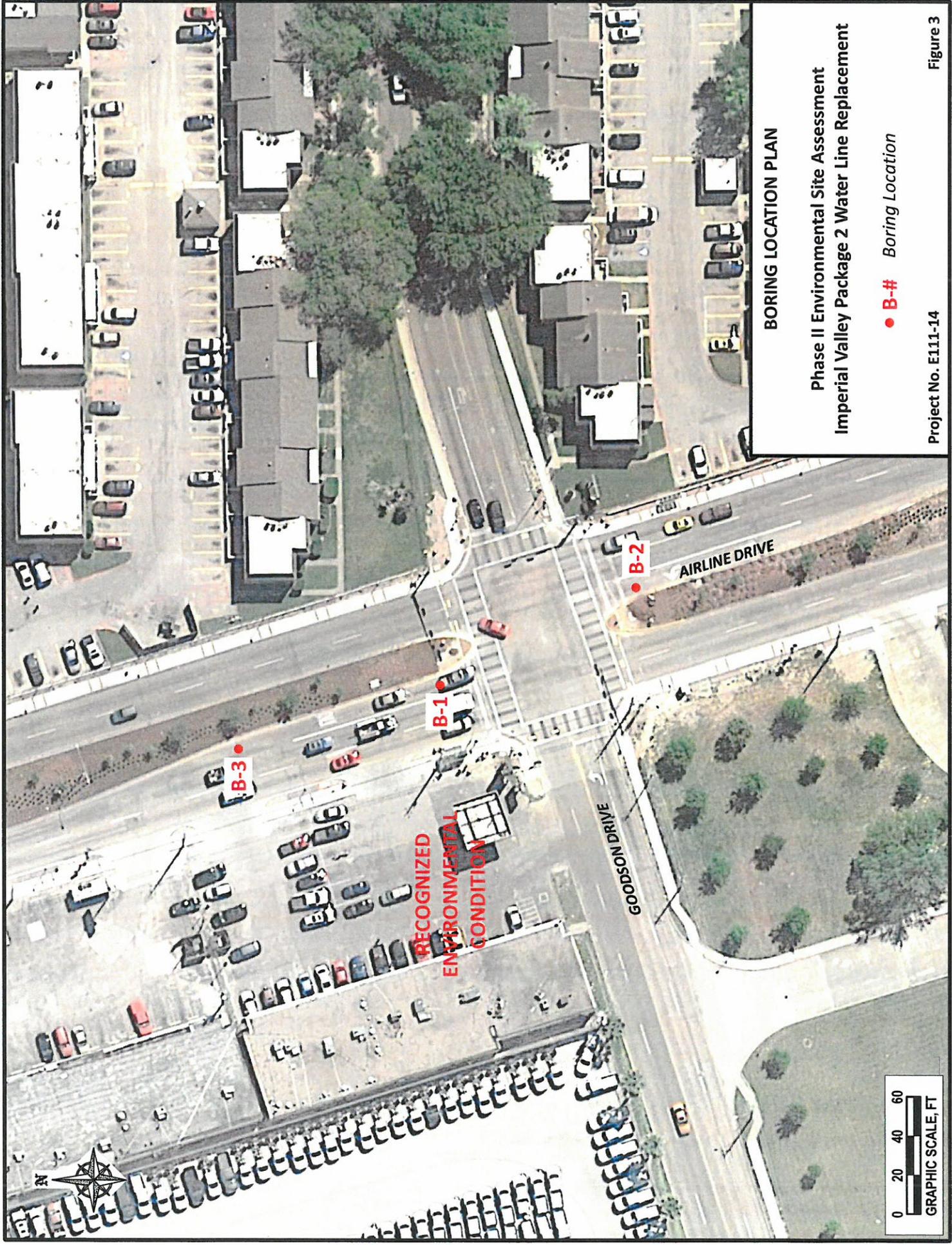
**FIGURES**

**Imperial Valley Package II Area  
Phase II Environmental Site Assessment**



**Figure 1**  
Site Location Map  
— Subject Right-of-Way





**BORING LOCATION PLAN**

Phase II Environmental Site Assessment  
Imperial Valley Package 2 Water Line Replacement

● B-# Boring Location

Project No. E111-14

Figure 3



**Limited Phase II Environmental Site Assessment for Water Line Replacement  
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**APPENDIX B  
PHOTOGRAPHS**

Phase II Environmental Site Assessment  
Water Line Replacement in Imperial Valley Package II Area, Houston, Texas



**Photograph 1:** View to the west of coring the pavement at the B-2 location.



**Photograph 2:** View to the southwest of drilling of B-1. The REC is in the background.

**Phase II Environmental Site Assessment  
Water Line Replacement in Imperial Valley Package II Area, Houston, Texas**



**Photograph 3:** View to the southeast of drilling of B-3.



**Photograph 4:** View to the east-southeast of installed temporary monitor well at the B-1 location.

**Phase II Environmental Site Assessment  
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**Photograph 5:** View of plugged boring B-1.

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**APPENDIX C  
SOIL BORING LOGS**



PROJECT: Imperial Valley Package 2, ESA II

ENGINEERING CORP.  
GEOTECHNICAL ENGINEERS

BORING

B-1

DATE 10/20/14

TYPE Direct Push

LOCATION See Site Plan, Figure 3

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
0					Pavement: 9" concrete		0
					Base: 12" stabilized sand, crushed limestone and gravel		
2		27	19		Sandy Silty Clay (CL-ML), dark to medium gray and tan, with ferrous nodules	0.0	2
4						0.0	4
6		48	36		Sandy Clay (CL), gray and orange-brown, with ferrous nodules	0.0	6
					Sandy Clay (CL), gray and orange-brown, with sand partings, and ferrous nodules and stains	0.0	
8					Sandy Clay (CL), light gray and orange-brown, with sand partings and ferrous stains	0.0	8
10		48	46		- with slickensides 11'-12'	0.0	10
12					Sandy Clay (CL), light gray and red-brown with black stringers, with sand partings	0.0	12
14		48	46		- light gray and orange-brown, with sand pockets 14'-15'	0.0	14
16					Clay (CH), gray and red-brown, with occasional sand pockets or partings	0.0	16
18		48	46		- with silt and some sand 18'-19'	0.0	18
					- red-brown and gray 19'-20'	0.0	

BORING DRILLED TO 24 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT (DRY) FEET WHILE DRILLING

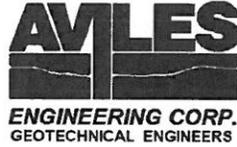
WATER LEVEL AT 21.64 FEET AFTER 1/2 HOUR

DRILLED BY Envirotech

CHECKED BY RJM

LOGGED BY RJM

PROJECT NO. E111-14



PROJECT: Imperial Valley Package 2, ESA II

ENGINEERING CORP. BORING B-1  
 GEOTECHNICAL ENGINEERS

DATE 10/20/14

TYPE Direct Push

LOCATION See Site Plan, Figure 3

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
20	[Hatched pattern]	48	44	[Solid black]	Clay ... (continued)	0.0	20
					Clay (CH), light gray and red-brown, with sand pockets and partings, sticky	0.0	
22					Clay (CH), red-brown, with calcareous nodules - with silt partings 22'-23'	0.0	22
24					Termination depth = 24 feet.	0.0	24
26							26
28							28
30							30
32							32
34							34
36							36
38							38

BORING DRILLED TO 24 FEET WITHOUT DRILLING FLUID  
 WATER ENCOUNTERED AT (DRY) FEET WHILE DRILLING   
 WATER LEVEL AT 21.64 FEET AFTER 1/2 HOUR   
 DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E111-14



PROJECT: Imperial Valley Package 2, ESA II

BORING B-2

DATE 10/20/14

TYPE Direct Push

LOCATION See Site Plan, Figure 3

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
0					Pavement: 9 1/2" concrete		0
					Base: 5 1/2" cement-stabilized crushed limestone and sand		
					Clay (CH), tan and brown, with sand partings and calcareous nodules	0.0	
2					Sandy Clay (CL), gray and orange-brown, with calcareous nodules, ferrous nodules and ferrous stains	0.0	2
		29	33			0.0	
4						0.0	4
					Clay (CH), gray and orange-brown, with sand partings, ferrous nodules and stains, and few calcareous nodules	0.0	
6						0.0	6
		43	48			0.0	
8					- gray and red-brown, with sand pockets 8'-10'	0.0	8
						0.0	
10					- with calcareous nodules 10'-11'	0.0	10
		45.5	48		- with slickensides 10-12'	0.0	
12					Clay (CH), gray and orange-brown, with silty sand partings and pockets, calcareous nodules, and ferrous nodules and stains	0.0	12
		24	24			0.0	
14					Sandy Clay (CL), gray and orange-brown, damp	0.0	14
					Sandy Clay (CL), gray and red-brown, with clay layers	0.0	
					Termination depth = 14 feet.		
16							16
18							18

BORING DRILLED TO 14 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT (DRY) FEET WHILE DRILLING

WATER LEVEL AT (DRY) FEET AFTER 1/2 HOUR

DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E111-14



PROJECT: Imperial Valley Package 2, ESA II

ENGINEERING CORP. BORING B-3  
 GEOTECHNICAL ENGINEERS

DATE 10/20/14

TYPE Direct Push

LOCATION See Site Plan, Figure 3

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
0					Pavement: 8 1/2" concrete		0
					Base: 9 1/2" cement-stabilized crushed limestone and sand		
2		30	30		Sandy Clay (CL), gray and tan, with clay lenses, sand pockets, calcareous nodules and ferrous stains - with organic material 1.5'-2'	0.0	2
4					Clay w/Sand (CH), gray and orange-brown, with sand pockets, calcareous nodules, ferrous nodules and ferrous stains	0.0	4
6		48	32		- 7'-8' no sample recovered	0.0	6
8					Clay w/Sand (CH), gray and orange-brown, with sand partings, pockets and seams, and ferrous nodules and stains	0.0	8
10		48	43.5			0.0	10
12					Clay (CH), gray and orange-brown, with ferrous nodules and stains	0.0	12
14		24	24		Clay (CH), dark gray, damp - very soft 12'-13'	0.0	14
					Termination depth = 14 feet.		
16							16
18							18

BORING DRILLED TO 14 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT (DRY) FEET WHILE DRILLING

WATER LEVEL AT (DRY) FEET AFTER 1/4 HOUR

DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E111-14

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**APPENDIX D**

**SUMMARY OF LABORATORY SAMPLE ANALYSIS RESULTS**

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**TABLE 2  
Summary of B-1 through B-3 Soil Sample Analyses**

SOIL BORING <sup>1</sup>	Sample Interval (feet below pavement surface)	CONTAMINANT CONCENTRATIONS IN SOIL SAMPLES									
		BENZENE mg/kg <sup>2</sup>	TOLUENE mg/kg	ETHYL-BENZENE mg/kg	m-&p-Xylenes	o-Xylenes	TOTAL XYLENES mg/kg	MTBE mg/kg	TPH C6-C12 mg/kg	TPH >C12-C28 mg/kg	TPH >C28-C35 mg/kg
B-1	21-22	U <sup>3</sup> , <0.001	U, <0.001	U, <0.007	U, <0.007	U, <0.003	U, <0.001	U, <31.8	U, <27.2	U, <23.7	
B-2	13-14	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.001	U, <27.5	U, <23.5	U, <20.5	
B-3	13-14	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.003	U, <0.001	U, <29.5	U, <25.3	U, <22	
TCEQ TRRP Tier 1 Residential <sup>GW</sup> Soil <sub>ing</sub> Soil PCLs		0.026	8.2	7.6	110/150	71	120	0.62	65	200	200

<sup>1</sup>Refer to Boring Location Plan in Figure 2

<sup>2</sup>mg/kg = milligrams per kilogram or parts per million.

<sup>3</sup>U = Undetected at Sample Detection Limit Shown

**Summary of B-1 Groundwater Sample Analyses**

SOIL BORING/ TEMPORARY WELL <sup>1</sup>	Measured Depth to Groundwater (feet below pavement surface)	CONTAMINANT CONCENTRATIONS IN GROUNDWATER SAMPLE									
		BENZENE mg/L <sup>2</sup>	TOLUENE mg/L	ETHYL-BENZENE mg/L	m-&p-Xylenes	o-Xylenes	TOTAL XYLENES mg/L	MTBE mg/L	TPH C6-C12 mg/L	TPH >C12-C28 mg/L	TPH >C28-C35 mg/L
B-1	21.64	U <sup>3</sup> , <0.0008	U, <0.001	U, <0.0008	<0.002	<0.001	U, <0.003	U, <0.001	U, <0.579	U, <0.755	U, <0.659
TCEQ TRRP Tier 1 Residential <sup>GW</sup> GW <sub>ing</sub> Groundwater PCLs		0.005	1.0	0.7	10	10	10	0.24	0.98	0.98	0.98

<sup>1</sup>Refer to Boring Location Plan in Figure 2

<sup>2</sup>mg/L = milligrams per liter or parts per million.

<sup>3</sup>U = Undetected at Sample Detection Limit Shown

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City of Houston WBS No. S-000035-0197-3**

**APPENDIX E**

**ANALYTICAL LABORATORY REPORTS AND QUALITY ASSURANCE AND  
QUALITY CONTROL DOCUMENTATION**

# Laboratory Analysis Report

Total Number of Pages: 25

Job ID : 14101084



10100 East Freeway, Suite 100, Houston, TX 77029 tel: 713-453-6060, fax: 713-453-6091, <http://www.ablabs.com>

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## Client Project Name :

E111-14 / Imperial Valley Package II, Houston, TX

Report To : Client Name: Aviles Engineering  
Attn: Bob Metzger  
Client Address: 5790 Windfern  
City, State, Zip: Houston, Texas, 77041

P.O.#.:  
Sample Collected By: Robert J. Metzger  
Date Collected: 10/20/14

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A&B Labs has analyzed the following samples...

Client Sample ID	Matrix	A&B Sample ID
B-1 21-22'	Soil	14101084.01
B-1 Water	Water	14101084.02
B-2 13-14'	Soil	14101084.03
B-3 13-14'	Soil	14101084.04

*Alisha Hughes*

Released By: Alisha Hughes

Title: Project Manager

Date: 10/28/2014



This Laboratory is NELAP (T104704213-14-11) accredited. Effective: 04/01/2014; Expires: 03/31/2015

Scope: Non-Potable Water, Drinking Water, Air, Solid, Hazardous Waste

I am the laboratory manager, or his/her designee, and I am responsible for the release of this data package. This laboratory data package has been reviewed and is complete and technically compliant with the requirements of the methods used, except where noted in the attached exception reports. I affirm, to the best of my knowledge that all problems/anomalies observed by this laboratory (and if applicable, any and all laboratories subcontracted through this laboratory) that might affect the quality of the data, have been identified in the Laboratory Review Checklist, and that no information or data have been knowingly withheld that would affect the quality of the data.

This report cannot be reproduced, except in full, without prior written permission of A&B Labs. Results shown relate only to the items tested. Samples are assumed to be in acceptable condition unless otherwise noted. Blank correction is not made unless otherwise noted. Air concentrations reported are based on field sampling information provided by client. Soil samples are reported on a wet weight basis unless otherwise noted. Uncertainty estimates are available on request.

Date Received : 10/20/2014 16:53

**LABORATORY TERM AND QUALIFIER DEFINITION REPORT**



Job ID : 14101084

Date: 10/28/2014

**General Term Definition**

Back-Wt	Back Weight	Post-Wt	Post Weight
BRL	Below Reporting Limit	ppm	parts per million
cfu	colony-forming units	Pre-Wt	Previous Weight
Conc.	Concentration	Q	Qualifier
D.F.	Dilution Factor	RegLimit	Regulatory Limit
Front-Wt	Front Weight	RPD	Relative Percent Difference
LCS	Laboratory Check Standard	RptLimit	Reporting Limit
LCSD	Laboratory Check Standard Duplicate	SDL	Sample Detection Limit
MS	Matrix Spike	surr	Surrogate
MSD	Matrix Spike Duplicate	T	Time
MW	Molecular Weight	TNTC	Too numerous to count

**Qualifier Definition**

Q18	Soils not collected in a hermetically sealed container may lose low-level VOCs.
R3	MS/MSD RPD exceeds control limit. Recovery meets acceptance criteria."The sample randomly selcted as QC for this batch was not part of your project. Therefore, this sample matrix is not applicable to your project samples."
U	Undetected at SDL (Sample Detection Limit).



LABORATORY TEST RESULTS

Client Sample ID: B-1 21-22'  
A&B Job Sample ID: 14101084.01

Date: 10/28/2014

Client Name: Aviles Engineering  
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: % Moisture  
Analytical Method: SM 2540G  
QC Batch ID: Qb14102276  
Prep Method: SM 2540G  
Prepared By: MMaldonado  
Prep Batch ID: PB14102256

Sample Matrix: Soil  
Date Collected: 10/20/2014 14:57  
Date Received: 10/20/2014 16:53  
Date Prepared: 10/22/2014 17:10

Analyst Initial: MAM

% Moisture: 25.4

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	25.4					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 21-22'
A&B Job Sample ID: 14101084.01

Date: 10/28/2014

Client Name: Aviles Engineering
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: Purgeable Aromatics

Sample Matrix: Soil

Analytical Method: SW-846 8021B

Date Collected: 10/20/2014 14:57

QC Batch ID: Qb14102223

Date Received: 10/20/2014 16:53

Prep Method: SW-846 5035A

Date Prepared: 10/21/2014 11:00

Prepared By: SBojja

Prep Batch ID: PB14102217

Analyst Initial: SRB

% Moisture: 25.4

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 21-22'
A&B Job Sample ID: 14101084.01

Date: 10/28/2014

Client Name: Aviles Engineering
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: Total Petroleum Hydrocarbons

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 10/20/2014 14:57

QC Batch ID: Qb14102218

Date Received: 10/20/2014 16:53

Prep Method: TX 1005

Date Prepared: 10/21/2014 16:30

Prepared By: AVBembde

Prep Batch ID: PB14102216

Analyst Initial: AVB

% Moisture: 25.4

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1, TPH-1005-2, TPH-1005-4, Total C6-C35, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 Water
A&B Job Sample ID: 14101084.02

Date: 10/28/2014

Client Name: Aviles Engineering
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: Purgeable Aromatics
Analytical Method: SW-846 8021B
QC Batch ID: Qb14102246
Prep Method: SW-846 5030C
Prepared By: SBojja
Prep Batch ID: PB14102237

Sample Matrix: Water
Date Collected: 10/20/2014 15:10
Date Received: 10/20/2014 16:53
Date Prepared: 10/22/2014 10:00

Analyst Initial: SRB

% Moisture

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).



**LABORATORY TEST RESULTS**

Client Sample ID: B-1 Water  
 A&B Job Sample ID: 14101084.02

Date: 10/28/2014

Client Name: Aviles Engineering  
 Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**

Sample Matrix: Water

Analytical Method: TX 1005

Date Collected: 10/20/2014 15:10

QC Batch ID: qb14102250

Date Received: 10/20/2014 16:53

Prep Method: TX 1005

Date Prepared: 10/21/2014 11:30

Prepared By: AVBembde

Prep Batch ID: PB14102240

Analyst Initial: AVB

% Moisture

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 0.579	U	0.579	1.32	0.66	1.5	60	mg/L	0.878	10/21/14 22:10
TPH-1005-2	>C12-C28 <sup>1</sup>	< 0.755	U	0.755	1.32	0.86	1.5	60	mg/L	0.878	10/21/14 22:10
TPH-1005-4	>C28-C35 <sup>1</sup>	< 0.659	U	0.659	1.32	0.75	1.5	60	mg/L	0.878	10/21/14 22:10
	Total C6-C35	<					----	----	mg/L	0.878	10/21/14 22:10
111-85-3	1-Chlorooctane(surr)	74.8					59	122	%	0.878	10/21/14 22:10
3386-33-2	Chlorooctadecane(sur)	86.6					48	123	%	0.878	10/21/14 22:10

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 13-14'  
A&B Job Sample ID: 14101084.03

Date: 10/28/2014

Client Name: Aviles Engineering  
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: **% Moisture**  
Analytical Method: SM 2540G  
QC Batch ID: Qb14102276  
Prep Method: SM 2540G  
Prepared By: MMaldonado  
Prep Batch ID: PB14102256  
Analyst Initial: MAM

Sample Matrix: Soil  
Date Collected: 10/20/2014 13:20  
Date Received: 10/20/2014 16:53  
Date Prepared: 10/22/2014 17:10

% Moisture: 13.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	13.7					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-2 13-14'  
 A&B Job Sample ID: 14101084.03

Date: 10/28/2014

Client Name: Aviles Engineering  
 Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description:	<b>Purgeable Aromatics</b>	Sample Matrix	Soil
Analytical Method:	SW-846 8021B	Date Collected	10/20/2014 13:20
QC Batch ID:	Qb14102223	Date Received	10/20/2014 16:53
Prep Method:	SW-846 5035A	Date Prepared	10/21/2014 11:00
Prepared By:	SBojja		
Prep Batch ID	PB14102217		
Analyst Initial	SRB	% Moisture	13.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
1634-04-4	MTBE	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.00	10/21/14 16:51
71-43-2	Benzene	< 0.001	Q18,U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.00	10/21/14 16:51
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.00	10/21/14 16:51
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	1.00	10/21/14 16:51
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.012	0.005	0.01	0.8	mg/Kg	1.00	10/21/14 16:51
95-47-6	o-Xylene	< 0.002	U	0.002	0.006	0.002	0.005	0.4	mg/Kg	1.00	10/21/14 16:51
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	1.00	10/21/14 16:51
98-08-8	Trifluorotoluene(surr)	96.5						81 111	%	1.00	10/21/14 16:51

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 13-14'
A&B Job Sample ID: 14101084.03

Date: 10/28/2014

Client Name: Aviles Engineering
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: Total Petroleum Hydrocarbons

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 10/20/2014 13:20

QC Batch ID: Qb14102218

Date Received: 10/20/2014 16:53

Prep Method: TX 1005

Date Prepared: 10/21/2014 16:30

Prepared By: AVBembde

Prep Batch ID: PB14102216

Analyst Initial: AVB

% Moisture: 13.7

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1 through TPH-1005-4, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 13-14'  
A&B Job Sample ID: 14101084.04

Date: 10/28/2014

Client Name: Aviles Engineering

Attn: Bob Metzger

Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Test Description: % Moisture

Analytical Method: SM 2540G

QC Batch ID: Qb14102276

Prep Method: SM 2540G

Prepared By: MMaldonado

Prep Batch ID: PB14102256

Analyst Initial: MAM

Sample Matrix: Soil

Date Collected: 10/20/2014 12:20

Date Received: 10/20/2014 16:53

Date Prepared: 10/22/2014 17:10

% Moisture: 19.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	19.7					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 13-14'
A&B Job Sample ID: 14101084.04

Date: 10/28/2014

Client Name: Aviles Engineering
Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: Purgeable Aromatics
Analytical Method: SW-846 8021B
QC Batch ID: Qb14102223
Prep Method: SW-846 5035A
Prepared By: SBojja
Prep Batch ID: PB14102217

Sample Matrix: Soil
Date Collected: 10/20/2014 12:20
Date Received: 10/20/2014 16:53
Date Prepared: 10/21/2014 11:00

Analyst Initial: SRB

% Moisture: 19.7

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include MTBE, Benzene, Toluene, Ethylbenzene, m- & p-Xylenes, o-Xylene, Xylenes, and Trifluorotoluene(surr).



**LABORATORY TEST RESULTS**

Client Sample ID: B-3 13-14'  
 A&B Job Sample ID: 14101084.04

Date: 10/28/2014

Client Name: Aviles Engineering  
 Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**

Sample Matrix: Soil

Analytical Method: TX 1005

Date Collected: 10/20/2014 12:20

QC Batch ID: Qb14102218

Date Received: 10/20/2014 16:53

Prep Method: TX 1005

Date Prepared: 10/21/2014 16:30

Prepared By: AVBembde

Prep Batch ID: PB14102216

Analyst Initial: AVB

% Moisture: 19.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 29.5	Q18,U	29.5	31.1	23.7	25	1000	mg/Kg	1	10/22/14 03:42
TPH-1005-2	>C12-C28 <sup>1</sup>	< 25.3	U	25.3	31.1	20.3	25	1000	mg/Kg	1	10/22/14 03:42
TPH-1005-4	>C28-C35 <sup>1</sup>	< 22	U	22	31.1	17.7	25	1000	mg/Kg	1	10/22/14 03:42
	Total C6-C35	<					----	----	mg/Kg	1	10/22/14 03:42
111-85-3	1-Chlorooctane(surr)	60.2					60	143	%	1	10/22/14 03:42
3386-33-2	Chlorooctadecane(sur	72.6					60	150	%	1	10/22/14 03:42

Soil results reported on dry weight basis  
<sup>1</sup>-Parameter not available for accreditation

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101084

**Date :** 10/28/2014

**Analysis :** Total Petroleum Hydrocarbons      **Method :** TX 1005      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb14102218      **Created Date :** 10/22/14      **Created By :** AVBembde

**Samples in This QC Batch :** 14101084.01,03,04

**Sample Preparation :** PB14102216      **Prep Method :** TX 1005      **Prep Date :** 10/21/14 16:30      **Prep By :** AVBembde

<b>QC Type: Method Blank</b>							
Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
C6-C12	TPH-1005-1	< MDL	mg/Kg	1	25	23.7	
>C12-C28	TPH-1005-2	< MDL	mg/Kg	1	25	20.3	
>C28-C35	TPH-1005-4	< MDL	mg/Kg	1	25	17.7	
Total C6-C35		< MDL	mg/Kg	1	---		
Chlorooctadecane(surr)	3386-33-2	118	%	1			
1-Chlorooctane(surr)	111-85-3	117	%	1			

<b>QC Type: LCS and LCSD</b>										
Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
C6-C12	500	512	102	500	475	95	7.5	20	75-125	
>C12-C28	500	466	93.2	500	456	91.2	2.2	20	75-125	
>C28-C35	500	600	120	500	532	106	12	20	75-125	

<b>QC Type: MS and MSD</b>											
<b>QC Sample ID: 14101112.01</b>											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
C6-C12	BRL	500	458	88.9	500	553	108	19.3	20	75-125	
>C12-C28	BRL	500	449	86	500	492	94.6	9.5	20	75-125	
>C28-C35	BRL	500	487	96.4	500	591	117	19.5	20	75-125	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101084

**Date :** 10/28/2014

**Analysis :** Purgeable Aromatics

**Method :** SW-846 8021B

**Reporting Units :** mg/Kg

**QC Batch ID :** Qb14102223

**Created Date :** 10/21/14

**Created By :** SBojja

**Samples in This QC Batch :** 14101084.01,03,04

**Sample Preparation :** PB14102217

**Prep Method :** SW-846 5035A

**Prep Date :** 10/21/14 11:00 **Prep By :** SBojja

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
MTBE	1634-04-4	< MDL	mg/Kg	1	0.005	0.001		
Benzene	71-43-2	< MDL	mg/Kg	1	0.005	0.001		
Toluene	108-88-3	< MDL	mg/Kg	1	0.005	0.001		
Ethylbenzene	100-41-4	< MDL	mg/Kg	1	0.005	0.005		
m- & p-Xylenes	108-38-3&106-42-3	< MDL	mg/Kg	1	0.01	0.005		
o-Xylene	95-47-6	< MDL	mg/Kg	1	0.005	0.002		
Xylenes	1330-20-7	< MDL	mg/Kg	1	0.005	0.002		
Trifluorotoluene(surr)	98-08-8	99	%	1				

**QC Type: LCS and LCSD**

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
MTBE	0.05	0.045	90	0.05	0.045	90	0.0	20	67.2-132	
Benzene	0.05	0.045	90	0.05	0.045	90	0.0	20	76.2-128	
Toluene	0.05	0.046	92	0.05	0.045	90	2.2	20	74.2-126	
Ethylbenzene	0.05	0.045	90	0.05	0.045	90	0.0	20	79.4-125	
m- & p-Xylenes	0.1	0.093	93	0.1	0.091	91	2.2	20	76.3-126	
o-Xylene	0.05	0.046	92	0.05	0.046	92	0.0	20	77.1-123	
Xylenes	0.15	0.139	92.7	0.15	0.137	91.3	1.4	20	77.2-125	

**QC Type: MS and MSD**

**QC Sample ID: 14101083.01**

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
MTBE	BRL	0.051	0.064	125	0.05	0.045	90	34.9	26	76-134	R3
Benzene	BRL	0.051	0.063	124	0.05	0.045	90	33.3	19	68-138	R3
Toluene	BRL	0.051	0.064	125	0.05	0.046	92	32.7	19	67-135	R3
Ethylbenzene	BRL	0.051	0.062	122	0.05	0.044	88	34	20	71-127	R3
m- & p-Xylenes	BRL	0.101	0.127	126	0.1	0.09	90	34.1	27	56-135	R3
o-Xylene	BRL	0.051	0.063	124	0.05	0.044	88	35.5	24	56-134	R3
Xylenes	BRL	0.152	0.19	125	0.15	0.134	89.3	34.6	25	59-134	R3

Refer to the Definition page for terms.



**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101084

**Date :** 10/28/2014

**Analysis :** Total Petroleum Hydrocarbons      **Method :** TX 1005      **Reporting Units :** mg/L

**QC Batch ID :** qb14102250      **Created Date :** 10/22/14      **Created By :** AVBembde

**Samples in This QC Batch :** 14101084.02

**Sample Preparation :** PB14102240      **Prep Method :** TX 1005      **Prep Date :** 10/21/14 11:30      **Prep By :** AVBembde

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
C6-C12	TPH-1005-1	< MDL	mg/L	1	1.5	0.66	
>C12-C28	TPH-1005-2	< MDL	mg/L	1	1.5	0.86	
>C28-C35	TPH-1005-4	< MDL	mg/L	1	1.5	0.75	
Total C6-C35		< MDL	mg/L	1	---		
1-Chlorooctane(surr)	111-85-3	73	%	1			
Chlorooctadecane(surr)	3386-33-2	73	%	1			

**QC Type: LCS and LCSD**

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrlLimit	%Recovery CtrlLimit	Qual
C6-C12	30	31.9	106	30	32	107	0.3	20	75-125	
>C12-C28	30	30.1	100	30	30.3	101	0.7	20	75-125	
>C28-C35	30	30.7	102	30	30.7	102	0.0	20	75-125	

**QC Type: MS and MSD**

**QC Sample ID: 14101112.15**

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
C6-C12	BRL	26.4	28	106	26.4	28.9	109	3.2	20	75-125	
>C12-C28	BRL	26.4	27	101	26.4	25.5	94.9	5.8	20	75-125	
>C28-C35	BRL	26.4	27.5	102	26.4	27.2	101	1.1	20	75-125	

Refer to the Definition page for terms.





10100 East Fwy (I-10)  
Suite 100  
Houston, TX 77029  
713-453-6060  
1-877-478-6060 Toll Free  
713-453-6091 Fax  
ablabs.com

A&B JOB ID #

1410084

Project #

E111-14

Project Name/Location

Imperial Valley Package II Houston, TX

Reporting Requirement:

TRRP Limits only  TRRP Rpt. Package  See Attached  Standard Level II  PST  MDL  EDD

Sampler's Name & Company (PLEASE PRINT)

Robert Metzger AEC 10/20/14

LAB USE ONLY

LAB USE ONLY	9. Sample ID and Description	10. Sampling		11. 12. Matrix							18. REMARKS					
		Date	Time 24 Hr	Comp.	Grab	Water	Soil	Sludge	Oil	Drinking Water		Air	Other			
00A	B-1 21-22'	10/20/14	14:57	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	None marked on 2:57 on 10/20/14
00B	AC P-4 water	10/20/14	15:10	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	7:10 on 10/20/14 marked on 3:10
00C	B-2 13-14'	10/20/14	13:20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
00D	B-3 13-14'	10/20/14	12:20	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

1. REPORT TO: AEC  
Company: Avels Engineering Corp  
Address: 5790 Woodland  
Houston, TX 77041  
Contact: Bob Metzger  
Phone: 281-792-8352  
Fax:   
E-mail:  bobmetzger@avels.com

2. INVOICE TO: AEC  
Company: AEC  
Address: As in Box 1  
Contact:   
Phone:   
Fax:   
E-mail:

3. PO #  
3a. A&B Quote #  
4. Turnaround Time (Business Days)  
 1 Day  Other:  
 2 Days\*  
 3 Days\*  
 4 Days - Standard  
\*Surcharge applies

13. 14. Containers*	903	103	VQA	VQA
15. Preservatives**	C	C	H	H
16. PH-Lab Only				

17. Analyze/Methods	BTEX/MG6 T-H 1005 BTEX/MG6 T-H 1003
---------------------	--

19. RELINQUISHED BY: [Signature]  
DATE: 10/20/14  
TIME: 16:53

20. RECEIVED BY: [Signature]  
DATE: 10/20/14  
TIME: 11:05

21. KNOWN HAZARDS/COMMENTS  
Temperature: 29.07 = 30.0 °C  
Thermometer ID: 10140589697  
Intact:  Y  N  Both Initials: ac  
A&B cannot accept verbal changes  
Please FAX written changes to 713-453-6091  
Samples will be disposed of after 30 days

\*Containers: VQA - 40 ml vial  
4 oz/8 oz - glass wide mouth  
P/O - Plastic/other

\*\*Preservatives: C - Cool  
OH - NaOH  
H - HCl  
T - Na<sub>2</sub>S<sub>2</sub>O<sub>8</sub>  
N - HNO<sub>3</sub>  
X - Other

METHOD OF SHIPMENT

LAB USE ONLY SAMPLING RENTAL PAU

BILL OF LADING/TRACKING #



## Sample Condition Checklist

A&B JobID : <b>14101084</b>	Date Received : <b>10/20/2014</b>	Time Received : <b>4:53PM</b>																										
Client Name : <b>Aviles Engineering</b>																												
Temperature : <b>2.9+0.7cf=3.6°C</b>	Sample pH : <b>NA</b>																											
Thermometer ID : <b>140539697</b>	pH Paper ID : <b>NA</b>																											
<b>Check Points</b>																												
<b>1.</b>	<b>Cooler seal present and signed.</b>	X		N/A																								
<b>2.</b>	<b>Sample(s) in a cooler.</b>	X																										
<b>3.</b>	<b>If yes, ice in cooler.</b>	X																										
<b>4.</b>	<b>Sample(s) received with chain-of-custody.</b>	X																										
<b>5.</b>	<b>C-O-C signed and dated.</b>	X																										
<b>6.</b>	<b>Sample(s) received with signed sample custody seal.</b>		X																									
<b>7.</b>	<b>Sample containers arrived intact. (If no comment).</b>	X																										
<b>8.</b>	<table style="width: 100%; border: none;"> <tr> <td style="text-align: left;"><b>Matrix</b></td> <td style="text-align: center;"><b>Water</b></td> <td style="text-align: center;"><b>Soil</b></td> <td style="text-align: center;"><b>Liquid</b></td> <td style="text-align: center;"><b>Sludge</b></td> <td style="text-align: center;"><b>Solid</b></td> <td style="text-align: center;"><b>Cassette</b></td> <td style="text-align: center;"><b>Tube</b></td> <td style="text-align: center;"><b>Bulk</b></td> <td style="text-align: center;"><b>Badge</b></td> <td style="text-align: center;"><b>Food</b></td> <td style="text-align: center;"><b>Other</b></td> </tr> <tr> <td style="text-align: left;">:</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: center;"><input type="checkbox"/></td> </tr> </table>	<b>Matrix</b>	<b>Water</b>	<b>Soil</b>	<b>Liquid</b>	<b>Sludge</b>	<b>Solid</b>	<b>Cassette</b>	<b>Tube</b>	<b>Bulk</b>	<b>Badge</b>	<b>Food</b>	<b>Other</b>	:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											
<b>Matrix</b>	<b>Water</b>	<b>Soil</b>	<b>Liquid</b>	<b>Sludge</b>	<b>Solid</b>	<b>Cassette</b>	<b>Tube</b>	<b>Bulk</b>	<b>Badge</b>	<b>Food</b>	<b>Other</b>																	
:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>																									
<b>9.</b>	<b>Sample(s) were received in appropriate container(s).</b>	X																										
<b>10.</b>	<b>Sample(s) were received with proper preservative</b>			X																								
<b>11.</b>	<b>All samples were logged or labeled.</b>	X																										
<b>12.</b>	<b>Sample ID labels match C-O-C ID's</b>	X																										
<b>13.</b>	<b>Bottle count on C-O-C matches bottles found.</b>	X																										
<b>14.</b>	<b>Sample volume is sufficient for analyses requested.</b>	X																										
<b>15.</b>	<b>Samples were received within the hold time.</b>	X																										
<b>16.</b>	<b>VOA vials completely filled.</b>			X																								
<b>17.</b>	<b>Sample accepted.</b>	X																										
<b>Comments : Include actions taken to resolve discrepancies/problem:</b>																												
The time for sample 02 on COC is 1510 but containers say 2:57.																												

Received by : CCripe

Check in by/date : Dlopez / 10/20/2014



## Laboratory Data Package Cover Page

This data package is for Job No. 14101084 and laboratory batch no(s).  
Qb14102218, Qb14102223, Qb14102246, qb14102250, Qb14102276 and consists of:

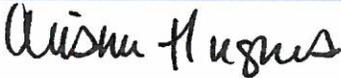
This signature page, the laboratory review checklist, and the following reportable data:

- R1 - Field chain-of-custody documentation;
- R2 - Sample identification cross-reference;
- R3 - Test reports (analytical data sheets) for each environmental sample that includes:
  - a. Items consistent with NELAC Chapter 5,
  - b. dilution factors,
  - c. preparation methods,
  - d. cleanup methods, and
  - e. if required for the project, tentatively identified compounds (TICs).
- R4 - Surrogate recovery data including:
  - a. Calculated recovery (%R), and
  - b. The laboratory's surrogate QC limits.
- R5 - Test reports/summary forms for blank samples;
- R6 - Test reports/summary forms for laboratory control samples (LCSs) including:
  - c. LCS spiking amounts,
  - d. Calculated %R for each analyte, and
  - e. The laboratory's LCS QC limits.
- R7 - Test reports for project matrix spike/matrix spike duplicates (MS/MSDs) including:
  - f. Samples associated with the MS/MSD clearly identified,
  - g. MS/MSD spiking amounts,
  - h. Concentration of each MS/MSD analyte measured in the parent and spiked samples,
  - i. Calculated %Rs and relative percent differences (RPDs), and
  - j. The laboratory's MS/MSD QC limits
- R8 - Laboratory analytical duplicate (if applicable) recovery and precision:
  - k. The amount of analyte measured in the duplicate,
  - l. The calculated RPD, and
  - m. The laboratory's QC limits for analytical duplicates.
- R9 - List of method quantitation limits (MQLs) and detectability check sample results for each analyte for each method and matrix.
- R10 - Other problems or anomalies.

The Exception Report for each "No" or "Not Reviewed (NR)" item in Laboratory Review Checklist and for each analyte, matrix, and method for which the laboratory does not hold NELAC accreditation under the Texas Laboratory Accreditation Program.

Release Statement: I am responsible for the release of this laboratory data package. This laboratory is NELAC accredited under the Texas Laboratory Accreditation Program for all the methods, analytes, and matrices reported in this data package except as noted in the Exception Reports. The data have been reviewed and are technically compliant with the requirements of the methods used, except where noted by the laboratory in the Exception Reports. By my signature below, I affirm to the best of my knowledge all problems/ anomalies observed by the laboratory have been identified in the Laboratory Review Checklist, and no information affecting the quality of the data has been knowingly withheld.

Check, if applicable: [ ] This laboratory meets an exception under 30 TAC §25.6 and was last inspection by [ ] TCEQ or [ ] \_\_\_\_\_ on \_\_\_\_\_. Any findings affecting the data in this laboratory data package are noted in the Exception Reports herein. The official signing the cover page of the report in which these data are used is responsible for releasing this data package and is by signature affirming the above release statement is true.

Name (Printed)	Signature	Official Title (Printed)	Date
Alisha Hughes		Project Manager	10/28/2014



### Laboratory Review Checklist: Reportable Data

Project Name: E111-14 / Imperial Valley Package II, Houston, TX

A&B Job ID: 14101084

Prep Batch Number(s): Qb14102218, Qb14102223, Qb14102246, qb14102250, Qb14102276

Reviewed By: AHughes

Date Reviewed: 10/28/2014

#	A	Description	Yes	No	NA	NR	ER#
<b>R1</b>	<b>OI</b>	<b>Chain-of Custody</b>					
		1) Did samples meet the laboratory's standard conditions of sample acceptability upon receipt?	X				
		2) Were all departures from standard conditions described in an exception report?	X				
<b>R2</b>	<b>OI</b>	<b>Sample and Quality Control (QC) Identification</b>					
		1) Are all field sample ID numbers cross-referenced to the laboratory ID numbers?	X				
		2) Are all laboratory ID numbers cross referenced to corresponding QC data?	X				
<b>R3</b>	<b>OI</b>	<b>Test Reports</b>					
		1) Were all samples prepared and analyzed within holding times?	X				
		2) Other than those results <MQL, were all other reported results within calibration range?	X				
		3) Were calculations subject to appropriate checks?	X				
		4) Were all analyte identifications subject to appropriate checks?	X				
		5) Were all sample quantitation limits reported for all analytes not detected?	X				
		6) Were all results for soil and sediment samples reported on a dry weight basis?	X				
		7) Was % moisture (or solids) reported for all samples?	X				
		8) Were bulk soils/solids samples for volatile analysis extracted with methanol per SW846 Method 5035		X			R3/8
		9) If required for the project, were tentatively identified compounds (TICs) reported?			X		
<b>R4</b>	<b>OI</b>	<b>Surrogate Recovery Data</b>					
		1) Were surrogates added prior to extraction?	X				
		2) Were surrogate percent recoveries (%R) within the laboratory QC limits?	X				
<b>R5</b>	<b>OI</b>	<b>Test Reports/Summary Forms for Blank Samples</b>					
		1) Were appropriate type(s) of blanks analyzed?	X				
		2) Were blanks analyzed at the appropriate frequency?	X				
		3) Were method blanks taken through the entire analytical process, including preparation and, if applicable, cleanup procedures?	X				
		4) Were blanks free of detected target compounds and, if applicable, reported TICs?	X				
<b>R6</b>	<b>OI</b>	<b>Laboratory Control Samples (LCS)</b>					
		1) Were all COCs included in the LCS?	X				
		2) Was each LCS taken through the entire analytical procedure, including prep and cleanup steps?	X				
		3) Were LCSs analyzed at the required frequency?	X				
		4) Were LCS (and LCSD, if applicable) %Rs within the laboratory QC limits?	X				
		5) Were LCSs spiked at or below the LORP or do the detectability data document the laboratory's capability of detecting the COCs in samples spiked at the MDL?	X				
		6) Was the LCSD RPD within QC limits?	X				
<b>R7</b>	<b>OI</b>	<b>Matrix Spike (MS) and Matrix Spike Duplicate (MSD) Data</b>					
		1) Were the project/method specified analytes included in the MS and MSD?	X				
		2) Were MS/MSD analyzed at the appropriate frequency?	X				
		3) Were MS (and MSD, if applicable) %R within the laboratory QC limits?	X				
		4) Were MS/MSD RPDs within laboratory QC limits?		X			R7/4
<b>R8</b>	<b>OI</b>	<b>Analytical Duplicate Data</b>					
		1) Were appropriate analytical duplicates analyzed for each matrix?	X				
		2) Were analytical duplicates analyzed at the appropriate frequency?	X				
		3) Were RPDs or relative standard deviations within the laboratory QC limits?	X				
<b>R9</b>	<b>OI</b>	<b>Method Quantitation Limits MQLs)</b>					
		1) Are the MQLs for each method analyte listed and included in the laboratory data package?	X				
		2) Do the MQLs correspond to the concentration of the lowest non-zero standard?	X				
		3) Are unadjusted MQLs included in the laboratory data package?	X				



### Laboratory Review Checklist: Reportable Data

Project Name: E111-14 / Imperial Valley Package II, Houston, TX  
 A&B Job ID: 14101084  
 Prep Batch Number(s): Qb14102218, Qb14102223, Qb14102246, qb14102250, Qb14102276

Reviewed By: AHughes  
 Date Reviewed: 10/28/2014

#	A	Description	Yes	No	NA	NR	ER#
<b>R10</b>	<b>OI</b>	<b>Other Problems/Anomalies</b>					
		1) Are all known problems/anomalies/special conditions noted in this LRC and ER?		X			R10/1
		2) Was applicable and available technology used to lower the SDL to minimize the matrix interference effects on the sample results?	X				
		3) Is the laboratory NELAC-accredited under the Texas Laboratory Accreditation Program for the analytes, matrices and methods associated with this laboratory data package?	X				
<b>S1</b>	<b>OI</b>	<b>INITIAL CALIBRATION (ICAL)</b>					
		1) Were response factors (RFs) and/or relative response factors (RRFs) for each analyte within the QC limits?	X				
		2) Were percent RSDs or correlation coefficient criteria met?	X				
		3) Were the number of standards recommended in the method used for all analytes?	X				
		4) Were all points generated between the lowest and highest standard used to calculate the curve?	X				
		5) Are ICAL data available for instruments used?	X				
		6) Has the initial calibration curve been verified using an appropriate second source standard?	X				
<b>S2</b>	<b>OI</b>	<b>INITIAL AND CONTINUING CALIBRATION VERIFICATION (ICCV AND CCV) AND CONTINUING CALIBRATION BLANK (CCB):</b>					
		1) Was the CCV analyzed at the method-required frequency?	X				
		2) Were percent differences for each analyte within the method-required QC limits?	X				
		3) Was the ICAL curve verified for each analyte?	X				
		4) Was the absolute value of the analyte concentration in the inorganic CCB < MDL?	X				
<b>S3</b>	<b>O</b>	<b>MASS SPECTRAL TUNING:</b>					
		1) Was the appropriate compound for the method used for tuning?	X				
		2) Were ion abundance data within the method-required QC limits?	X				
<b>S4</b>	<b>O</b>	<b>INTERNAL STANDARDS (IS):</b>					
		Were IS area counts and retention times within the method-required QC limits?	X				
<b>S5</b>	<b>OI</b>	<b>Raw data (NELAC Section 5.5.10)</b>					
		1) Were the raw data (e.g., chromatograms, and spectral data) reviewed by an analyst?	X				
		2) Were data associated with manual integrations flagged on the raw data?	X				
<b>S6</b>	<b>OI</b>	<b>DUAL COLUMN CONFIRMATION</b>					
		Did dual column confirmation results meet the method-required QC?	X				
<b>S7</b>	<b>OI</b>	<b>TENTATIVELY IDENTIFIED COMPOUNDS (TICS):</b>					
		If TICS were requested, were the mass spectra and TIC data subject to appropriate checks?			X		
<b>S8</b>	<b>OI</b>	<b>INTERFERENCE CHECK SAMPLE (ICS) RESULTS:</b>					
		Were percent recoveries within method QC limits?			X		
<b>S9</b>	<b>OI</b>	<b>SERIAL DILUTIONS, POST DIGESTION SPIKES, AND METHOD OF STANDARD ADDITIONS</b>					
		Were percent differences, recoveries, and the linearity within the QC limits			X		
<b>S10</b>	<b>OI</b>	<b>VERIFICATION/VALIDATION DOCUMENTATION FOR METHODS</b>					
		Are all methods documented and verified and validated, where applicable, (NELAC 5.10.2 or ISO/IEC 17025 Section 5.4.5)?	X				
<b>S11</b>	<b>OI</b>	<b>METHOD DETECTION LIMIT (MDL) STUDIES</b>					
		1) Was a MDL study performed for each reported analyte?	X				
		2) Is the MDL either adjusted or supported by the analysis of DCSs?	X				
<b>S12</b>	<b>OI</b>	<b>STANDARDS DOCUMENTATION</b>					
		Are the standards used in the analyses NIST-traceable or obtained from other appropriate sources?	X				
<b>S13</b>	<b>OI</b>	<b>COMPOUND/ANALYTE IDENTIFICATION PROCEDURES</b>					



### Laboratory Review Checklist: Reportable Data

Project Name: E111-14 / Imperial Valley Package II, Houston, TX

Reviewed By: AHughes

A&B Job ID: 14101084

Date Reviewed: 10/28/2014

Prep Batch Number(s): Qb14102218, Qb14102223, Qb14102246, qb14102250, Qb14102276

#	A	Description	Yes	No	NA	NR	ER#
		Are the procedures for compound/analyte identification documented?	X				
<b>S14</b>	<b>OI</b>	<b>DEMONSTRATION OF CAPABILITY (DOC)</b>					
		1) Was DOC conducted generally consistent with NELAC 5C or ISO/IEC 4.2.2?	X				
		2) Is documentation of the analyst's competency up-to-date and on file?	X				
<b>S15</b>	<b>OI</b>	<b>PROFICIENCY TEST REPORTS:</b>					
		Are proficiency testing or inter-laboratory comparison results on file?	X				
<b>S16</b>	<b>OI</b>	<b>LABORATORY STANDARD OPERATING PROCEDURES (SOPS):</b>					
		Are laboratory SOPs current and on file for each method performed?	X				

ER#	EXCEPTION
R3/8	All volatile soil samples were received in bulk containers not 5035 prep bottles; however 5035 prep may not be required for this sample program.
R7/4	Purgeable Aromatics Method SW-846 8021B, QC Batch ID: Qb14102223 - The MS/MSD RPD recovery for all compounds exceeded laboratory control limits. They were qualified with a R3.
R10/1	Quarterly DCS reports are kept on file at the laboratory and are available upon request.

O = organic analyses;

I = inorganic analyses (and general chemistry, when applicable);

NA = Not applicable;

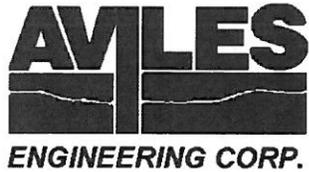
NR = Not Reviewed;

ER# = Exception Report identification number (an Exception Report should be completed for an item if "NR" or "No" is checked).

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Imperial Valley Package II Area, Houston, Texas  
City of Houston WBS No. S-000035-0197-3**

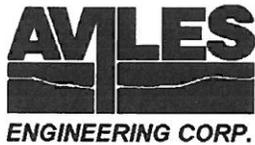
**APPENDIX F**

**RESUME**



## ROBERT J. METZGER, PG, CAPM

<b>POSITION</b>	Senior Geologist for 12 years Aviles Engineering Corporation, Houston, Texas
<b>EDUCATION</b>	Bowling Green State University, Bachelor of Science in Education - Earth and Biological Sciences  Bowling Green State University, Master of Science – Geology
<b>REGISTRATIONS</b>	Texas Registered Professional Geoscientist License No. 1133  Texas Commission on Environmental Quality Corrective Action Project Manager No. 01418  Certified with 40-Hour OSHA Hazardous Material Health and Safety Training and 8-Hour Refresher
<b>EXPERIENCE</b>	<b>Conducted Phase I and Phase II ESAs for the City of Houston Department of Public Works and Engineering Projects:</b> <ul style="list-style-type: none"><li>• Riverwood Estates No. 1 Lift Station and Force Main</li><li>• Harvey Wilson Drive and Armour Drive Reconstruction</li><li>• Riverwood Estates, John Alber, and Garden Oaks Phase II Areas Water Line Replacements</li><li>• Jensen Drive Pump Station Valve Box and Pipeline</li><li>• Polk Street Underpass Storm Water Inlet Replacement</li><li>• Park Row Road from State Highway 6 to Eldridge Parkway</li><li>• Heights Area Waterline Replacement</li><li>• West Little York Street Reconstruction from Deep Forest Drive to TC Jester Boulevard</li><li>• Bastrop Street Sanitary Sewer Line</li><li>• Northgate Regional Lift Station and Force Main</li><li>• Corder Subdivision Water Main Replacement</li><li>• Bennington Subdivision Water Main Replacement</li><li>• Westheimer North Water Main Replacement</li><li>• Lockwood Street Paving from Bennington Boulevard to Tidwell Road</li><li>• Huntington Water Main Replacement</li><li>• McCarty #1 Lift Station and Force Main Replacement</li><li>• Parker Road Water Main Replacement</li><li>• Kingspoint Road Sanitary Sewer Line</li><li>• Alabonson Area Water Line Replacment</li><li>• Mangum Manor Areas Water Line Replacment</li></ul> <b>Phase II Environmental Site Assessment: Toyota Center, Houston, Texas:</b> Conducted comprehensive Phase II ESA of a six-block site to assess and delineate contaminated soil and groundwater prior to construction of the Toyota Center.



**EXPERIENCE,  
continued**

**Houston Airport Systems Hobby Airport Taxiway H Phase II Environmental Site Assessment:** Conducted Phase II ESA for expansion of Taxiway H at Hobby Airport, which included advancement of soil borings, installation of temporary groundwater monitoring wells and soil and groundwater sampling. Prepared Phase II ESA report.

**Environmental Assessment: Houston Police Department Firing Range at George Bush Intercontinental Airport:** Oversight of drilling soil borings and installation of monitor wells during decommissioning of firing range to determine soil and groundwater disposal options and site cleanup. Prepared and edited assessment report.

**Environmental Soil Sampling and Analysis Woodhouse Paving Phase I and II Project Areas at Port of Houston Authority:** During the Phase I Project, surface concrete was cored, a soil boring was conducted from the soil surface to 18 inches below the surface, and a soil sample was collected from each boring at 20 locations. During the Phase II Project, six soil borings were drilled to 4 feet below the ground surface (bgs), two borings were drilled to 10 feet bgs, and two borings were drilled to 30 feet bgs. One to two soil samples were collected from each boring for a total of 14 samples. Each of the soil samples collected during Phase I and Phase II was submitted to a commercial laboratory for analyses of the following potential environmental contaminants:

- Total petroleum hydrocarbons
- Total RCRA metals
- Volatile and semi volatile organic compounds
- Polychlorinated biphenyls (PCBs)
- Herbicides and Pesticides

Following analysis, a report was prepared for each project area describing the soil boring and sampling procedures, and the results of the laboratory analyses. Concentrations of contaminant in the soil samples were compared to applicable TCEQ standards.

**Additional Phase II Environmental Site Assessments**

- City of Pasadena Strawberry Road Improvements from Cherrybrook Lane to Spencer Highway.
- City of Pasadena Strawberry Road Improvements from State Highway 225 to Harris Avenue.
- Property at 44 Aldine Bender Road impacted by adjoining leaking underground storage tank site.