

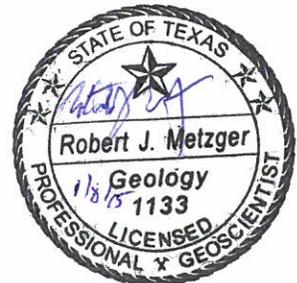
**FINAL REPORT  
LIMITED PHASE II  
ENVIRONMENTAL SITE ASSESSMENT  
FOR WATER LINE REPLACEMENT IN  
ANTOINE FOREST AREA, HOUSTON, TEXAS  
CITY OF HOUSTON WBS No. S-000035-0196-3**

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**AEC Project No. E105-14**

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In Antoine Forest Area, Houston, Texas  
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**1.0 EXECUTIVE SUMMARY**

The City of Houston (COH) plans to replace approximately 34,000 feet of water lines in existing City of Houston street rights-of-way in the Antoine Forest 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 E106-13 dated December 31, 2013) that identified the following recognized environmental conditions (RECs) in connection with the Subject Right-of-Way (refer to attached Figures 3 and 4):

- **REC 1:** Includes three facilities at two locations in close proximity to each other: three monitor wells at the Friendly Mart at 6002 Antoine Drive which may indicate a leak at the site; Leaking Petroleum Storage Tank (LPST) at the former Courtaulds Coatings site at 6001 Antoine Drive; and the release of chemicals and metals into the air and groundwater and the 24 former underground storage tanks at the International Paint location at 6001 Antoine Drive.
- **REC 2:** The release of chromium, manganese, copper and nickel to air and water during nine separate years, the black dust on the ground, above-ground storage tanks, fueling station, and oily wastes generated at the Forged Vessel Connections/Ameriforge at 2525 De Soto Street.

The ESA-I recommended that a limited Phase II Environmental Site Assessment (ESA-II) investigation be conducted with the installation of soil borings and temporary groundwater monitor wells to investigate and assess if petroleum products or metals contaminated the Subject Right-of-Way adjacent to or near each 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 investigations on October 17 and 20, 2014, six soil borings (B-1 through B-6) were advanced to either 13 or 14 feet below pavement surface (bps) and boring B-4 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 two RECs considering on-site conditions and utilities.

Soils encountered during drilling were primarily sandy clay and clay. Sand was encountered in borings B-4 through B-6 and silt was encountered in boring B-5. No petroleum product odors were detected in the soil cores. A soil sample was collected from each boring. Groundwater was encountered in each of borings B-4 through B-6 during drilling. A temporary groundwater monitor well was installed in boring B-4. The six soil samples collected from B-1 through B-6 and the groundwater sample collected from B-4 were analyzed to determine the concentrations of benzene, toluene, ethylbenzene and total xylenes (collectively known as BTEX), methyl tertiary butyl ether (MTBE), total petroleum hydrocarbons (TPH), and Resource Conservation Recovery Act (RCRA) metals. In addition, total copper and total zinc were analyzed in each of the soil samples from B-1 through B-3. Total copper, manganese, and nickel were also analyzed in each of the soil samples from B-4 through B-6 and in the groundwater sample from B-4. The BTEX, MTBE, and TPH concentrations in each of the collected soil samples and groundwater

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sample were less than their respective laboratory sample detection limits. The total metals concentrations in the soils samples except for arsenic in the soil sample collected from boring B-3 were either below the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) Tier 1 soil <sup>GW</sup>Soil<sub>ing</sub> residential protective concentration levels (PCLs) (regulatory action levels) or the acceptable Texas-Specific Background Concentrations as stated in Texas Administrative Code 30TAC 350.51(m). The total arsenic concentration of 6.62 milligrams per kilogram (mg/kg) of the soil sample from boring B-3 exceeded the PCL standard of 5.0 mg/kg and the Texas-Specific Background Concentration standard of 5.9 mg/kg. The total metals concentrations except for lead in the groundwater sample collected from B-4 were below the TCEQ TRRP Tier 1 groundwater <sup>GW</sup>GW<sub>ing</sub> residential PCLs. The total lead concentration of 0.026 milligrams per Liter (mg/L) exceeded the groundwater PCL standard of 0.015 mg/L.

The waste soil from the soil borings whose soil sample did not exceed the applicable TCEQ TRRP PCLs or the Texas-Specific Background Concentration standard were disposed as solid waste. The soil which exceeded the standards and the groundwater will be properly disposed.

Potentially Petroleum Contaminated Areas (PPCA; a general term used by the COH to include all types of contamination), based on COH guidelines have been identified and anticipated to be in the areas between survey stations 3+57 and 5+57 along the De Soto Street Subject Right-of-Way near Antoine Drive and between survey stations 0+00 and 2+74 along Rolland Street at De Soto Street as PPCA #1 and #2, respectively (refer to Figures 5 and 6 in Appendix A). The vertical extent of PPCA #1 is anticipated to be the thickness of the clays which extend from approximately 4.5 feet below pavement surface (bps) to the total depth of 14 feet bps in boring B-3. The vertical extent of PPCA #2 is anticipated to be the thickness of the ground-water bearing sand which extends from approximately 9.5 feet to 13 feet bps at boring B-4. Soil excavated from the PPCA should be continuously monitored (samples and analyzed for the contaminant of concern) and the soil excavated from the PPCA should be contained, properly handled, and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston's Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (refer to Appendix G). Until proven otherwise the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA.

Groundwater was not encountered during the ESA-II drilling at PPCA #1. However if during construction activities groundwater is encountered in the soil zone contaminated with arsenic, then groundwater should be sampled and analyzed for arsenic. If dewatering is necessary, then groundwater should be contained, sampled, and analyzed for arsenic in order to discharge or dispose of the water.

Groundwater was present during the ESA-II drilling at PPCA #2. Lead-contaminated groundwater is present at boring B-4 in the construction area. In addition, the potential for lead-contaminated groundwater moving into the rest of the construction area is high especially during dewatering. Groundwater should be contained, sampled and analyzed for lead during construction activities to discharge or dispose of the water.

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Groundwater from the PPCA should be continuously monitored (sampled and analyzed for the contaminant of concern) and the contaminated groundwater encountered during construction activities should be contained, properly handled and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston's Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (COH Section 02136; refer to Appendix G). Until proven otherwise the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA.

At each of the PPCAs, runoff into the construction site or into areas adjacent to the construction site could be potentially contaminated by contaminants from the adjacent pavement, ground surfaces, or from excavated materials from the anticipated contaminated soil strata stockpiled or stored on the adjacent surfaces. All excavated materials from the anticipated PPCA stratas should be contained at all times with a barrier to prevent runoff from entering the construction site is also recommended.

Workers and the general public should be protected during construction at each of the PPCAs. Of concern is accidental ingestion of contaminated soil and groundwater, inhalation of suspended contaminated soil and groundwater particles, and absorption of contaminants through the skin or eyes. A qualified environmental firm and toxicologist should be hired during the planning of and performance of the construction activities to develop an health and safety plan to among other things determine if PPE is needed and if so what types and a plan for waste material containment during excavation, handling, testing, and disposal practices. The COH Section 02136 should be followed during construction (refer to Appendix G). The construction contractor, environmental firm, and toxicologist should follow the most stringent of Occupational Safety Health Administration (OSHA) standards; and Federal, State, and Local regulations and guidelines.

The construction contractor shall be responsible for following the above guidelines, all Federal, State, and Local regulations and guidelines, and the COH Section 02136 (refer to Appendix G). The construction contractor should follow the most stringent of any conflicting guidelines while performing all construction activities. AEC recommends that the construction contractor provide to the COH the name and qualifications of the environmental firm and toxicologist selected, and provide a submittal to the COH describing how the contractor, environmental firm, and toxicologist will handle the environmental problems and situations.

The information and conclusions provided in this report are based on a general knowledge of the Subject Right-of-Way in the Antoine Forest area and the water line alignment; and the results of the limited ESA- II investigation. The ESA-II investigation was limited by the number and location of the soil borings and temporary monitor wells, the number of soil and groundwater samples collected, the specific sample analyses, and the cost and time constraints of the project. This report documents the concentrations of petroleum products and metals detected in the respective soil samples and groundwater sample collected and analyzed during the limited ESA-II investigation near the two RECs identified in the ESA-I report. There is a possibility that soil and/or groundwater contaminated by hazardous substances, petroleum products, or metals may exist in the Subject Right-of-Way and water line alignment that were not detected during the

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limited ESA-II investigation. In addition, AEC cannot guarantee the accuracy of the PPCA delineation and it is possible that contamination might be found outside the limits of the PPCA. AEC also cannot guarantee that the depths to the top and base of the clay or the groundwater-bearing sand which define the PPCA at borings B-3 and B-4 will be encountered at the same depth throughout the PPCA.

## **2.0 INTRODUCTION**

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

The City of Houston plans to replace approximately 34,000 feet of water lines in existing City of Houston street rights-of-way in the Antoine Forest 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 E106-13 dated December 31, 2013) that identified the following recognized environmental conditions (RECs) in connection with the Subject Right-of-Way (refer to attached Figures 3 and 4 in Appendix A):

- **REC 1:** Includes three facilities at two locations in close proximity to each other: three monitor wells at the Friendly Mart at 6002 Antoine Drive which may indicate a leak at the site; Leaking Petroleum Storage Tank (LPST) at the former Courtaulds Coatings site at 6001 Antoine Drive; and the release of chemicals and metals into the air and groundwater and the 24 former underground storage tanks at the International Paint location at 6001 Antoine Drive.
- **REC 2:** The release of chromium, manganese, copper and nickel to air and water during nine separate years, the black dust on the ground, above-ground storage tanks, fueling station, and oily wastes generated at the Forged Vessel Connections/Ameriforge at 2525 De Soto Street.

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

AEC has performed a limited ESA-II investigation of the Subject Right-of-Way near the two RECs for the water line replacement in the Antoine Forest 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.

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Following site preparation activities, six soil borings (B-1 through B-6) were drilled and one temporary monitor well (at B-4) was installed on October 17 and 20, 2014 in the Subject Right-of-Way. Each soil boring was placed in the best practicable location, considering the location of utilities and other site-specific conditions. Each of the borings was drilled to either 13 or 14 feet bps. Boring B-1 was drilled closest to REC #1 and boring B-4 was drilled closest to REC #2.

The concrete pavement at each of the boring locations B-1 through B-3 near REC #1 was cored prior to drilling. The pavement thickness at each location was 7 inches. No base material was encountered. The asphalt pavement was vibrated through with the soil coring machine at each of the boring locations B-4 through B-6. The asphalt ranged from 2 to 4 inches thick. Below the asphalt surface, 4 inches of gravel base was encountered at boring B-4 and 8 inches of gravel base was encountered at boring B-5. At boring B-6, 2 foot 5 inches of sand was present beneath the pavement. It is not certain whether this sand is all base material, natural soil material, or a combination of both. Table 1 on the next page summarizes the pavement and base thicknesses.

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 1, 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 primarily clay or sandy clay (refer to the soil borings in Appendix C and summary of the borings in Table 1). A wet sand zone at least 2 feet thick was encountered at the base of each of borings B-4 through B-6. A 2.4-foot dry sand was also encountered beneath the pavement in boring B-6 and a 1-foot sandy silt zone was encountered beneath the base material in boring B-5. A representative section of soil was cut from each 1-foot section of core and placed in a zip-lock type sandwich bag for 10 minutes. After that time period, the headspace concentration of volatile organic vapors from each section of soil were 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.

**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>Primary Soil Type</b>	<b>Wet Zones, feet *</b>	<b>Ground-water Sampled</b>	<b>Analyses</b>
<b>B-1 REC#1</b>	7 inches of concrete; no base	13	12 to 13 (total depth of boring)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and RCRA Metals Plus Total Copper and Zinc (soil)
<b>B-2 REC#1</b>	7 inches of concrete;	13	12 to 13 (total depth	Sandy Clay	None (damp zone in clay	Not Applicable	BTEX, MTBE, TPH,

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Boring No.	Pavement and Base/Fill	Total Depth, feet*	Soil Sample Interval, feet*	Primary Soil Type	Wet Zones, feet *	Ground-water Sampled	Analyses
	no base		of boring)		from 12.9 feet to 13 feet; did not produce water)		and RCRA Metals Plus Total Copper and Zinc (soil)
<b>B-3 REC#1</b>	7 inches of concrete; no base	14	13 to 14 (total depth of boring)	Clay	None	Not Applicable	BTEX, MTBE, TPH, and RCRA Metals Plus Total Copper and Zinc (soil)
<b>B-4 REC#2</b>	2 inches of asphalt and 4 inches of gravel base	13	9 to 10 (above groundwater)	Sandy Clay	9.7 ft. to 13 ft. (sand); Depth to groundwater in temporary well was 7.52' three hours after drilling.	Yes	BTEX, MTBE, TPH, and RCRA Metals plus Total Copper, Manganese, and Nickel (soil and groundwater)
<b>B-5 REC#2</b>	4 inches of asphalt and 8 inches of gravel base	14	11 to 12 (above groundwater)	Sandy Clay	12' to 14' (sand); depth to groundwater could not be measured after drilling due to cave in to 8.3 feet after drilling.	No	BTEX, MTBE, TPH, and RCRA Metals plus Total Copper, Manganese, and Nickel (soil)
<b>B-6 REC#2</b>	4 inches of asphalt; 2 foot 5 inches of sand was below the pavement but it could not	14	10 to 11 (above groundwater)	Sandy Clay	10.6 feet to 14 feet (sand); depth to groundwater could not be measured due to cave in to 3.5 feet after drilling.	No	BTEX, MTBE, TPH, and RCRA Metals plus Total Copper, Manganese, and Nickel (soil)

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<b>Boring No.</b>	<b>Pavement and Base/Fill</b>	<b>Total Depth, feet*</b>	<b>Soil Sample Interval, feet*</b>	<b>Primary Soil Type</b>	<b>Wet Zones, feet *</b>	<b>Ground-water Sampled</b>	<b>Analyses</b>
	be determined how much was base and how much was natural soil.						

\*below pavement surface

As shown in Table 1 and the boring logs of Appendix C, a soil sample for laboratory analysis was collected from the total depths of each of borings B-1 through B-3 since no groundwater was encountered in any of those borings and just above the groundwater depth in each of borings B-4 through B-6. 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.

Groundwater was not encountered during the drilling of borings B-1 through B-3 near REC #1. A soft damp clay was encountered between 12.9 feet and the total depth of 13 feet in boring B-2, but it did not yield groundwater. Groundwater was encountered in a sand zone in each of borings B-4 through B-6 located near REC #2. Table 1 shows the depth and thickness of the sand zone in each boring. Boring B-4 was converted into a temporary groundwater monitor well because it was located closest to REC #2 and due to the abundant amount of water in the borehole (refer to Photograph 4 in Appendix B). The well consisted of 5.5 feet of new 1-inch diameter polyvinyl chloride (PVC) casing and 7.5 feet of new 1-inch diameter PVC screen. The groundwater in the temporary groundwater monitor well was purged prior to sampling. The well did not go dry. The water level in the well was allowed to return to 90% of its original measured depth 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-4 and each of the boreholes B-1 through B-6 was grouted from the total depth to the base of the street pavement. The pavement at each of the B-1 through B-3 soil boring locations was patched with concrete and each of the B-4 through B-6 soil boring locations was patched with asphalt.

#### **4.0 LABORATORY ANALYSES**

Each of the six soil samples and the groundwater sample was analyzed by A&B Environmental Services, Inc. laboratory. Each sample collected was analyzed to determine BTEX and MTBE

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concentrations by analytical method SW-846 8021B and TPH concentrations by Texas Commission on Environmental Quality (TCEQ) TX Method 1005. Each sample was also analyzed for Resource Conservation Recovery Act (RCRA) total metals using analytical methods SW-846 6010C and 7470A. Each of the soil samples from B-1 through B-3 were also analyzed for total copper and zinc using analytical method SW-846 6010C. Each of the soil samples from B-4 through B-6 and the groundwater sample from B-4 were also analyzed for total copper, manganese, and nickel using analytical method SW-846 6010C. 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 Tables 2 through 5 in Appendix D. Appendix E contains the laboratory analysis report, quality control certificate, and chain-of-custody.

As shown in Tables 2 through 5 in Appendix D, 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. The total metals concentrations except for arsenic, copper, and zinc in the soil sample collected from boring B-3 and lead in the soil samples collected from borings B-2, B-3, B-4 and B-6, were both below the Texas Commission on Environmental Quality (TCEQ) Texas Risk Reduction Program (TRRP) Tier 1 soil <sup>GW</sup>Soil<sub>Ing</sub> residential protective concentration levels (PCLs) (regulatory action levels) and the Texas-Specific Background Concentrations as promulgated in Texas Administrative Code 30TAC 350.51(m). The total copper concentration of 18.7 mg/Kg (B-3) exceeded the Texas-Specific Background Concentration of 15 mg/Kg but was significantly less than the TCEQ TRRP PCL of 1,000 mg/Kg. The total lead concentrations of 5.90 mg/Kg (B-2), 11.8 mg/Kg (B-3), 3.51 mg/Kg (B-4) and 3.34 mg/Kg (B-6) exceeded the TCEQ TRRP PCL of 3.0 mg/Kg but were below the Texas-Specific Background Concentration of 15 mg/Kg. The total zinc concentration of 54.4 mg/Kg (B-3) exceeded the Texas-Specific Background Concentration of 30 mg/Kg, but was significantly below the TCEQ TRRP PCL of 2,400 mg/Kg. The total arsenic concentration of 6.62 milligrams per kilogram (mg/kg) of the soil sample from boring B-3 exceeded the PCL standard of 5.0 mg/kg and the Texas-Specific Background Concentration standard of 5.9 mg/kg. The total metals concentrations except for lead in the groundwater sample collected from B-4 were below their respective TCEQ TRRP Tier 1 groundwater <sup>GW</sup>GW<sub>Ing</sub> residential PCLs. The total lead concentration of 0.026 milligrams per Liter (mg/L) exceeded the TCEQ TRRP groundwater PCL standard of 0.015 mg/L. Based on the laboratory analysis, the soil sample collected from boring B-3 near REC#1 contains unacceptable levels of total arsenic contamination and the groundwater sample collected from the temporary well in boring B-4 near REC#2 contains unacceptable levels of total lead contamination.

### **5.0 WASTE DISPOSAL**

The waste soil from the soil borings whose soil sample did not exceed the applicable TCEQ TRRP PCLs or the Texas-Specific Background Concentration standard were disposed as solid waste. The remaining waste soil and groundwater will be properly disposed.

### **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

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and assess if petroleum products and metals contaminated the Subject Right-of-Way in the area of each of two RECs identified in the ESA-I report.

Six soil borings, B-1 through B-6, were drilled to either 13 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 each of the two RECs. The majority of the soil encountered during drilling was either clay or sandy clay. A wet sand zone at least 2 feet was encountered at the base of each of borings B-4 through B-6. PID readings of soil removed from each one foot interval of each 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 each of borings B-4 through B-6. No petroleum odors were detected in the groundwater. A soil sample was collected from each soil boring and a groundwater sample was collected from a temporary monitor well installed in B-4. Each sample was analyzed for BTEX, MTBE, TPH, and RCRA metals. Each soil sample from B-1 through B-3 was also analyzed for total copper and zinc. Each soil sample from B-4 through B-6 and the groundwater sample from B-4 were also analyzed for total copper, manganese, and nickel.

Concentrations of BTEX, MTBE, and TPH in each of the soil samples and the groundwater sample were below laboratory detection limits. A total arsenic concentration of 6.62 milligrams per kilogram (mg/kg) in the soil sample from boring B-3 exceeded the TCEQ TRRP Tier 1 soil <sup>GW</sup>Soil<sub>mg</sub> residential PCL standard of 5.0 mg/kg and the Texas-Specific Background Concentration standard of 5.9 mg/kg. A total lead concentration of 0.026 mg/L in the groundwater sample collected from B-4 exceeded the TCEQ TRRP Tier 1 groundwater <sup>GW</sup>GW<sub>mg</sub> residential PCL of 0.015 mg/L. The remaining total metals concentrations in the soil samples and groundwater sample were each below the TCEQ TRRP PCLs or the Texas-Specific Background Concentration standard.

## **7.0 CONCLUSION AND RECOMMENDATIONS**

According to the City of Houston's (COH) requirements as specified in Section 11.28 of Chapter 11 of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual for conducting ESA-IIs and the City of Houston December 9, 2014 interoffice correspondence (refer to Appendix F), the ESA-II report should define a Potentially Petroleum Contaminated Area (PPCA; a general term used by the COH to include all types of contamination) based on professional judgment and the results of the ESA-II investigation. Mr. Maher Tanbouz, P.E. of the COH Geo-Environmental Services Branch of the Public Works and Engineering Department stated during a December 17, 2014 telephone conversation that the PPCA should extend 100 to 150 feet outward from the contaminated boring/s or temporary monitor well. If there is an uncontaminated boring within that distance, then the PPCA should extend to the midpoint between the contaminated and uncontaminated boring. A vertical extent of contamination should be identified.

In addition, this ESA-I report should, in accordance with COH specifications, address the potential for contaminated runoff entering the work area and the potential for migration of contamination into the construction area due to construction dewatering; and should provide recommendations for construction phase monitoring which should take into account:

- The vertical and horizontal extent of the PPCA and action plan,
- Worker protection and general health and safety;

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- Potential contaminated media screening, testing, handling, and disposal consistent with Federal, State, and City Regulations and Specifications.

Based on the guidelines provided by Mr. Tanbouz above, AEC has identified the areas between survey stations 3+57 and 5+57 along the De Soto Street Subject Right-of-Way near Antoine Drive and between survey stations 0+00 and 2+74 along Rolland Street at De Soto Street as PPCA #1 and #2, respectively (refer to Figures 5 and 6 in Appendix A). The vertical extent of PPCA #1 is anticipated to be the thickness of the clays which extend from approximately 4.5 feet below pavement surface (bps) to the total depth of 14 feet bps in boring B-3, since the clays at those depths are similar to the contaminated clay soil sample collected from 12 to 14 feet bps. The vertical extent of PPCA #2 is anticipated to be the thickness of the ground-water bearing sand which extends from approximately 9.5 feet to 13 feet bps at boring B-4. Soil excavated from the PPCA should be continuously monitored (samples and analyzed for the contaminant of concern) and the soil excavated from the PPCA should be contained, properly handled, and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston's Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (refer to Appendix G). Until proven otherwise the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA.

Groundwater was not encountered during the ESA-II drilling at PPCA #1. However if during construction activities groundwater is encountered in the soil zone contaminated with arsenic, then groundwater should be sampled and analyzed for arsenic. If dewatering is necessary, then groundwater should be contained, sampled, and analyzed for arsenic in order to discharge or dispose of the water.

Groundwater was present during the ESA-II drilling at PPCA #2. Lead-contaminated groundwater is present at boring B-4 in the construction area. The recharge into the temporary water well was rapid after removing water during development of the well for sampling. Over 5 gallons of water were removed during development and the water level depth was the same after development as the original water level depth. Therefore the potential for the lead-contaminated groundwater migrating into other parts of the construction area is high especially during dewatering. Groundwater should be contained, sampled, and analyzed for arsenic to discharge or dispose of the water.

Groundwater from the PPCA should be continuously monitored (sampled and analyzed for the contaminant of concern) and the contaminated groundwater encountered during construction activities should be contained, properly handled and disposed in accordance with appropriate Federal, State, and Local requirements and guidelines and the City of Houston's Section 02136 – Waste Material Handling, Testing and Disposal of the City of Houston Department of Public Works and Engineering Infrastructure Design Manual (COH Section 02136; refer to Appendix G). Until proven otherwise the person responsible for the environmental monitoring should verify and document that contamination does not exist outside of the PPCA.

At each of the PPCAs, runoff into or from the construction site or into areas adjacent to the construction site could be potentially contaminated by contaminants from the adjacent pavement,

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

ground surfaces, or from excavated materials from the anticipated contaminated soil strata stockpiled or stored on the adjacent surfaces. All excavated materials from the anticipated PPCA stratas should be contained at all times and a barrier to prevent runoff from entering or leaving the construction site is also recommended.

Workers and the general public should be protected during construction at each of the PPCAs. Of concern is accidental ingestion of contaminated soil and groundwater, inhalation of suspended contaminated soil and groundwater particles, and absorption of contaminants through the skin or eyes. A qualified environmental firm and toxicologist should be hired during the planning of and performance of the construction activities to develop an health and safety plan to among other things determine if PPE is needed and if so what types and a plan for waste material containment during excavation, handling, testing, and disposal practices. The COH Section 02136 should be followed during construction (refer to Appendix G). The construction contractor, environmental firm, and toxicologist should follow the most stringent of Occupational Safety Health Administration (OSHA) standards; and Federal, State, and Local regulations and guidelines.

The construction contractor shall be responsible for following the above guidelines, all Federal, State, and Local regulations and guidelines, and the COH Section 02136 (refer to Appendix G). The construction contractor should follow the most stringent of any conflicting guidelines while performing all construction activities. AEC recommends that the construction contractor provide to the COH the name and qualifications of the environmental firm and toxicologist selected, and provide a submittal to the COH describing how the contractor, environmental firm, and toxicologist will handle the environmental problems and situations.

### **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 Antoine Forest area and the water line alignment; and the results of the limited ESA- II investigation. This report documents the concentrations of petroleum products and metals detected in the respective soil samples and groundwater sample collected and analyzed during the limited ESA-II investigation near the two RECs identified in the ESA-I report. There is a possibility that soil and/or groundwater contaminated by hazardous substances, petroleum products, or metals 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.

In this report, two PPCAs were identified based on laboratory results of one soil sample collected from each soil boring, one groundwater sample collected from a temporary monitor well installed at PPCA #2, COH guidelines and specifications, and the environmental professional's judgment. Because of these limitations, AEC cannot guarantee the accuracy of the PPCA delineation and it is possible that contamination might be found outside the limits of the PPCA. AEC also cannot guarantee that the depths to the top and base of the clay or the groundwater-bearing sand which define the PPCA at borings B-3 and B-4 will be encountered at the same depth throughout the PPCA.

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
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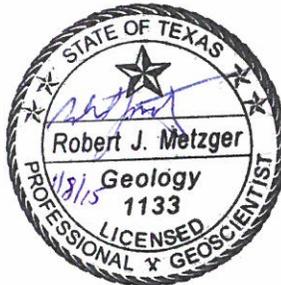
This investigation was performed using the standard level of care and diligence normally practiced by recognized professional environmental and engineering firms in this area, presently performing similar services under similar circumstances. This report has been prepared specifically to investigate potential contamination of the Subject Right-of-Way near the two RECs 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 H.



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



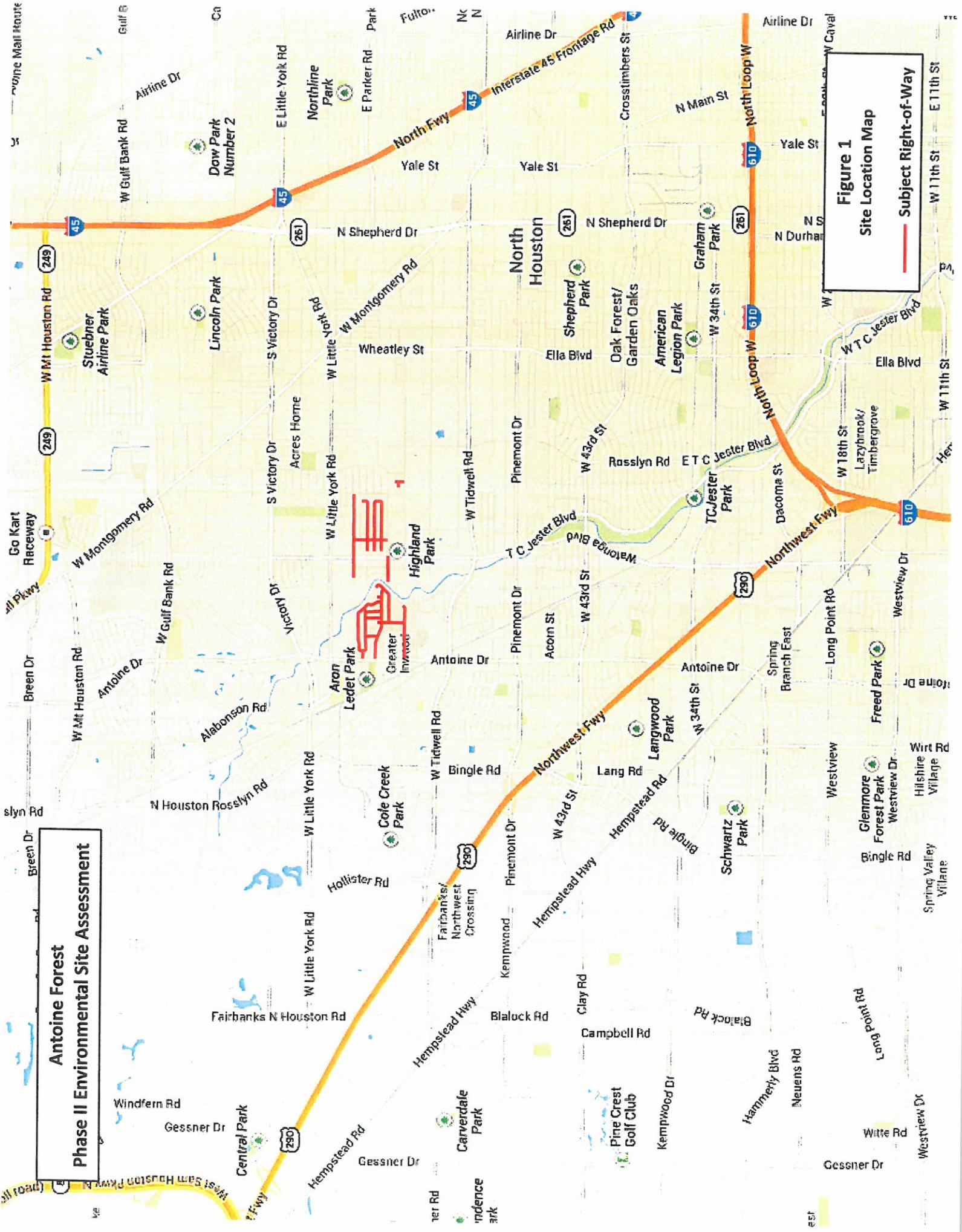
**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX A  
FIGURES**

**Antoine Forest  
Phase II Environmental Site Assessment**

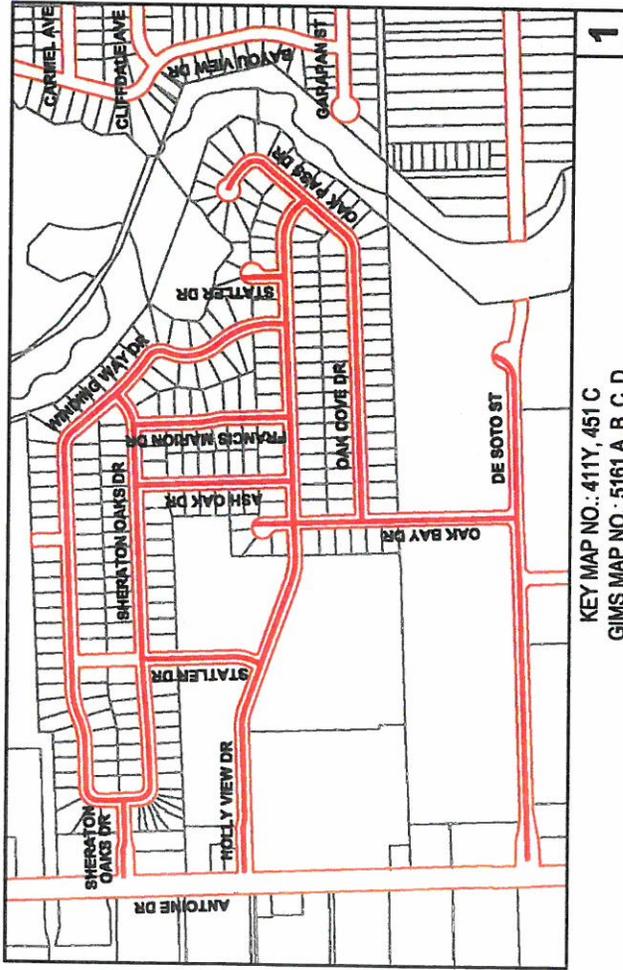
**Figure 1  
Site Location Map**

— Subject Right-of-Way



**Antoine Forest**  
**Phase II Environmental Site Assessment**

**DEPARTMENT OF PUBLIC WORKS AND ENGINEERING**  
**ENGINEERING & CONSTRUCTION DIVISION**



KEY MAP NO.: 411Y, 451 C  
 GIMS MAP NO.: 5161 A, B, C, D  
 COUNCIL DISTRICT - A



KEY MAP NO.: 411 Z, 412 W, 452 A  
 GIMS MAP NO.: 5161 B, D & 5261 A  
 COUNCIL DISTRICT - B

STREET	ADDRESS	START	END	Existing Water Line Size (inch)	Proposed Water Line Size (inch)	Length (feet)
<b>Water Line Replacement in Antoine Forest Area</b> WBS No.: S-000035-0196-3 Key Map No's. 411 Y, Z, 412 W, 451 C, 452 A						
<b>COUNCIL DISTRICT B</b>						
Winding Wy	5200 - 5699	Sheraton Oaks	Holly View	6	8	3,100
Sheraton Oaks	5400 - 5699	Antoine	PVC W/L S of Sheraton Oaks	4,6	8	2,460
Staller		Holly View		8	8	830
Ash Oak	6200 - 6399	Sheraton Oaks	Holly View	6	8	720
Francis Marion	6200 - 6399	Sheraton Oaks	Holly View	4	6	720
Holly View	5200 - 5699	Antoine	Oak Pass	8	8	3,230
Holly View Ct	6200 - 6299	Holly View	END (north)	6	8	150
Oak Bay	6000 - 6299	De Soto	END (north)	8	8	1,150
Oak Cove	5300 - 5499	Oak Bay	Oak Pass	8	8	1,300
Oak Pass	6100 - 6299	Oak Cove	END (north)	8,6	8,6	800
De Soto	5300 - 5699	Antoine	END (east)	8	8	2,400
Areba	2400 - 3599	END (west of T.C. Jester)	Goldspier	2,6	8	3,750
Cliffdale	2600 - 3299	END (west)	Carmel	6	8	2,300
Daleview	2600 - 3299	END (west)	Druid	6	8	2,300
Druid	2600 - 3299	END (west)	Daleview	6	8	2,300
Goldspier	6700 - 6799	Areba	Mayview	8	8	300
Yorkdale	6700 - 6799	Areba	Gannan	8	8	1,560
Garapan	3400 - 3599	END (west)	T.C. Jester	8	8	1,000
Roland	6200 - 6299	De Soto	END (north)	2,6	8,6	400
Homer Dr	6200 - 6299	Roland	END (west)	2	4,6	300

31,070

**PROJECT LOCATION MAP**

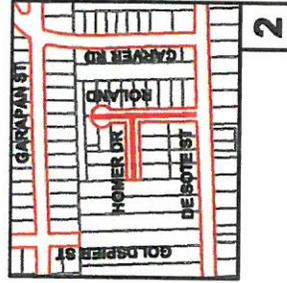
WATER LINE REPLACEMENT IN  
 ANTOINE FOREST AREA  
 WBS:S-000035-0196-3

**EXHIBIT 'B'**

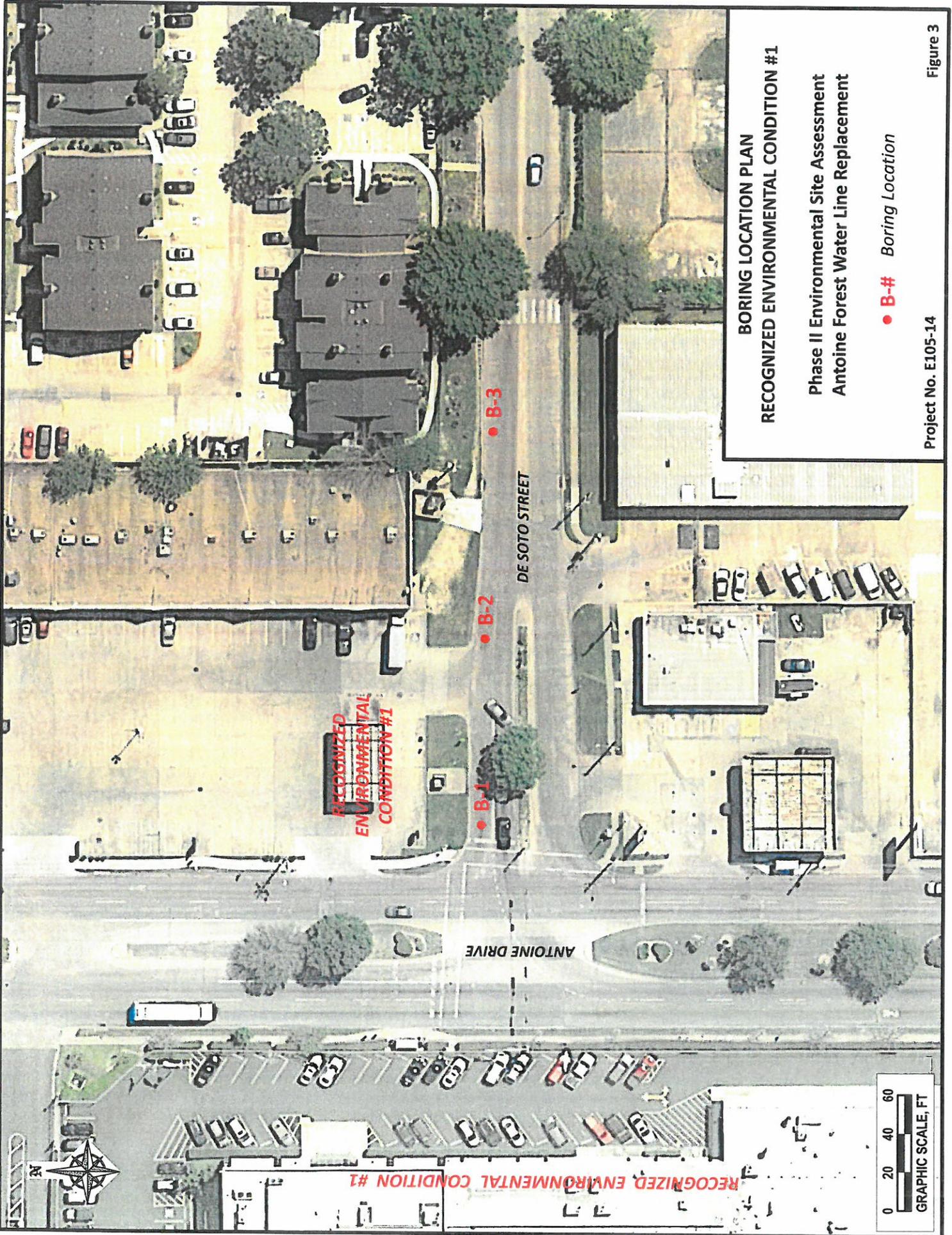


**Texas American Engineering**

881 N. Sam Houston Parkway East  
 Houston, Texas 77060  
 Phone (281) 270-7000  
 FAX (281) 270-0000



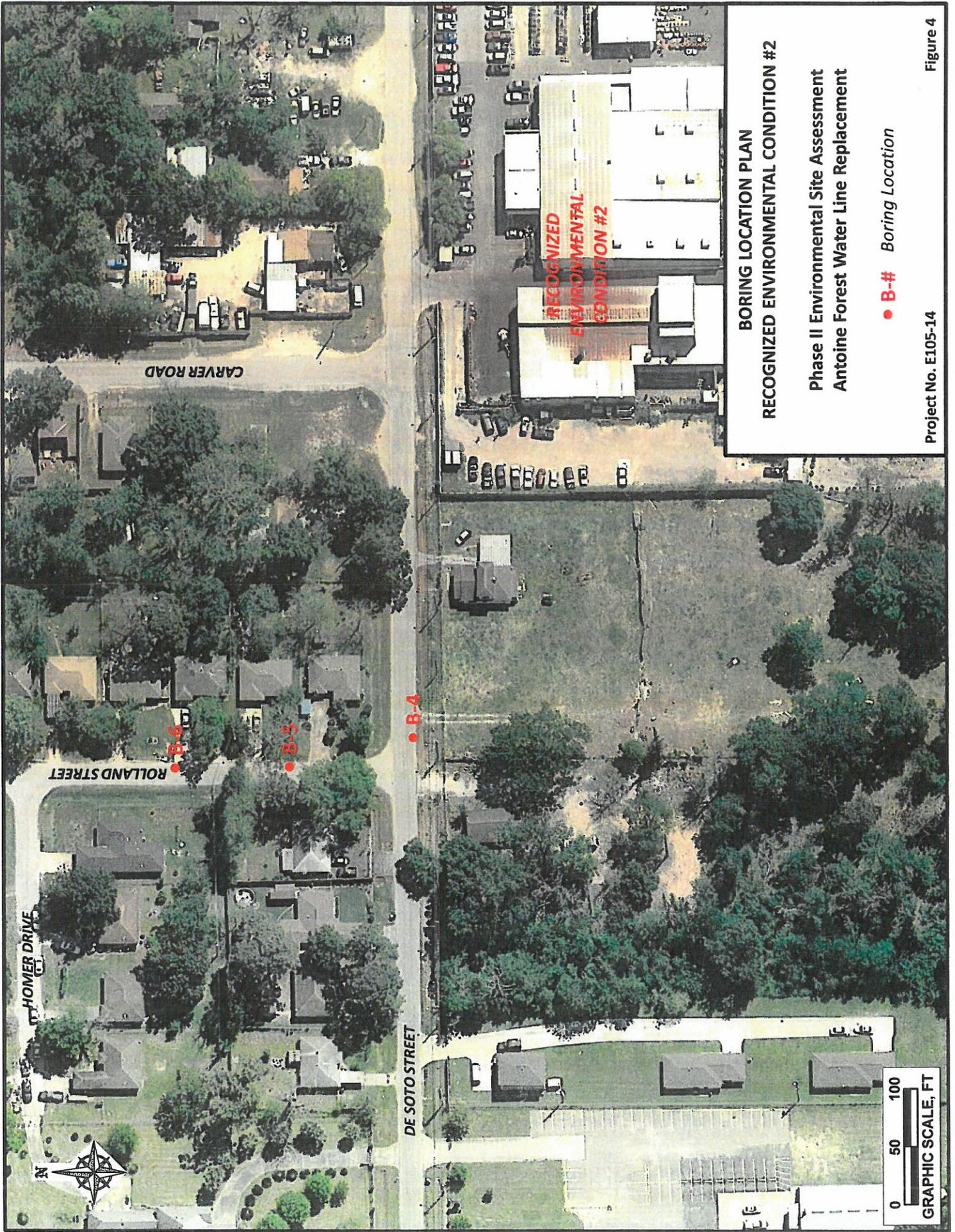
**Figure 2**



**BORING LOCATION PLAN**  
**RECOGNIZED ENVIRONMENTAL CONDITION #1**  
 Phase II Environmental Site Assessment  
 Antoine Forest Water Line Replacement  
 ● B-# Boring Location

Project No. E105-14

Figure 3





**BENCHMARK:**  
 1. THE BENCHMARK IS THE CORNER OF THE LOT 100' X 100' PLAT IN THE 1911 PLAT OF THE CITY OF HOUSTON, TEXAS, AS SHOWN ON THE CITY RECORDS. THE BENCHMARK IS A 1/2" IR. W/ CAP AT LESSON ST. AND SET 1/2" IR. W/ CAP AT LESSON ST. AND ROLLAND ST. INTERSECTION. ELEVATION 81.29 FEET D. B. STA. 1+16.12 OFFSET: 22.00' LT.

**LEGEND:**  
 PROPOSED P.P.C.A. (Red cloud)  
 \*NOTE: LOCATION IS APPROXIMATE; SEE TEXT FOR DETAILS.  
 PROPOSED NJ WATER LINE (Zzzzzzz)  
 PROPOSED RJ DP WATER LINE (Dashed line)  
 CRITICAL LOCATE AS PER STD SPEC 02317 (Circle with cross)  
 APPROXIMATE LOCATION OF PROPERTY AS PER CON STD DETAILS. (Circle)

**NOTICE:**  
 FOR YOUR SAFETY, YOU ARE REQUESTED BY THIS LINE TO CALL THE UTILITY LOCATOR TO LOCATE ALL UTILITIES PRIOR TO ANY CONSTRUCTION. YOU WILL BE RESPONSIBLE FOR OBTAINING YOUR OWN INFORMATION TO VERIFY THE LOCATION OF ALL UTILITIES. YOU WILL BE RESPONSIBLE FOR OBTAINING YOUR OWN INFORMATION TO VERIFY THE LOCATION OF ALL UTILITIES.

**VERIFICATION OF PRIVATE UTILITY LINES**  
 The Engineer/Designer/Verifier shall verify the location of all private utility lines shown on this plan. The Engineer/Designer/Verifier shall verify the location of all private utility lines shown on this plan. The Engineer/Designer/Verifier shall verify the location of all private utility lines shown on this plan.

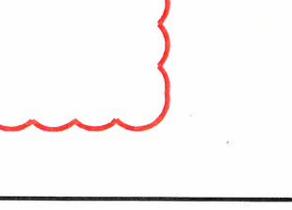
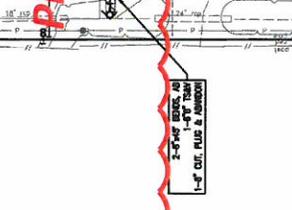
**APPROVED BY:** ALBERT TAMAYO/CHET ENGINEERING, INC.  
 STATE OF TEXAS  
 PROFESSIONAL ENGINEER  
 LICENSE NO. 10000

**DATE:** 08/14/2024  
**PROJECT:** PHASE II ENVIRONMENTAL SITE ASSESSMENT  
**LOCATION:** ANTONIO FOREST REPLACEMENT WATER LINE REPLACEMENT IN ANTONIO FOREST AREA

**SCALE:**  
 vert. 1" = 4'  
 horiz. 1" = 40'

**CITY OF HOUSTON**  
 DEPARTMENT OF PUBLIC WORKS AND ENGINEERING  
 WATER LINE REPLACEMENT IN ANTONIO FOREST AREA

**Phase II Environmental Site Assessment**  
**Antonio Forest Water Line Replacement**  
**Figure 6**



**PPCA #2**  
 STA. 0+00 TO STA. 2+74\*

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX B  
PHOTOGRAPHS**

Phase II Environmental Site Assessment  
Water Line Replacement in Antoine Forest Area, Houston, Texas



**Photograph 1:** View to the northwest of drilling of boring B-2 on De Soto Street near Antoine Drive (between the gas station canopy and the row of trees in upper left of photo). REC #1 is the background.



**Photograph 2:** View to the southeast of drilling of boring B-4 on De Soto Street. REC #2 is visible at the left side of the photograph.

Phase II Environmental Site Assessment  
Water Line Replacement in Antoine Forest Area, Houston, Texas



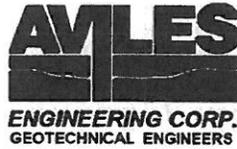
**Photograph 3:** View to the south along Rolland Street of drilling of boring B-5.



**Photograph 4:** View to the east of installation of temporary monitor well at the B-4 location on De Soto Street.

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX C  
SOIL BORING LOGS**



PROJECT: Antoine Forest, ESA II

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: 7" concrete		0
2		41	30		Sandy Clay (CL), gray - damp 0.6'-1' - gray and orange-brown, with vertical and horizontal sand partings 1'-4'	0.0	2
4					Clay w/Sand (CH), light gray, red-brown and orange-brown, with sand partings and pockets	0.0	4
6		48	47			0.0	6
8						0.0	8
10		48	45		Sandy Clay (CL), light gray and orange-brown, with sand pockets and seams	0.0	10
12		12	12		Clayey Sand (SC), orange-brown and light gray	0.0	12
14					Termination depth = 13 feet.		14
16							16
18							18

BORING DRILLED TO 13 FEET WITHOUT DRILLING FLUID  
 WATER ENCOUNTERED AT (dry) FEET WHILE DRILLING  $\nabla$   
 WATER LEVEL AT (dry) FEET AFTER 1/2 HOUR  $\nabla$   
 DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E105-14



PROJECT: Antoine Forest, 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: 7" concrete		0
2		41	41		Sandy Clay (CL), gray and orange-brown, with vertical and horizontal sand partings, and sand pockets - with ferrous stains 2'-3' - gray and red-brown 3'-7'	0.0	2
4						0.0	4
6		46	48			0.0	6
8					Clay (CH), light gray and red-brown, with sand pockets and ferrous stains	0.0	8
10		45.5	48		Clay (CH), light gray and red-brown, with sand partings, and ferrous stains and nodules	0.0	10
12		12	12		Clay (CH), light gray, soft, damp	0.0	12
14					Termination depth = 13 feet.		14
16							16
18							18

BORING DRILLED TO 13 FEET WITHOUT DRILLING FLUID  
 WATER ENCOUNTERED AT (dry) FEET WHILE DRILLING   
 WATER LEVEL AT (dry) FEET AFTER 1 HOUR   
 DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E105-14



PROJECT: Antoine Forest, ESA II

ENGINEERING CORP.  
GEOTECHNICAL ENGINEERS

BORING B-3

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: 7" concrete		0
2		42	41	42	Sandy Clay (CL), light gray and tan, with vertical and horizontal sand partings, and ferrous stains	0.0	2
4		42	48	42	Clay (CH), light gray and red-brown, with vertical and horizontal sand partings, and ferrous stains	0.0	4
6		42	48	42	- with slickensides 7'-8'	0.0	6
8		42	48	42	Clay (CH), red-brown and light gray, with slickensides - with occasional 1" soft clay zones	0.0	8
10		42	48	46		0.0	10
12		42	48	24	Clay (CH), red-brown and light gray, with calcareous nodules	0.0	12
14		42	48	24	Termination depth = 14 feet.	0.0	14
16							16
18							18

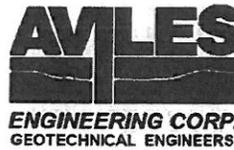
BORING DRILLED TO 14 FEET WITHOUT DRILLING FLUID

WATER ENCOUNTERED AT (dry) FEET WHILE DRILLING

WATER LEVEL AT (dry) FEET AFTER 2 HOURS

DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E105-14



PROJECT: Antoine Forest, ESA II

BORING B-5

DATE 10/17/14

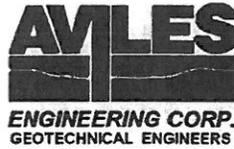
TYPE Direct Push

LOCATION See Site Plan, Figure 4

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
0					Pavement: 4" asphalt + 8" gravel base		0
2					Sandy Silt (ML), brown, with roots	0.0	2
4		36	33		Sandy Clay (CL), gray and brown - with roots 2'-8'	0.0	4
6		48	46		- with vertical and horizontal sand partings, and sand pockets 4'-11'	0.0	6
8		48	46		- gray and orange-brown 7'-11'	0.0	8
10		48	46			0.0	10
12		24	24		Sandy Clay (CL), gray and orange-brown, with sand seams	0.0	12
14					Sand (SM), light gray - wet at 12'	0.0	14
14					Termination depth = 14 feet.	0.0	14
16					**Note: borehole caved-in at 8.25' after 1/4 hour.		16
18							18

BORING DRILLED TO 14 FEET WITHOUT DRILLING FLUID  
 WATER ENCOUNTERED AT 12.0 FEET WHILE DRILLING   
 WATER LEVEL AT \*\* FEET AFTER 1/4 HOUR   
 DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E105-14



PROJECT: Antoine Forest, ESA II

BORING B-6

DATE 10/17/14

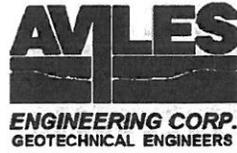
TYPE Direct Push

LOCATION See Site Plan, Figure 4

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
0					Pavement: 4" asphalt		0
2		44	30		Sand (SM), gray and brown, fine-grained, with roots	0.0	2
4					Sandy Clay (CL), gray, brown and orange-brown - with vertical and horizontal sand partings 4'-10.6'	0.0	4
6		48	46			0.0	6
8						0.0	8
10		48	45.5			0.0	10
12					Sand (SM), gray, fine-grained, damp - wet at 11.1'	0.0	12
14		24	24			0.0	14
16					Termination depth = 14 feet.		16
18					**Note: borehole caved-in at 3.5' after 1/4 hour.		18

BORING DRILLED TO 14 FEET WITHOUT DRILLING FLUID  
 WATER ENCOUNTERED AT 11.1 FEET WHILE DRILLING   
 WATER LEVEL AT \*\* FEET AFTER 1/4 HOUR   
 DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E105-14



PROJECT: Antoine Forest, ESA II

BORING B-4

DATE 10/20/14

TYPE Direct Push

LOCATION See Site Plan, Figure 4

DEPTH IN FEET	SYMBOL	PUSHED INTERVAL (IN.)	PUSH RECOVERY (IN.)	SAMPLE INTERVAL	SOIL DESCRIPTION	P.I.D. READING	DEPTH IN FEET
0					Pavement: 2" asphalt + 4" gravel base		0
					Clay (CL), dark gray (no sample; determined from observation of borehole sidewall)		
					Sandy Clay (CL), light tan, with sand partings and calcareous nodules	0.0	
2		36	32			0.0	2
						0.0	
4					Sandy Clay (CL), tan and gray, with ferrous stains	0.0	4
						0.0	
6		48	45		- with vertical and horizontal sand partings 6'-8'	0.0	6
						0.0	
8						0.0	8
						0.0	
10		48	44		Sand (SM), light brown, fine-grained, wet	0.0	10
						0.0	
12		12	12			0.0	12
						0.0	
14					Termination depth = 13 feet.		14
16							16
18							18
20							20

BORING DRILLED TO 13 FEET WITHOUT DRILLING FLUID  
 WATER ENCOUNTERED AT 9.7 FEET WHILE DRILLING   
 WATER LEVEL AT 7.52 FEET AFTER 3 HOURS   
 DRILLED BY Envirotech CHECKED BY RJM LOGGED BY RJM

PROJECT NO. E105-14

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX D**

**SUMMARY OF LABORATORY SAMPLE ANALYSIS RESULTS**

**Limited Phase II Environmental Site Assessment  
Water Line Replacement in Antoine Forest Area  
WBS No. S-000035-0196-3**

**TABLE 2  
Total Metals Concentrations in Soil Samples  
CONTAMINANT CONCENTRATIONS IN SOIL SAMPLES**

SOIL BORING <sup>1</sup>	Sample Interval (feet below pavement surface)	Total Arsenic mg/kg <sup>2</sup>	Total Barium mg/kg	Total Cadmium mg/kg	Total Chromium mg/kg	Total Copper mg/kg	Total Lead mg/kg	Total Manganese mg/kg	Total Mercury mg/kg	Total Nickel mg/kg	Total Selenium mg/kg	Total Silver mg/kg	Total Zinc mg/kg
B-1 (REC#1)	12 to 13	0.920	19.5	U <sup>3</sup> , <0.046	4.14	1.84	2.07	NR	U, <0.005	NR	U, <0.115	U, <0.023	5.86
B-2 (REC#1)	12 to 13	1.44	65.2	U, <0.048	7.46	3.61	5.90	NR	U, <0.005	NR	U, <0.120	U, <0.024	7.82
B-3 (REC#1)	13 to 14	6.62	168	U, <0.048	19.9	18.7	11.8	NR	U, <0.005	NR	U, <0.120	U, <0.024	54.4
B-4 (REC#2)	9 to 10	0.566	161	U, <0.045	3.74	0.906	3.51	5.78	U, <0.005	1.47	U, <0.113	U, <0.023	NR
B-5 (REC#2)	11 to 12	0.314	13.8	U, <0.046	2.20	0.465	2.76	12.5	U, <0.005	0.929	U, <0.116	U, <0.023	NR
B-6 (REC#2)	10 to 11	0.286	14.5	U, <0.046	3.52	0.686	3.34	19.6	U, <0.005	1.37	U, <0.114	U, <0.023	NR
TCEQ TRRP Tier-1 Residential Soil PCLs <sup>4</sup> <sup>OW</sup> Soil <sub>mg</sub> 0.5-Acre Source Area, 11/12/2014		5.0	440	1.5	2,400	1,000	3.0	3,400	0.0078	160	2.3	0.48	2,400
Texas - Specific Soil Background Concentrations		5.9	300	Not Applicable	30	15	15	300	0.04	10	0.3	Not Applicable	30

NR = Analysis not required

<sup>1</sup>Refer to Boring Location Plan, Figures 3 and 4

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

<sup>3</sup>U = Undetected at laboratory detection limit shown.

<sup>4</sup>TCEQ TRRP Tier-1 Residential Soil PCLs = Texas Commission on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Soil Protective Concentration Levels

Limited Phase II Environmental Site Assessment  
 Water Line Replacement in Antoine Forest Area  
 WBS No. S-000035-0196-3

TABLE 3

Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX), Methyl Tertiary Butyl Ether (MTBE), and Total Petroleum Hydrocarbons (TPH) Concentrations in Soil Samples from Borings B-1 through B-6

SOIL BORING <sup>1</sup>	Sample Interval, feet below ground 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 (REC#1)	12 to 13	U <sup>3</sup> , <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.002	U, <0.001	U, <27.2	U, <23.3	U, <20.3
B-2 (REC#1)	12 to 13	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.002	U, <0.001	U, <28.5	U, <24.4	U, <21.3
B-3 (REC#1)	13 to 14	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.002	U, <0.001	U, <28.5	U, <24.4	U, <21.3
B-4 (REC#2)	9 to 10	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.002	U, <0.001	U, <26.8	U, <23	U, <20
B-5 (REC#2)	11 to 12	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.002	U, <0.001	U, <27.5	U, <23.6	U, <20.6
B-6 (REC#2)	10 to 11	U, <0.001	U, <0.001	U, <0.006	U, <0.006	U, <0.002	U, <0.002	U, <0.001	U, <27.1	U, <23.2	U, <20.3
TCEQ TRRP Tier-1 Residential Soil PCLs <sup>4</sup> <small>gw</small> Soil <sub>mg</sub> 0.5-Acre Source Area, 11/12/2014		0.026	8.2	7.6	110/150	71	120	0.62	65	200	200

<sup>1</sup>Refer to Boring Location Maps in Figures 3 and 4

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

<sup>3</sup>U = Undetected at laboratory detection limit shown.

<sup>4</sup>TCEQ TRRP Tier-1 Residential Soil PCLs = Texas Commission on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Soil Protective Concentration Levels

**Limited Phase II Environmental Site Assessment  
Water Line Replacement in Antioine Forest Area  
WBS No. S-000035-0196-3**

**TABLE 4  
Total Metals Concentrations in Groundwater Sample  
From Temporary Monitor Well B-4**

SOIL BORING/ TEMPORARY WELL <sup>1</sup>	Measured Depth to Groundwater (feet below pavement surface)	CONTAMINANT CONCENTRATIONS IN GROUNDWATER SAMPLE										
		Total Arsenic mg/L <sup>2</sup>	Total Barium mg/L	Total Cadmium mg/L	Total Chromium mg/L	Total Copper mg/L	Total Lead mg/L	Total Manganese mg/L	Total Mercury mg/L	Total Nickel mg/L	Total Selenium mg/L	Total Silver mg/L
B-4 (REC#2)	7.52	U <sup>3</sup> , <0.004	0.296	U, <0.002	0.035	0.017	0.026	0.241	U, <0.00006	0.01	U, <0.004	U, <0.001
TCEQ TRRP Tier-1 Residential Groundwater PCLs <sup>4</sup> GW <sub>ing</sub> 0.5-Acre Source Area, 11/12/2014		0.01	2.0	0.005	0.1	1.3	0.015	3.4	0.002	0.49	0.05	0.12

<sup>1</sup> Refer to Boring Location Plan, Figure 4

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

<sup>3</sup> U = Undetected at laboratory detection limit shown.

<sup>4</sup> TCEQ TRRP Tier-1 Residential Groundwater PCLs = Texas Commission on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Groundwater Protective Concentration Levels

Limited Phase II Environmental Site Assessment  
 Water Line Replacement in Antioine Forest Area  
 WBS No. S-000035-0196-3

TABLE 5  
 Benzene, Toluene, Ethylbenzene and Total Xylenes (BTEX), Methyl Tertiary Butyl Ether (MTBE), and Total Petroleum Hydrocarbons (TPH) Concentrations in Groundwater Sample from Temporary Monitor Well B-4

		CONTAMINANT CONCENTRATIONS IN GROUNDWATER SAMPLE									
SOIL BORING/TEMPORARY WELL <sup>1</sup>	Measured Depth to Groundwater, (feet below pavement surface)	BENZENE mg/L <sup>2</sup>	TOLUENE mg/L	ETHYL-BENZENE mg/L	m- & p- Xylenes mg/L	o- Xylenes mg/L	TOTAL XYLENES mg/L	MTBE mg/L	TPH C6-C12 mg/L	TPH >C12-C28 mg/L	TPH >C28-C35 mg/L
B-4	7.52	U <sup>3</sup> , <0.0008	U <sup>3</sup> , <0.001	U <sup>3</sup> , <0.0008	U <sup>3</sup> , <0.002	U <sup>3</sup> , <0.001	U <sup>3</sup> , <0.003	U <sup>3</sup> , <0.001	U, <0.596	U, <0.777	U, <0.677
TCEQ TRRP Tier-1 Residential Groundwater PCLs <sup>4</sup> GW <sub>ing</sub> 11/12/14		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, Figure 4

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

<sup>3</sup> U = Undetected at laboratory detection limit shown.

<sup>4</sup>TCEQ TRRP Tier-1 Residential Groundwater PCLs = Texas Commission on Environmental Quality Texas Risk Reduction Program Tier-1 Residential Groundwater Protective Concentration Levels

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX E**

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

AMENDED  
Laboratory Analysis Report

Total Number of Pages: 31

Job ID : 14101083



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

Client Project Name :  
E105-14 / Antoine Forest / Houston

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

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

Client Sample ID	Matrix	A&B Sample ID
B-1 12-13'	Soil	14101083.01
B-2 12-13'	Soil	14101083.02
B-3 13-14'	Soil	14101083.03

*Shantall Carpenter*

Released By: Shantall Carpenter  
Title: Senior Project Manager  
Date: 11/24/2014



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.

Amended to include additional metals.

Date Received : 10/20/2014 16:54

## LABORATORY TERM AND QUALIFIER DEFINITION REPORT



Job ID : 14101083

Date: 11/24/2014

### 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

M2	Matrix Spike and/or Matrix Spike Duplicate recovery is below laboratory control limits due to matrix interference.
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.
U	Undetected at SDL (Sample Detection Limit).



LABORATORY TEST RESULTS

Client Sample ID: B-1 12-13'
A&B Job Sample ID: 14101083.01

Date: 11/24/2014

Client Name: Aviles Engineering
Project Name: E105-14 / Antoine Forest / Houston

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 10:28
Date Received: 10/20/2014 16:54
Date Prepared: 10/22/2014 17:10
% Moisture: 13

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Row 1: % Moisture1, 13, ---, ---, %, 1, 10/22/14 17:11



LABORATORY TEST RESULTS

Client Sample ID: B-1 12-13'
A&B Job Sample ID: 14101083.01

Date: 11/24/2014

Client Name: Aviles Engineering
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: Total Recoverable Metals

Sample Matrix: Soil
Date Collected: 10/20/2014 10:28
Date Received: 10/20/2014 16:54
Date Prepared: 10/21/2014 15:56

Analytical Method: SW-846 6010C
QC Batch ID: Qb14102342
Prep Method: SW-846 3050B
Prepared By: Eperez
Prep Batch ID: PB14102323

Analyst Initial: GG

% Moisture: 13

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Selenium, Silver, and Zinc.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-1 12-13'  
A&B Job Sample ID: 14101083.01

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Metals - Mercury**  
Analytical Method: SW-846 7470A  
QC Batch ID: Qb14102278  
Prep Method: SW-846 7470A  
Prepared By: Eperez  
Prep Batch ID: PB14102258  
Analyst Initial: SRG

Sample Matrix: Soil  
Date Collected: 10/20/2014 10:28  
Date Received: 10/20/2014 16:54  
Date Prepared: 10/22/2014 12:29

% Moisture: 13

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MLQ	UQL	Units	DF	Date/Time
7439-97-6	Mercury	< 0.005	U	0.005	0.005	0.004	0.004	0.2	mg/Kg	1	10/22/14 16:58

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-1 12-13'  
 A&B Job Sample ID: 14101083.01

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

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 10:28  
 Date Received: 10/20/2014 16:54  
 Date Prepared: 10/21/2014 11:00

Analyst Initial: SRB

% Moisture: 13

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	1.01	10/21/14 12:36
71-43-2	Benzene	< 0.001	Q18,U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.01	10/21/14 12:36
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.01	10/21/14 12:36
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	1.01	10/21/14 12:36
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.012	0.005	0.01	0.8	mg/Kg	1.01	10/21/14 12:36
95-47-6	o-Xylene	< 0.002	U	0.002	0.006	0.002	0.005	0.4	mg/Kg	1.01	10/21/14 12:36
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	1.01	10/21/14 12:36
98-08-8	Trifluorotoluene(surr)	98.5					81	111	%	1.01	10/21/14 12:36

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-1 12-13'  
 A&B Job Sample ID: 14101083.01

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**  
 Analytical Method: TX 1005  
 QC Batch ID: Qb14102218  
 Prep Method: TX 1005  
 Prepared By: AVBembde  
 Prep Batch ID: PB14102216  
 Analyst Initial: AVB

Sample Matrix: Soil  
 Date Collected: 10/20/2014 10:28  
 Date Received: 10/20/2014 16:54  
 Date Prepared: 10/21/2014 16:30

% Moisture: 13

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 27.2	Q18,U	27.2	28.7	23.7	25	1000	mg/Kg	1	10/22/14 01:45
TPH-1005-2	>C12-C28 <sup>1</sup>	< 23.3	U	23.3	28.7	20.3	25	1000	mg/Kg	1	10/22/14 01:45
TPH-1005-4	>C28-C35 <sup>1</sup>	< 20.3	U	20.3	28.7	17.7	25	1000	mg/Kg	1	10/22/14 01:45
	Total C6-C35	<					----	----	mg/Kg	1	10/22/14 01:45
111-85-3	1-Chlorooctane(surr)	107					60	143	%	1	10/22/14 01:45
3386-33-2	Chlorooctadecane(sur)	103					60	150	%	1	10/22/14 01:45

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 12-13'  
A&B Job Sample ID: 14101083.02

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description:	<b>% Moisture</b>	Sample Matrix	Soil
Analytical Method:	SM 2540G	Date Collected	10/20/2014 09:37
QC Batch ID:	Qb14102276	Date Received	10/20/2014 16:54
Prep Method:	SM 2540G	Date Prepared	10/22/2014 17:10
Prepared By:	MMaldonado		
Prep Batch ID	PB14102256		
Analyst Initial	MAM	% Moisture	16.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	ML	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	16.9					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 12-13'
A&B Job Sample ID: 14101083.02

Date: 11/24/2014

Client Name: Aviles Engineering
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: Total Recoverable Metals

Sample Matrix: Soil

Analytical Method: SW-846 6010C

Date Collected: 10/20/2014 09:37

QC Batch ID: Qb14102342

Date Received: 10/20/2014 16:54

Prep Method: SW-846 3050B

Date Prepared: 10/21/2014 15:56

Prepared By: Eperez

Prep Batch ID: PB14102323

Analyst Initial: GG

% Moisture: 16.9

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include Arsenic, Barium, Cadmium, Chromium, Copper, Lead, Selenium, Silver, and Zinc.

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-2 12-13'  
A&B Job Sample ID: 14101083.02

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Metals - Mercury**  
Analytical Method: SW-846 7470A  
QC Batch ID: Qb14102278  
Prep Method: SW-846 7470A  
Prepared By: Eperez  
Prep Batch ID: PB14102258  
Analyst Initial: SRG

Sample Matrix: Soil  
Date Collected: 10/20/2014 09:37  
Date Received: 10/20/2014 16:54  
Date Prepared: 10/22/2014 12:29

% Moisture: 16.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MLL	UQL	Units	DF	Date/Time
7439-97-6	Mercury	< 0.005	U	0.005	0.005	0.004	0.004	0.2	mg/Kg	1	10/22/14 17:01

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-2 12-13'  
 A&B Job Sample ID: 14101083.02

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description:	<b>Purgeable Aromatics</b>	Sample Matrix	Soil
Analytical Method:	SW-846 8021B	Date Collected	10/20/2014 09:37
QC Batch ID:	Qb14102223	Date Received	10/20/2014 16:54
Prep Method:	SW-846 5035A	Date Prepared	10/21/2014 11:00
Prepared By:	SBojja		
Prep Batch ID	PB14102217		
Analyst Initial	SRB	% Moisture	16.9

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	0.99	10/21/14 15:33
71-43-2	Benzene	< 0.001	Q18,U	0.001	0.006	0.001	0.005	0.4	mg/Kg	0.99	10/21/14 15:33
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	0.99	10/21/14 15:33
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	0.99	10/21/14 15:33
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.012	0.005	0.01	0.8	mg/Kg	0.99	10/21/14 15:33
95-47-6	o-Xylene	< 0.002	U	0.002	0.006	0.002	0.005	0.4	mg/Kg	0.99	10/21/14 15:33
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	0.99	10/21/14 15:33
98-08-8	Trifluorotoluene(surr) 94						81	111	%	0.99	10/21/14 15:33

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-2 12-13'  
 A&B Job Sample ID: 14101083.02

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**  
 Analytical Method: TX 1005  
 QC Batch ID: Qb14102218  
 Prep Method: TX 1005  
 Prepared By: AVBembde  
 Prep Batch ID: PB14102216  
 Analyst Initial: AVB

Sample Matrix: Soil  
 Date Collected: 10/20/2014 09:37  
 Date Received: 10/20/2014 16:54  
 Date Prepared: 10/21/2014 16:30

% Moisture: 16.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 28.5	Q18,U	28.5	30.1	23.7	25	1000	mg/Kg	1	10/22/14 02:08
TPH-1005-2	>C12-C28 <sup>1</sup>	< 24.4	U	24.4	30.1	20.3	25	1000	mg/Kg	1	10/22/14 02:08
TPH-1005-4	>C28-C35 <sup>1</sup>	< 21.3	U	21.3	30.1	17.7	25	1000	mg/Kg	1	10/22/14 02:08
	Total C6-C35	<					----	----	mg/Kg	1	10/22/14 02:08
111-85-3	1-Chlorooctane(surr)	87.8					60	143	%	1	10/22/14 02:08
3386-33-2	Chlorooctadecane(sur)	91.3					60	150	%	1	10/22/14 02:08

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 13-14'  
A&B Job Sample ID: 14101083.03

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

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 08:50  
Date Received: 10/20/2014 16:54  
Date Prepared: 10/22/2014 17:10

% Moisture: 16.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MLQ	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	16.9					----	----	%	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: 14101083.03

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Recoverable Metals**

Analytical Method: SW-846 6010C

QC Batch ID: Qb14102342

Prep Method: SW-846 3050B

Prepared By: Eperez

Prep Batch ID: PB14102323

Analyst Initial: GG

Sample Matrix: Soil

Date Collected: 10/20/2014 08:50

Date Received: 10/20/2014 16:54

Date Prepared: 10/21/2014 15:56

% Moisture: 16.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7440-38-2	Arsenic	6.62		0.120	0.602	0.1	0.5	1000	mg/Kg	1	10/22/14 19:41
7440-39-3	Barium	168		2.41	12	0.1	0.5	50	mg/Kg	20	10/22/14 19:48
7440-43-9	Cadmium	< 0.048	U	0.048	0.602	0.04	0.5	750	mg/Kg	1	10/22/14 19:41
7440-47-3	Chromium	19.9		0.120	0.602	0.1	0.5	1000	mg/Kg	1	10/22/14 19:41
7440-50-8	Copper	18.7		2.41	12	0.1	0.5	750	mg/Kg	20	10/22/14 19:48
7439-92-1	Lead	11.8		0.120	0.602	0.1	0.5	2500	mg/Kg	1	10/22/14 19:41
7782-49-2	Selenium	< 0.120	U	0.120	0.602	0.1	0.5	1000	mg/Kg	1	10/22/14 19:41
7440-22-4	Silver	< 0.024	U	0.024	0.602	0.02	0.5	100	mg/Kg	1	10/22/14 19:41
7440-66-6	Zinc	54.4		2.41	12	0.1	0.5	500	mg/Kg	20	10/22/14 19:48

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 13-14'  
A&B Job Sample ID: 14101083.03

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description:	<b>Total Metals - Mercury</b>	Sample Matrix	Soil
Analytical Method:	SW-846 7470A	Date Collected	10/20/2014 08:50
QC Batch ID:	Qb14102278	Date Received	10/20/2014 16:54
Prep Method:	SW-846 7470A	Date Prepared	10/22/2014 12:29
Prepared By:	Eperez		
Prep Batch ID	PB14102258		
Analyst Initial	SRG	% Moisture	16.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7439-97-6	Mercury	< 0.005	U	0.005	0.005	0.004	0.004	0.2	mg/Kg	1	10/22/14 17:04



**LABORATORY TEST RESULTS**

Client Sample ID: B-3 13-14'  
 A&B Job Sample ID: 14101083.03

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

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 08:50  
 Date Received: 10/20/2014 16:54  
 Date Prepared: 10/21/2014 11:00

Analyst Initial: SRB

% Moisture: 16.9

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	10/21/14 15:59
71-43-2	Benzene	< 0.001	Q18,U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1	10/21/14 15:59
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1	10/21/14 15:59
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	1	10/21/14 15:59
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.012	0.005	0.01	0.8	mg/Kg	1	10/21/14 15:59
95-47-6	o-Xylene	< 0.002	U	0.002	0.006	0.002	0.005	0.4	mg/Kg	1	10/21/14 15:59
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	1	10/21/14 15:59
98-08-8	Trifluorotoluene(surr)	95.5					81	111	%	1	10/21/14 15:59

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-3 13-14'
A&B Job Sample ID: 14101083.03

Date: 11/24/2014

Client Name: Aviles Engineering
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: Total Petroleum Hydrocarbons
Analytical Method: TX 1005
QC Batch ID: Qb14102218
Prep Method: TX 1005
Prepared By: AVBembde
Prep Batch ID: PB14102216
Analyst Initial: AVB

Sample Matrix: Soil
Date Collected: 10/20/2014 08:50
Date Received: 10/20/2014 16:54
Date Prepared: 10/21/2014 16:30

% Moisture: 16.9

Table with 12 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Rows include TPH-1005-1 (C6-C12), TPH-1005-2 (>C12-C28), TPH-1005-4 (>C28-C35), 111-85-3 (1-Chlorooctane), and 3386-33-2 (Chlorooctadecane).

Soil results reported on dry weight basis
1-Parameter not available for accreditation

QUALITY CONTROL CERTIFICATE



Job ID : 14101083

Date : 11/24/2014

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 : 14101083.01,02,03

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

QC Type: Method Blank								
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				

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	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	

QC Type: MS and MSD											
QC Sample ID: 14101112.01											
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 :** 14101083

**Date :** 11/24/2014

**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 :** 14101083.01,02,03

**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 : 14101083

Date : 11/24/2014

Analysis : Total Metals - Mercury Method : SW-846 7470A Reporting Units : mg/Kg

QC Batch ID : Qb14102278 Created Date : 10/22/14 Created By : SRGade

Samples in This QC Batch : 14101083.01,02,03

Digestion : PB14102258 Prep Method : SW-846 7470A Prep Date : 10/22/14 12:29 Prep By : Eperez

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
Mercury	7439-97-6	< MDL	mg/Kg	1	0.004	0.004	

**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
Mercury	0.1	0.0947	94.7	0.1	0.0945	94.5	0.2	20	80-120	

**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
Mercury	BRL	0.1	0.0991	98.4						70-130	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101083

**Date :** 11/24/2014

**Analysis :** Total Recoverable Metals      **Method :** SW-846 6010C      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb14102342      **Created Date :** 10/22/14      **Created By :** Ggorane

**Samples in This QC Batch :** 14101083.01,02,03

**Digestion :** PB14102323      **Prep Method :** SW-846 3050B      **Prep Date :** 10/21/14 15:56      **Prep By :** Eperez

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
Arsenic	7440-38-2	< MDL	mg/Kg	1	0.5	0.1		
Barium	7440-39-3	< MDL	mg/Kg	1	0.5	0.1		
Cadmium	7440-43-9	< MDL	mg/Kg	1	0.5	0.04		
Chromium	7440-47-3	< MDL	mg/Kg	1	0.5	0.1		
Copper	7440-50-8	< MDL	mg/Kg	1	0.5	0.1		
Lead	7439-92-1	< MDL	mg/Kg	1	0.5	0.1		
Selenium	7782-49-2	< MDL	mg/Kg	1	0.5	0.1		
Silver	7440-22-4	< MDL	mg/Kg	1	0.5	0.02		
Zinc	7440-66-6	< MDL	mg/Kg	1	0.5	0.1		

**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
Arsenic	25	22.7	90.8	25	22.7	90.7	0.0	20	80-120	
Barium	25	23.1	92.2	25	22.8	91.1	1.2	20	80-120	
Cadmium	25	22.3	89.4	25	22.3	89	0.4	20	80-120	
Chromium	25	24.0	96.1	25	24.0	95.8	0.3	20	80-120	
Copper	25	23.2990	93.2	25	23.1045	92.4	0.8	20	80-120	
Lead	25	22.5	90	25	22.4	89.7	0.4	20	80-120	
Selenium	25	21.4	85.7	25	21.4	85.4	0.4	20	80-120	
Silver	25	22.6	90.5	25	22.6	90.4	0.2	20	80-120	
Zinc	25	22.6308	90.5	25	22.4940	90	0.6	20	80-120	

**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
Arsenic	0.8	25	12.5	46.7						70-130	M2
Barium	17.0	25	29.5	50.3						70-130	M2
Cadmium	BRL	25	11.8	47.1						70-130	M2
Chromium	3.6	25	16.6	51.8						70-130	M2
Copper	1.6	25	14.4374	51.3						70-130	M2
Lead	1.8	25	12.3	41.8						70-130	M2
Selenium	BRL	25	9.6	38.5						70-130	M2
Silver	BRL	25	12.4	49.5						70-130	M2

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 14101083

Date : 11/24/2014

Analysis : Total Recoverable Metals Method : SW-846 6010C Reporting Units : mg/Kg

QC Batch ID : Qb14102342 Created Date : 10/22/14 Created By : Ggorane

Samples in This QC Batch : 14101083.01,02,03

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
Zinc	5.1	25	16.7266	46.5						70-130	M2

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 # 1410085  
Project # E105-14

Project Name/Location  
Antoine Forest / Houston

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

Sampler's Name & Company (PLEASE PRINT)  
Robert J. Metzger AEC

Sampler's Signature & Date  
RMJ 10/20/14

LAB USE ONLY	9. Sample ID and Description	10. Sampling		11, 12. Matrix									
		Date	Time 24 Hr	Comp	Grab	Water	Soil	Sludge	Oil	Drinking Water	Air	Other	
	<u>01A B-1 12-13'</u>	<u>10/20/14</u>	<u>10:28</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>						
	<u>02A B-2 12-13'</u>	<u>10/20/14</u>	<u>9:37</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>						
	<u>03A B-3 13-14'</u>	<u>10/20/14</u>	<u>8:50</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>						

Page

19. RELINQUISHED BY  
RMJ

DATE TIME RECEIVED BY  
10/20/14 16:54 RMJ

\*Containers: VOA - 40 ml vial  
4 oz/8 oz - glass wide mouth  
P/O - Plastic/other  
A/G - Amber/Glass 1 Liter

METHOD OF SHIPMENT

RENTAL SAMPLING P/U

INVOICE TO:

As-is box 1

Company: Articles Engineering Corp  
Address: 5790 Wilshire Houston, TX 77041  
Contact: Bob Metzger  
Phone: 281-793-8352  
Fax:   
E-mail:  rmetzger@articlesengineering.com

3. PO #

3a. A&B Quote #

4. Turnaround Time (Business Days)  
 1 Day\*  Other:  
 2 Days\*  Surcharge applies  
 3 Days\*  7 Days - Standard

13. No. of Containers	<u>403</u>	<u>407</u>	<u>403</u>
14. Containers*	<u>C</u>	<u>C</u>	<u>C</u>
15. Preservatives**			
16. PH-Lab Only			

17. Analyses/Methods  
TRP Metals  
GREX Metals

18. REMARKS

21. KNOWN HAZARDS/COMMENTS

00014 10054  
Temperature: 4.1+0.7=4.8 °C  
Thermometer ID 140539097  
Intact: Y or N Initials CC

A&B cannot accept verbal changes  
Please FAX written changes to 713-453-6091

Samples will be disposed of after 30 days

RENTAL

P/U

## additional requested analysis

Robert Metzger [rmetzger@avilesengineering.com]

**Sent:** Thursday, November 13, 2014 5:47 PM

**To:** Shantall Carpenter

**Importance:** High

Shantall,

To clarify my request, please run the following additional analysis:  
Please include this email of the requests in the lab report.

**Please analyze each** of the following soil and groundwater samples for manganese, copper, and nickel:

B-4; 9-10'

B-5; 11 to 12'

B-6; 10 to 11'

Groundwater sample from B-4

These samples were previously analyzed for BTEX, TPH, MTBE, RCRA metals in lab report 14101030.

**Also Please analyze each** of the following soil samples for zinc, and copper

B-1; 12 to 13'

B-2; 12 to 13'

B-3; 13 to 14'

These samples were previously analyzed for BTEX, MTBE, TPH, and RCRA metals in lab report 14101083.

I need these in a hurry but do not have money to do rush job. Can you turn around in 5 days at the 7day cost?

Thank you.

*Robert J. Metzger, P.G., CAPM  
Aviles Engineering Corporation  
5790 Windfern  
Houston, TX 77041  
Office: 713-895-7645  
Fax: 713-895-7943*

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## Sample Condition Checklist

A&B JobID : <b>14101083</b>	Date Received : <b>10/20/2014</b>	Time Received : <b>4:54PM</b>																										
Client Name : <b>Aviles Engineering</b>																												
Temperature : <b>4.1+0.7cf=4.8°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																										
<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="width: 10%;"><b>Matrix</b></td> <td style="width: 10%;"><b>Water</b></td> <td style="width: 10%;"><b>Soil</b></td> <td style="width: 10%;"><b>Liquid</b></td> <td style="width: 10%;"><b>Sludge</b></td> <td style="width: 10%;"><b>Solid</b></td> <td style="width: 10%;"><b>Cassette</b></td> <td style="width: 10%;"><b>Tube</b></td> <td style="width: 10%;"><b>Bulk</b></td> <td style="width: 10%;"><b>Badge</b></td> <td style="width: 10%;"><b>Food</b></td> <td style="width: 10%;"><b>Other</b></td> </tr> <tr> <td>:</td> <td style="text-align: center;"><input 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 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 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>																												
Cu & Zn analysis was added to all samples on a std 5bd tat per client instructions. AS 11/13/14																												

Received by : CCripe

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



## Laboratory Data Package Cover Page

This data package is for Job No. 14101083 and laboratory batch no(s).  
Qb14102218, Qb14102223, Qb14102276, Qb14102278, Qb14102342 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
Shantall Carpenter		Senior Project Manager	11/24/2014



### Laboratory Review Checklist: Reportable Data

Project Name: E105-14 / Antoine Forest / Houston

A&B Job ID: 14101083

Prep Batch Number(s): Qb14102218, Qb14102223, Qb14102276, Qb14102278, Qb14102342

Reviewed By: Scarpenter

Date Reviewed: 11/24/2014

#	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			R7/3
		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				



### Laboratory Review Checklist: Reportable Data

Project Name: E105-14 / Antoine Forest / Houston

A&B Job ID: 14101083

Prep Batch Number(s): Qb14102218, Qb14102223, Qb14102276, Qb14102278, Qb14102342

Reviewed By: Scarpenter

Date Reviewed: 11/24/2014

#	A	Description	Yes	No	NA	NR	ER#
		3) Are unadjusted MQLs included in the laboratory data package?	X				
<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			S9
<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				



### Laboratory Review Checklist: Reportable Data

Project Name: E105-14 / Antoine Forest / Houston  
 A&B Job ID: 14101083  
 Prep Batch Number(s): Qb14102218, Qb14102223, Qb14102276, Qb14102278, Qb14102342

Reviewed By: Scarpenter  
 Date Reviewed: 11/24/2014

#	A	Description	Yes	No	NA	NR	ER#
S13	OI	<b>COMPOUND/ANALYTE IDENTIFICATION PROCEDURES</b>					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	<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				
S15	OI	<b>PROFICIENCY TEST REPORTS:</b>					
		Are proficiency testing or inter-laboratory comparison results on file?	X				
S16	OI	<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.
R7/3	Total Metals Method SW-846 6010C, QC Batch Qb14102342 - For this batch, the MS recoveries for all metals are below the laboratory control limits. These metals are qualified with a M2 qualifier. The post digestion spikes were below control limits for all. The serial dilutions for arsenic (151%D), barium (149%D), cadmium (BRL), chromium (148%D), copper (139%D), lead (149%D), nickel (151%D), selenium (BRL), silver (BRL), and zinc (149%D) were outside the acceptance criteria of ten percent difference (%D).
R7/4	Purgeable Aromatics by SW-846 8021B, QC Batch ID: Qb14102223 - The MS/MSD RPD recovery for all compounds is above 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.  Additional metals analyzed as per client request received via email 11/13/14.
S9	See R7/3.

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).

AMENDED

# Laboratory Analysis Report

Total Number of Pages: 42

Job ID : 14101030



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

Client Project Name :  
E105-14 / Antoine Forest / Houston

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: 10/17/14

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

Client Sample ID	Matrix	A&B Sample ID
B-4, 9-10'	Soil	14101030.01
B-5, 11-12	Soil	14101030.02
B-6, 10-11	Soil	14101030.03
B-4, Water	Water	14101030.04

*Shantall Carpenter*

Released By: Shantall Carpenter  
Title: Senior Project Manager  
Date: 11/24/2014



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 : 10/17/2014 15:52

# LABORATORY TERM AND QUALIFIER DEFINITION REPORT



Job ID : 14101030

Date: 11/24/2014

## 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

B1	Target analyte detected in method blank at or above the method reporting limit.
J	Estimation. Below calibration range but above MDL.
M6	Not calculated. Sample concentration high. Spike out of linear range. Control limits do not apply.
Q18	Soils not collected in a hermetically sealed container may lose low-level VOCs.
R4	LCS/LCSD RPD exceeds control limit. Recovery meets acceptance criteria.
U	Undetected at SDL (Sample Detection Limit).



LABORATORY TEST RESULTS

Client Sample ID: B-4, 9-10'  
A&B Job Sample ID: 14101030.01

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

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: 10/17/2014 09:53  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/22/2014 17:10

Analyst Initial: MAM

% Moisture: 11.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	11.7					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-4, 9-10'  
 A&B Job Sample ID: 14101030.01

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Recoverable Metals**

Sample Matrix: Soil  
 Date Collected: 10/17/2014 09:53  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 15:36

Analytical Method: SW-846 6010C  
 QC Batch ID: Qb14102179  
 Prep Method: SW-846 3050B  
 Prepared By: Eperez  
 Prep Batch ID: PB14102127

Analyst Initial: GG

% Moisture: 11.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MLL	UQL	Units	DF	Date/Time
7440-38-2	Arsenic	0.566	J	0.113	0.566	0.1	0.5	1000	mg/Kg	1	10/20/14 22:04
7440-39-3	Barium	161		2.27	11.3	0.1	0.5	50	mg/Kg	20	10/20/14 22:25
7440-43-9	Cadmium	< 0.045	U	0.045	0.566	0.04	0.5	750	mg/Kg	1	10/20/14 22:04
7440-47-3	Chromium	3.74		0.113	0.566	0.1	0.5	1000	mg/Kg	1	10/20/14 22:04
7440-50-8	Copper	0.906		0.113	0.566	0.1	0.5	750	mg/Kg	1	10/20/14 22:04
7439-92-1	Lead	3.51		0.113	0.566	0.1	0.5	2500	mg/Kg	1	10/20/14 22:04
7439-95-5	Manganese	5.78		0.113	0.566	0.1	0.5	250	mg/Kg	1	10/20/14 22:04
7440-02-0	Nickel	1.47		0.113	0.566	0.1	0.5	2500	mg/Kg	1	10/20/14 22:04
7782-49-2	Selenium	< 0.113	U	0.113	0.566	0.1	0.5	1000	mg/Kg	1	10/20/14 22:04
7440-22-4	Silver	< 0.023	U	0.023	0.566	0.02	0.5	100	mg/Kg	1	10/20/14 22:04

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-4, 9-10'  
A&B Job Sample ID: 14101030.01

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Metals - Mercury**  
Analytical Method: SW-846 7470A  
QC Batch ID: Qb141021104  
Prep Method: SW-846 7470A  
Prepared By: Eperez  
Prep Batch ID: PB14102150

Sample Matrix: Soil  
Date Collected: 10/17/2014 09:53  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/21/2014 10:20

Analyst Initial: SRG

% Moisture: 11.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7439-97-6	Mercury	< 0.005	U	0.005	0.005	0.004	0.004	0.2	mg/Kg	1	10/21/14 16:24

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-4, 9-10'  
 A&B Job Sample ID: 14101030.01

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Purgeable Aromatics**

Sample Matrix: Soil  
 Date Collected: 10/17/2014 09:53  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 10:00

Analytical Method: SW-846 8021B  
 QC Batch ID: Qb141021102  
 Prep Method: SW-846 5030C  
 Prepared By: SBojja  
 Prep Batch ID: PB14102140

Analyst Initial: SRB

% Moisture: 11.7

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 00:19
71-43-2	Benzene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.00	10/21/14 00:19
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.00	10/21/14 00:19
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	1.00	10/21/14 00:19
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.011	0.005	0.01	0.8	mg/Kg	1.00	10/21/14 00:19
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 00:19
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	1.00	10/21/14 00:19
98-08-8	Trifluorotoluene(surr) 98						81	111	%	1.00	10/21/14 00:19

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-4, 9-10'  
 A&B Job Sample ID: 14101030.01

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**  
 Analytical Method: TX 1005  
 QC Batch ID: Qb14102110  
 Prep Method: TX 1005  
 Prepared By: AVBembde  
 Prep Batch ID: PB14102107  
 Analyst Initial: AVB

Sample Matrix: Soil  
 Date Collected: 10/17/2014 09:53  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 11:00

% Moisture: 11.7

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 26.8	Q18,U	26.8	28.3	23.7	25	1000	mg/Kg	1	10/20/14 20:31
TPH-1005-2	>C12-C28 <sup>1</sup>	< 23	U	23	28.3	20.3	25	1000	mg/Kg	1	10/20/14 20:31
TPH-1005-4	>C28-C35 <sup>1</sup>	< 20	U	20	28.3	17.7	25	1000	mg/Kg	1	10/20/14 20:31
	Total C6-C35	<					----	----	mg/Kg	1	10/20/14 20:31
111-85-3	1-Chlorooctane(surr)	63.8					60	143	%	1	10/20/14 20:31
3386-33-2	Chlorooctadecane(sur)	82.7					60	150	%	1	10/20/14 20:31

Soil results reported on dry weight basis



### LABORATORY TEST RESULTS

Client Sample ID: B-5, 11-12  
A&B Job Sample ID: 14101030.02

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

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: 10/17/2014 11:39  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/22/2014 17:10

Analyst Initial: MAM

% Moisture: 13.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	13.9					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



## LABORATORY TEST RESULTS

Client Sample ID: B-5, 11-12  
 A&B Job Sample ID: 14101030.02

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Recoverable Metals**  
 Analytical Method: SW-846 6010C  
 QC Batch ID: Qb14102238  
 Prep Method: SW-846 3050B  
 Prepared By: Eperez  
 Prep Batch ID: PB14102231

Sample Matrix: Soil  
 Date Collected: 10/17/2014 11:39  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 16:57

Analyst Initial: GG

% Moisture: 13.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7440-38-2	Arsenic	0.314	J	0.116	0.581	0.1	0.5	1000	mg/Kg	1	10/21/14 17:42
7440-39-3	Barium	13.8		0.116	0.581	0.1	0.5	50	mg/Kg	1	10/21/14 17:42
7440-43-9	Cadmium	< 0.046	U	0.046	0.581	0.04	0.5	750	mg/Kg	1	10/21/14 17:42
7440-47-3	Chromium	2.20		0.116	0.581	0.1	0.5	1000	mg/Kg	1	10/21/14 17:42
7440-50-8	Copper	0.465	J	0.116	0.581	0.1	0.5	750	mg/Kg	1	10/21/14 17:42
7439-92-1	Lead	2.76		0.116	0.581	0.1	0.5	2500	mg/Kg	1	10/21/14 17:42
7439-95-5	Manganese	12.5		2.32	11.6	0.1	0.5	250	mg/Kg	20	10/21/14 18:03
7440-02-0	Nickel	0.929		0.116	0.581	0.1	0.5	2500	mg/Kg	1	10/21/14 17:42
7782-49-2	Selenium	< 0.116	U	0.116	0.581	0.1	0.5	1000	mg/Kg	1	10/21/14 17:42
7440-22-4	Silver	< 0.023	U	0.023	0.581	0.02	0.5	100	mg/Kg	1	10/21/14 17:42

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-5, 11-12  
A&B Job Sample ID: 14101030.02

Date: 11/24/2014

Attn: Bob Metzger

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Test Description: **Total Metals - Mercury**  
Analytical Method: SW-846 7470A  
QC Batch ID: Qb141021104  
Prep Method: SW-846 7470A  
Prepared By: Eperez  
Prep Batch ID: PB14102150  
Analyst Initial: SRG

Sample Matrix: Soil  
Date Collected: 10/17/2014 11:39  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/21/2014 10:20

% Moisture: 13.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7439-97-6	Mercury	< 0.005	U	0.005	0.005	0.004	0.004	0.2	mg/Kg	1	10/21/14 18:13

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-5, 11-12  
 A&B Job Sample ID: 14101030.02

Date: 11/24/2014

Attn: Bob Metzger

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Test Description: **Purgeable Aromatics**

Analytical Method: SW-846 8021B

QC Batch ID: Qb141021102

Prep Method: SW-846 5035A

Prepared By: SBojja

Prep Batch ID: PB14102149

Analyst Initial: SRB

Sample Matrix: Soil  
 Date Collected: 10/17/2014 11:39  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 14:00

% Moisture: 13.9

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	1.01	10/21/14 01:36
71-43-2	Benzene	< 0.001	Q18,U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.01	10/21/14 01:36
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.01	10/21/14 01:36
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	1.01	10/21/14 01:36
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.012	0.005	0.01	0.8	mg/Kg	1.01	10/21/14 01:36
95-47-6	o-Xylene	< 0.002	U	0.002	0.006	0.002	0.005	0.4	mg/Kg	1.01	10/21/14 01:36
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	1.01	10/21/14 01:36
98-08-8	Trifluorotoluene(surr) 102						81	111	%	1.01	10/21/14 01:36

Soil results reported on dry weight basis



### LABORATORY TEST RESULTS

Client Sample ID: B-5, 11-12  
A&B Job Sample ID: 14101030.02

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**  
Analytical Method: TX 1005  
QC Batch ID: Qb14102110  
Prep Method: TX 1005  
Prepared By: AVBembde  
Prep Batch ID: PB14102107

Sample Matrix: Soil  
Date Collected: 10/17/2014 11:39  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/20/2014 11:00

Analyst Initial: AVB

% Moisture: 13.9

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 27.5	Q18,U	27.5	29	23.7	25	1000	mg/Kg	1	10/20/14 20:55
TPH-1005-2	>C12-C28 <sup>1</sup>	< 23.6	U	23.6	29	20.3	25	1000	mg/Kg	1	10/20/14 20:55
TPH-1005-4	>C28-C35 <sup>1</sup>	< 20.6	U	20.6	29	17.7	25	1000	mg/Kg	1	10/20/14 20:55
	Total C6-C35	<					----	----	mg/Kg	1	10/20/14 20:55
111-85-3	1-Chlorooctane(surr)	61.5					60	143	%	1	10/20/14 20:55
3386-33-2	Chlorooctadecane(sur)	81.3					60	150	%	1	10/20/14 20:55

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-6, 10-11  
A&B Job Sample ID: 14101030.03

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

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: 10/17/2014 10:48  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/22/2014 17:10

% Moisture: 12.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
	% Moisture <sup>1</sup>	12.6					----	----	%	1	10/22/14 17:11

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-6, 10-11  
 A&B Job Sample ID: 14101030.03

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Recoverable Metals**

Analytical Method: SW-846 6010C  
 QC Batch ID: Qb14102238  
 Prep Method: SW-846 3050B  
 Prepared By: Eperez  
 Prep Batch ID: PB14102231

Sample Matrix: Soil  
 Date Collected: 10/17/2014 10:48  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 16:57

Analyst Initial: GG

% Moisture: 12.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7440-38-2	Arsenic	0.286	J	0.114	0.572	0.1	0.5	1000	mg/Kg	1	10/21/14 18:20
7440-39-3	Barium	14.5		0.114	0.572	0.1	0.5	50	mg/Kg	1	10/21/14 18:20
7440-43-9	Cadmium	< 0.046	U	0.046	0.572	0.04	0.5	750	mg/Kg	1	10/21/14 18:20
7440-47-3	Chromium	3.52		0.114	0.572	0.1	0.5	1000	mg/Kg	1	10/21/14 18:20
7440-50-8	Copper	0.686		0.114	0.572	0.1	0.5	750	mg/Kg	1	10/21/14 18:20
7439-92-1	Lead	3.34		0.114	0.572	0.1	0.5	2500	mg/Kg	1	10/21/14 18:20
7439-95-5	Manganese	19.6		2.29	11.4	0.1	0.5	250	mg/Kg	20	10/21/14 18:26
7440-02-0	Nickel	1.37		0.114	0.572	0.1	0.5	2500	mg/Kg	1	10/21/14 18:20
7782-49-2	Selenium	< 0.114	U	0.114	0.572	0.1	0.5	1000	mg/Kg	1	10/21/14 18:20
7440-22-4	Silver	< 0.023	U	0.023	0.572	0.02	0.5	100	mg/Kg	1	10/21/14 18:20

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-6, 10-11  
A&B Job Sample ID: 14101030.03

Date: 11/24/2014

Client Name: Aviles Engineering  
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Metals - Mercury**  
Analytical Method: SW-846 7470A  
QC Batch ID: Qb141021104  
Prep Method: SW-846 7470A  
Prepared By: Eperez  
Prep Batch ID: PB14102150  
Analyst Initial: SRG

Sample Matrix: Soil  
Date Collected: 10/17/2014 10:48  
Date Received: 10/17/2014 15:52  
Date Prepared: 10/21/2014 10:20

% Moisture: 12.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
7439-97-6	Mercury	< 0.005	U	0.005	0.005	0.004	0.004	0.2	mg/Kg	1	10/21/14 18:16

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-6, 10-11  
 A&B Job Sample ID: 14101030.03

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Purgeable Aromatics**

Sample Matrix: Soil  
 Date Collected: 10/17/2014 10:48  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 14:00

Analytical Method: SW-846 8021B  
 QC Batch ID: Qb141021102  
 Prep Method: SW-846 5035A  
 Prepared By: SBojja  
 Prep Batch ID: PB14102149

Analyst Initial: SRB

% Moisture: 12.6

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 02:01
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 02:01
108-88-3	Toluene	< 0.001	U	0.001	0.006	0.001	0.005	0.4	mg/Kg	1.00	10/21/14 02:01
100-41-4	Ethylbenzene	< 0.006	U	0.006	0.006	0.005	0.005	0.4	mg/Kg	1.00	10/21/14 02:01
108-38-3&106-4	m- & p-Xylenes	< 0.006	U	0.006	0.011	0.005	0.01	0.8	mg/Kg	1.00	10/21/14 02:01
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 02:01
1330-20-7	Xylenes	< 0.002	U	0.002	0.006	0.002	0.005	1.2	mg/Kg	1.00	10/21/14 02:01
98-08-8	Trifluorotoluene(surr)	99.5					81	111	%	1.00	10/21/14 02:01

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-6, 10-11  
 A&B Job Sample ID: 14101030.03

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Petroleum Hydrocarbons**  
 Analytical Method: TX 1005  
 QC Batch ID: Qb14102110  
 Prep Method: TX 1005  
 Prepared By: AVBembde  
 Prep Batch ID: PB14102107  
 Analyst Initial: AVB

Sample Matrix: Soil  
 Date Collected: 10/17/2014 10:48  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 11:00

% Moisture: 12.6

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
TPH-1005-1	C6-C12 <sup>1</sup>	< 27.1	Q18,U	27.1	28.6	23.7	25	1000	mg/Kg	1	10/20/14 21:18
TPH-1005-2	>C12-C28 <sup>1</sup>	< 23.2	U	23.2	28.6	20.3	25	1000	mg/Kg	1	10/20/14 21:18
TPH-1005-4	>C28-C35 <sup>1</sup>	< 20.3	U	20.3	28.6	17.7	25	1000	mg/Kg	1	10/20/14 21:18
	Total C6-C35	<					----	----	mg/Kg	1	10/20/14 21:18
111-85-3	1-Chlorooctane(surr)	66.9					60	143	%	1	10/20/14 21:18
3386-33-2	Chlorooctadecane(sur)	95					60	150	%	1	10/20/14 21:18

Soil results reported on dry weight basis



**LABORATORY TEST RESULTS**

Client Sample ID: B-4, Water  
 A&B Job Sample ID: 14101030.04

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Total Recoverable Metals**

Sample Matrix: Water  
 Date Collected: 10/17/2014 12:55  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/21/2014 14:28

Analytical Method: SW-846 6010C  
 QC Batch ID: Qb14102236  
 Prep Method: SW-846 3010A  
 Prepared By: Eperez  
 Prep Batch ID: PB14102224

Analyst Initial: GG

% Moisture

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MLL	UQL	Units	DF	Date/Time
7440-38-2	Arsenic	< 0.004	U	0.004	0.02	0.004	0.02	40	mg/L	1	10/21/14 20:24
7440-39-3	Barium	0.296		0.004	0.02	0.004	0.02	2	mg/L	1	10/21/14 20:24
7440-43-9	Cadmium	< 0.002	U	0.002	0.02	0.002	0.02	30	mg/L	1	10/21/14 20:24
7440-47-3	Chromium	0.035		0.004	0.02	0.004	0.02	40	mg/L	1	10/21/14 20:24
7440-50-8	Copper	0.017	J	0.004	0.02	0.004	0.02	30	mg/L	1	10/21/14 20:24
7439-92-1	Lead	0.026		0.004	0.02	0.004	0.02	100	mg/L	1	10/21/14 20:24
7439-95-5	Manganese	0.241		0.004	0.02	0.004	0.02	10	mg/L	1	10/21/14 20:24
7440-02-0	Nickel	0.01	J	0.004	0.02	0.004	0.02	100	mg/L	1	10/21/14 20:24
7782-49-2	Selenium	< 0.004	U	0.004	0.02	0.004	0.02	40	mg/L	1	10/21/14 20:24
7440-22-4	Silver	< 0.001	U	0.001	0.02	0.001	0.02	4	mg/L	1	10/21/14 20:24

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-4, Water
A&B Job Sample ID: 14101030.04

Date: 11/24/2014

Client Name: Aviles Engineering
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: Total Metals - Mercury
Analytical Method: SW-846 7470A
QC Batch ID: Qb14102466
Prep Method: SW-846 7470A
Prepared By: Eperez
Prep Batch ID: PB14102468
Analyst Initial: SRG

Sample Matrix: Water
Date Collected: 10/17/2014 12:55
Date Received: 10/17/2014 15:52
Date Prepared: 10/24/2014 12:07

% Moisture

Table with 11 columns: CAS Number, Parameter, Result, Flag, SDL, SQL, MDL, MQL, UQL, Units, DF, Date/Time. Row 1: 7439-97-6, Mercury, < 0.00006 U, 0.00006, 0.0002, 0.00006, 0.0002, 0.01, mg/L, 1, 10/24/14 15:45



**LABORATORY TEST RESULTS**

Client Sample ID: B-4, Water  
 A&B Job Sample ID: 14101030.04

Date: 11/24/2014

Client Name: Aviles Engineering  
 Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: **Purgeable Aromatics**  
 Analytical Method: SW-846 8021B  
 QC Batch ID: Qb14102180  
 Prep Method: SW-846 5030C  
 Prepared By: SBojja  
 Prep Batch ID: PB14102140

Sample Matrix: Water  
 Date Collected: 10/17/2014 12:55  
 Date Received: 10/17/2014 15:52  
 Date Prepared: 10/20/2014 10:00

Analyst Initial: SRB

% Moisture

CAS Number	Parameter	Result	Flag	SDL	SQL	MDL	MQL	UQL	Units	DF	Date/Time
1634-04-4	MTBE	< 0.001	U	0.001	0.002	.0014	0.002	0.16	mg/L	1	10/20/14 18:48
71-43-2	Benzene	< 0.0008	U	0.0008	0.002	.0008	0.002	0.16	mg/L	1	10/20/14 18:48
108-88-3	Toluene	< 0.001	U	0.001	0.002	.0010	0.002	0.16	mg/L	1	10/20/14 18:48
100-41-4	Ethylbenzene	< 0.0008	U	0.0008	0.002	.0008	0.002	0.16	mg/L	1	10/20/14 18:48
108-38-3&106-4	m- & p-Xylenes	< 0.002	U	0.002	0.004	.0016	0.004	0.32	mg/L	1	10/20/14 18:48
95-47-6	o-Xylene	< 0.001	U	0.001	0.002	.0010	0.002	0.16	mg/L	1	10/20/14 18:48
1330-20-7	Xylenes	< 0.003	U	0.003	0.002	.0025	0.002	0.48	mg/L	1	10/20/14 18:48
98-08-8	Trifluorotoluene(surr)	97.5					75	125	%	1	10/20/14 18:48

Soil results reported on dry weight basis



LABORATORY TEST RESULTS

Client Sample ID: B-4, Water
A&B Job Sample ID: 14101030.04

Date: 11/24/2014

Client Name: Aviles Engineering
Project Name: E105-14 / Antoine Forest / Houston

Attn: Bob Metzger

Test Description: Total Petroleum Hydrocarbons
Analytical Method: TX 1005
QC Batch ID: qb14102250
Prep Method: TX 1005
Prepared By: AVBembde
Prep Batch ID: PB14102314

Sample Matrix: Water
Date Collected: 10/17/2014 12:55
Date Received: 10/17/2014 15:52
Date Prepared: 10/20/2014 11:00

Analyst Initial: AVB

% Moisture

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, 111-85-3, and 3386-33-2.

Soil results reported on dry weight basis
1-Parameter not available for accreditation

QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

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

**QC Batch ID :** Qb14102110      **Created Date :** 10/21/14      **Created By :** AVBembde

**Samples in This QC Batch :** 14101030.01,02,03

**Sample Preparation :** PB14102107      **Prep Method :** TX 1005      **Prep Date :** 10/20/14 11:00      **Prep By :** AVBembde

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	ML	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	99.9	%	1				
1-Chlorooctane(surr)	111-85-3	73.9	%	1				

**QC Type: LCS and LCSD**

Parameter	LCS Spk Added	LCS Result	LCS % Rec	LCSD Spk Added	LCSD Result	LCSD % Rec	RPD	RPD CtrLimit	%Recovery CtrLimit	Qual
C6-C12	500	408	81.6	500	500	100	20.3	20	75-125	R4
>C12-C28	500	441	88.2	500	554	111	22.7	20	75-125	R4
>C28-C35	500	449	89.8	500	564	113	22.7	20	75-125	R4

**QC Type: MS and MSD**

**QC Sample ID: 14100657.04**

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrLimit	%Rec CtrLimit	Qual
C6-C12	BRL	500	541	108	500	490	97.8	9.9	20	75-125	
>C12-C28	BRL	500	590	114	500	538	104	9.5	20	75-125	
>C28-C35	BRL	500	595	119	500	562	112	5.7	20	75-125	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101030

**Date :** 11/24/2014

**Analysis :** Purgeable Aromatics      **Method :** SW-846 8021B      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb141021102      **Created Date :** 10/20/14      **Created By :** SBojja

**Samples in This QC Batch :** 14101030.01,02,03

**Sample Preparation :** PB14102140      **Prep Method :** SW-846 5030C      **Prep Date :** 10/20/14 10:00      **Prep By :** SBojja  
 PB14102149      SW-846 5035A      10/20/14 14:00      SBojja

<b>QC Type: Method Blank</b>								
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	98.5	%	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
MTBE	0.05	0.048	96	0.05	0.048	96	0	20	67.2-132	
Benzene	0.05	0.047	94	0.05	0.047	94	0	20	76.2-128	
Toluene	0.05	0.047	94	0.05	0.047	94	0	20	74.2-126	
Ethylbenzene	0.05	0.047	94	0.05	0.047	94	0	20	79.4-125	
m- & p-Xylenes	0.1	0.093	93	0.1	0.094	94	1.1	20	76.3-126	
o-Xylene	0.05	0.047	94	0.05	0.047	94	0	20	77.1-123	
Xylenes	0.15	0.14	93.3	0.15	0.141	94	0.7	20	77.2-125	

<b>QC Type: MS and MSD</b>											
<b>QC Sample ID: 14101030.01</b>											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
MTBE	BRL	0.05	0.043	86	0.05	0.042	84	2.4	26	76-134	
Benzene	BRL	0.05	0.043	86	0.05	0.043	86	0	19	68-138	
Toluene	BRL	0.05	0.044	88	0.05	0.044	88	0	19	67-135	
Ethylbenzene	BRL	0.05	0.043	86	0.05	0.043	86	0	20	71-127	
m- & p-Xylenes	BRL	0.101	0.086	85.1	0.101	0.085	84.2	1.2	27	56-135	
o-Xylene	BRL	0.05	0.043	86	0.05	0.043	86	0	24	56-134	
Xylenes	BRL	0.151	0.129	85.4	0.151	0.128	84.8	0.8	25	59-134	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101030

**Date :** 11/24/2014

**Analysis :** Total Metals - Mercury      **Method :** SW-846 7470A      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb141021104      **Created Date :** 10/21/14      **Created By :** SRGade

**Samples in This QC Batch :** 14101030.01,02,03

**Digestion :** PB14102150      **Prep Method :** SW-846 7470A      **Prep Date :** 10/21/14 10:20      **Prep By :** Eperez

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
Mercury	7439-97-6	< MDL	mg/Kg	1	0.004	0.004	

**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
Mercury	0.1	0.0967	96.7	0.1	0.0929	92.9	4	20	80-120	

**QC Type: MS and MSD**

**QC Sample ID:** 14101030.01

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Mercury	BRL	0.1	0.1110	111						70-130	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101030

**Date :** 11/24/2014

**Analysis :** Total Recoverable Metals      **Method :** SW-846 6010C      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb14102179      **Created Date :** 10/20/14      **Created By :** Ggorane

**Samples in This QC Batch :** 14101030.01

**Digestion :** PB14102127      **Prep Method :** SW-846 3050B      **Prep Date :** 10/20/14 15:36      **Prep By :** Eperez

<b>QC Type: Method Blank</b>								
Parameter	CAS #	Result	Units	D.F.	ML	MDL		Qual
Arsenic	7440-38-2	< MDL	mg/Kg	1	0.5	0.1		
Barium	7440-39-3	< MDL	mg/Kg	1	0.5	0.1		
Cadmium	7440-43-9	< MDL	mg/Kg	1	0.5	0.04		
Chromium	7440-47-3	< MDL	mg/Kg	1	0.5	0.1		
Copper	7440-50-8	< MDL	mg/Kg	1	0.5	0.1		
Lead	7439-92-1	< MDL	mg/Kg	1	0.5	0.1		
Manganese	7439-95-5	< MDL	mg/Kg	1	0.5	0.1		
Nickel	7440-02-0	< MDL	mg/Kg	1	0.5	0.1		
Selenium	7782-49-2	< MDL	mg/Kg	1	0.5	0.1		
Silver	7440-22-4	< MDL	mg/Kg	1	0.5	0.02		

<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
Arsenic	25	22.9	91.4	25	22.8	91.3	0.1	20	80-120	
Barium	25	23.2	93	25	23.3	93.3	0.3	20	80-120	
Cadmium	25	22.3	89.4	25	22.3	89.4	0.0	20	80-120	
Chromium	25	24.1	96.6	25	24.3	97.3	0.7	20	80-120	
Copper	25	23.3	93.3	25	23.4	93.6	0.2	20	80-120	
Lead	25	22.7	90.8	25	22.7	90.9	0.0	20	80-120	
Manganese	25	24.3	97	25	24.2	96.8	0.2	20	80-120	
Nickel	25	23.1	92.6	25	23.2	92.8	0.3	20	80-120	
Selenium	25	21.4	85.8	25	21.5	85.8	0.1	20	80-120	
Silver	25	22.4	89.5	25	22.4	89.5	0.0	20	80-120	

<b>QC Type: MS and MSD</b>											
<b>QC Sample ID: 14101030.01</b>											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Arsenic	0.5	25	19.3	75.4						70-130	
Barium	142.0	25	N/C	N/C						70-130	M6
Cadmium	BRL	25	19.7	78.6						70-130	
Chromium	3.3	25	25.1	87						70-130	
Copper	0.8	25	21.9	84.5						70-130	
Lead	3.1	25	21.1	71.9						70-130	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

Analysis : Total Recoverable Metals

Method : SW-846 6010C

Reporting Units : mg/Kg

QC Batch ID : Qb14102179

Created Date : 10/20/14

Created By : Ggorane

Samples in This QC Batch : 14101030.01

QC Type: MS and MSD

QC Sample ID: 14101030.01

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Manganese	5.1	25	26.5	85.4						70-130	
Nickel	1.3	25	20.1	75.1						70-130	
Selenium	BRL	25	17.7	70.7						70-130	
Silver	BRL	25	21.0	83.9						70-130	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

Analysis : Purgeable Aromatics Method : SW-846 8021B Reporting Units : mg/L

QC Batch ID : Qb14102180 Created Date : 10/20/14 Created By : SBojja

Samples in This QC Batch : 14101030.04

Sample Preparation : PB14102140 Prep Method : SW-846 5030C Prep Date : 10/20/14 10:00 Prep By : SBojja

QC Type: Method Blank							
Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
MTBE	1634-04-4	< MDL	mg/L	1	0.002	.0014	
Benzene	71-43-2	< MDL	mg/L	1	0.002	.0008	
Toluene	108-88-3	< MDL	mg/L	1	0.002	.0010	
Ethylbenzene	100-41-4	< MDL	mg/L	1	0.002	.0008	
m- & p-Xylenes	108-38-3&106-42-3	< MDL	mg/L	1	0.004	.0016	
o-Xylene	95-47-6	< MDL	mg/L	1	0.002	.0010	
Xylenes	1330-20-7	< MDL	mg/L	1	0.002	.0025	
Trifluorotoluene(surr)	98-08-8	98.8	%	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	0.02	0.022	110	0.02	0.021	105	4.6	30	69.4-124	
Benzene	0.02	0.022	110	0.02	0.021	105	4.6	30	79.1-123	
Toluene	0.02	0.022	110	0.02	0.021	105	4.6	30	72.3-117	
Ethylbenzene	0.02	0.022	110	0.02	0.021	105	4.6	30	77.4-119	
m- & p-Xylenes	0.04	0.043	108	0.04	0.042	105	2.4	30	77.2-127	
o-Xylene	0.02	0.022	110	0.02	0.021	105	4.6	30	71-114	
Xylenes	0.06	0.065	108	0.06	0.063	105	3.1	30	75.8-121	

QC Type: MS and MSD											
QC Sample ID: 14101030.04											
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	0.02	0.019	95	0.02	0.019	95	0	21	68-117	
Benzene	BRL	0.02	0.018	90	0.02	0.018	90	0	17	65-143	
Toluene	BRL	0.02	0.019	95	0.02	0.018	90	5.4	29	67-136	
Ethylbenzene	BRL	0.02	0.018	90	0.02	0.018	90	0	30	80-134	
m- & p-Xylenes	BRL	0.04	0.036	90	0.04	0.035	87.5	2.8	22	81-131	
o-Xylene	BRL	0.02	0.018	90	0.02	0.018	90	0	21	74-134	
Xylenes	BRL	0.06	0.054	90	0.06	0.053	88.3	1.9	21	80-136	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

**Analysis :** Total Recoverable Metals      **Method :** SW-846 6010C      **Reporting Units :** mg/L

**QC Batch ID :** Qb14102236      **Created Date :** 10/21/14      **Created By :** Ggorane

**Samples in This QC Batch :** 14101030.04

**Digestion :** PB14102224      **Prep Method :** SW-846 3010A      **Prep Date :** 10/21/14 14:28      **Prep By :** Epez

QC Type: Method Blank								
Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
Arsenic	7440-38-2	< MDL	mg/L	1	0.02	0.004		
Barium	7440-39-3	< MDL	mg/L	1	0.02	0.004		
Cadmium	7440-43-9	< MDL	mg/L	1	0.02	0.002		
Chromium	7440-47-3	< MDL	mg/L	1	0.02	0.004		
Copper	7440-50-8	< MDL	mg/L	1	0.02	0.004		
Lead	7439-92-1	< MDL	mg/L	1	0.02	0.004		
Manganese	7439-95-5	< MDL	mg/L	1	0.02	0.004		
Nickel	7440-02-0	< MDL	mg/L	1	0.02	0.004		
Selenium	7782-49-2	< MDL	mg/L	1	0.02	0.004		
Silver	7440-22-4	< MDL	mg/L	1	0.02	0.001		

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
Arsenic	1	0.928	92.8	1	0.930	93	0.3	20	80-120	
Barium	1	0.933	93.3	1	0.936	93.6	0.3	20	80-120	
Cadmium	1	0.885	88.5	1	0.889	88.9	0.4	20	80-120	
Chromium	1	0.936	93.6	1	0.943	94.3	0.7	20	80-120	
Copper	1	0.918	91.8	1	0.925	92.5	0.7	20	80-120	
Lead	1	0.903	90.3	1	0.907	90.7	0.4	20	80-120	
Manganese	1	0.944	94.4	1	0.940	94	0.4	20	80-120	
Nickel	1	0.897	89.7	1	0.900	90	0.4	20	80-120	
Selenium	1	0.872	87.2	1	0.872	87.2	0.0	20	80-120	
Silver	1	0.954	95.4	1	0.952	95.2	0.2	20	80-120	

QC Type: MS and MSD											
QC Sample ID: 14101030.04											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Arsenic	BRL	1	0.948	94.6						75-125	
Barium	0.2963	1	1.196	90						75-125	
Cadmium	BRL	1	0.898	89.8						75-125	
Chromium	0.0350	1	0.960	92.5						75-125	
Copper	0.017	1	0.941	92.4						75-125	
Lead	0.0257	1	0.881	85.5						75-125	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

Analysis : Total Recoverable Metals Method : SW-846 6010C Reporting Units : mg/L

QC Batch ID : Qb14102236 Created Date : 10/21/14 Created By : Ggorane

Samples in This QC Batch : 14101030.04

QC Type: MS and MSD											
QC Sample ID: 14101030.04											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Manganese	0.241	1	1.161	92						75-125	
Nickel	0.010	1	0.875	86.5						75-125	
Selenium	BRL	1	0.883	88.2						75-125	
Silver	BRL	1	0.957	95.7						75-125	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101030

**Date :** 11/24/2014

**Analysis :** Total Recoverable Metals      **Method :** SW-846 6010C      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb14102238      **Created Date :** 10/21/14      **Created By :** Ggorane

**Samples in This QC Batch :** 14101030.02,03

**Digestion :** PB14102231      **Prep Method :** SW-846 3050B      **Prep Date :** 10/20/14 16:57      **Prep By :** Eperez

<b>QC Type: Method Blank</b>								
Parameter	CAS #	Result	Units	D.F.	MQL	MDL		Qual
Arsenic	7440-38-2	< MDL	mg/Kg	1	0.5	0.1		
Barium	7440-39-3	< MDL	mg/Kg	1	0.5	0.1		
Cadmium	7440-43-9	< MDL	mg/Kg	1	0.5	0.04		
Chromium	7440-47-3	< MDL	mg/Kg	1	0.5	0.1		
Copper	7440-50-8	< MDL	mg/Kg	1	0.5	0.1		
Lead	7439-92-1	< MDL	mg/Kg	1	0.5	0.1		
Manganese	7439-95-5	1.1	mg/Kg	1	0.5	0.1		B1
Nickel	7440-02-0	< MDL	mg/Kg	1	0.5	0.1		
Selenium	7782-49-2	< MDL	mg/Kg	1	0.5	0.1		
Silver	7440-22-4	< MDL	mg/Kg	1	0.5	0.02		

<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
Arsenic	25	24.9	99.6	25	23.5	94	5.8	20	80-120	
Barium	25	24.7	98.8	25	24.0	96	2.9	20	80-120	
Cadmium	25	24.8	99.2	25	22.3	89.2	10.6	20	80-120	
Chromium	25	24.8	99.2	25	23.9	95.6	3.7	20	80-120	
Copper	25	25.0	100	25	23.6	94.4	5.8	20	80-120	
Lead	25	24.6	98.4	25	23.0	92	6.7	20	80-120	
Manganese	25	24.5	98	25	23.7	94.8	3.3	20	80-120	
Nickel	25	24.5	98	25	23.2	92.8	5.4	20	80-120	
Selenium	25	24.8	99.2	25	22.2	88.8	11.1	20	80-120	
Silver	25	25.3	101	25	22.9	91.6	10	20	80-120	

<b>QC Type: MS and MSD</b>											
<b>QC Sample ID: 14101030.02</b>											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Arsenic	0.27	25	23.6	93.4						70-130	
Barium	11.92	25	33.7	87.1						70-130	
Cadmium	BRL	25	22.2	88.7						70-130	
Chromium	1.89	25	25.2	93.1						70-130	
Copper	0.4	25	24.0	94.4						70-130	
Lead	2.38	25	23.7	85.3						70-130	

Refer to the Definition page for terms.

**QUALITY CONTROL CERTIFICATE**



**Job ID :** 14101030

**Date :** 11/24/2014

**Analysis :** Total Recoverable Metals      **Method :** SW-846 6010C      **Reporting Units :** mg/Kg

**QC Batch ID :** Qb14102238      **Created Date :** 10/21/14      **Created By :** Ggorane

**Samples in This QC Batch :** 14101030.02,03

<b>QC Type: MS and MSD</b>											
<b>QC Sample ID: 14101030.02</b>											
Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Manganese	10.8	25	32.5	86.8						70-130	
Nickel	0.8	25	22.5	86.8						70-130	
Selenium	BRL	25	22.1	88.2						70-130	
Silver	BRL	25	23.3	93.2						70-130	

Refer to the Definition page for terms.

QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

**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 :** 14101030.04

**Sample Preparation :** PB14102314      **Prep Method :** TX 1005      **Prep Date :** 10/20/14 11:00      **Prep By :** AVBembde

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	ML	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.



QUALITY CONTROL CERTIFICATE



Job ID : 14101030

Date : 11/24/2014

Analysis : Total Metals - Mercury Method : SW-846 7470A Reporting Units : mg/L

QC Batch ID : Qb14102466 Created Date : 10/24/14 Created By : SRGade

Samples in This QC Batch : 14101030.04

Digestion : PB14102468 Prep Method : SW-846 7470A Prep Date : 10/24/14 12:07 Prep By : Eperez

**QC Type: Method Blank**

Parameter	CAS #	Result	Units	D.F.	MQL	MDL	Qual
Mercury	7439-97-6	< MDL	mg/L	1	0.0002	0.00006	

**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
Mercury	0.005	0.0050	100	0.005	0.0049	97	3	20	80-120	

**QC Type: MS and MSD**

QC Sample ID: 14101030.04

Parameter	Sample Result	MS Spk Added	MS Result	MS % Rec	MSD Spk Added	MSD Result	MSD % Rec	RPD	RPD CtrlLimit	%Rec CtrlLimit	Qual
Mercury	BRL	0.005	0.0048	95						75-125	

Refer to the Definition page for terms.

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Contact: \_\_\_\_\_  
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E-mail: \_\_\_\_\_

3. PO # \_\_\_\_\_  
4. Turnaround Time (Business Days)  
 1 Day\*  Other  
 2 Days\*  Surcharge applies  
 3 Days\*  Surcharge applies  
 7 Days - Standard

5. Project # E105-14  
6. Project Name/Location Autawne Forest / Houston  
7. Reporting Requirement:  TRRP Limits only  TRRP Rpt. Package  See Attached  Standard Level II  
8. Sampler's Name & Company (PLEASE PRINT) Robert Metzger Avies Engineering Corp. Sampler's Signature & Date [Signature] 10/17/14

Lab Use Only	9. Sample ID and Description	10. Sampling		11. Matrix						12. No. of Containers	17. Analysis/Methods	18. REMARKS		
		Date	Time	Comp.	Grab	Water	Soil	Sludge	Oil				Air	Other
	<u>B-1</u>													
	<u>B-2</u>													
	<u>B-3</u>													
	<u>01A B-4 9-10</u>	10/17/14	9:53											
	<u>02A B-5 11-12</u>	10/17/14	11:39											
	<u>03A B-6 10-11</u>	10/17/14	10:18											
	<u>04A B-9 water</u>	10/17/14	12:55											

19. RELINQUISHED BY: [Signature] DATE: 10/17/14 TIME: 15:52

20. RECEIVED BY: [Signature] DATE: 10-17-14 TIME: 15:52

21. RECEIVED BY LABORATORY: \_\_\_\_\_  
\*Preservatives:  Cool  H - HCl  M - HNO<sub>3</sub>  S - H<sub>2</sub>SO<sub>4</sub>  
 OH - NaOH  T - Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>  X - Other \_\_\_\_\_

22. KNOWN HAZARDS/COMMENTS: \_\_\_\_\_

Temperature: 18.8 F / 72.5 C  
Intact:  Y  N Initials: 140539697

A&B cannot accept verbal changes.  
Please FAX written changes to 713-453-6091  
Samples will be disposed of after 30 days

**additional requested analysis**

Robert Metzger [rmetzger@avilesengineering.com]

**Sent:** Thursday, November 13, 2014 5:47 PM

**To:** Shantall Carpenter

**Importance:** High

Shantall,

To clarify my request, please run the following additional analysis:

Please include this email of the requests in the lab report.

**Please analyze each** of the following soil and groundwater samples for manganese, copper, and nickel:

B-4; 9-10'

B-5; 11 to 12'

B-6; 10 to 11'

Groundwater sample from B-4

These samples were previously analyzed for BTEX, TPH, MTBE, RCRA metals in lab report 14101030.

**Also Please analyze each** of the following soil samples for zinc, and copper

B-1; 12 to 13'

B-2; 12 to 13'

B-3; 13 to 14'

These samples were previously analyzed for BTEX, MTBE, TPH, and RCRA metals in lab report 14101083.

I need these in a hurry but do not have money to do rush job. Can you turn around in 5 days at the 7day cost?

Thank you.

*Robert J. Metzger, P.G., CAPM  
Aviles Engineering Corporation  
5790 Windfern  
Houston, TX 77041  
Office: 713-895-7645  
Fax: 713-895-7943*

*The information transmitted is intended only for the person or entity to which it is addressed and may contain confidential and/or privileged material. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient is prohibited. If you received this in error, please contact the sender and delete the material from any computer.*



## Sample Condition Checklist

A&B JobID : <b>14101030</b>	Date Received : <b>10/17/2014</b>	Time Received : <b>3:52PM</b>																										
Client Name : <b>Aviles Engineering</b>																												
Temperature : <b>1.8+0.7cf=2.5°C</b>	Sample pH : <b>&lt;2</b>																											
Thermometer ID : <b>140539697</b>	pH Paper ID : <b>58986</b>																											
<b>Check Points</b>																												
<b>1.</b>	<b>Cooler seal present and signed.</b>	<b>Yes</b>	<b>No</b>	<b>N/A</b>																								
<b>2.</b>	<b>Sample(s) in a cooler.</b>	X	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="width: 10%;">Matrix</td> <td style="width: 10%;">Water</td> <td style="width: 10%;">Soil</td> <td style="width: 10%;">Liquid</td> <td style="width: 10%;">Sludge</td> <td style="width: 10%;">Solid</td> <td style="width: 10%;">Cassette</td> <td style="width: 10%;">Tube</td> <td style="width: 10%;">Bulk</td> <td style="width: 10%;">Badge</td> <td style="width: 10%;">Food</td> <td style="width: 10%;">Other</td> </tr> <tr> <td>:</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>	Matrix	Water	Soil	Liquid	Sludge	Solid	Cassette	Tube	Bulk	Badge	Food	Other	:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>											
Matrix	Water	Soil	Liquid	Sludge	Solid	Cassette	Tube	Bulk	Badge	Food	Other																	
:	<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>																												
04 metals bottles have 'B-4 #1'(04G) & 'B-4 #2'(04H). Mn, Cu, Ni analysis added to all samples on a std 5bd tat per client instructions. AS 11/13/14																												

Received by : Dlopez

Check in by/date : AHall / 10/17/2014



## Laboratory Data Package Cover Page

This data package is for Job No. 14101030 and laboratory batch no(s).

Qb14102110, Qb141021102, Qb141021104, Qb14102179, Qb14102180, Qb14102236, Qb14102238, qb14102250, Qb14102276, Qb14102466 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
Shantall Carpenter		Senior Project Manager	11/24/2014



### Laboratory Review Checklist: Reportable Data

Project Name: E105-14 / Antoine Forest / Houston

A&B Job ID: 14101030

Prep Batch Number(s): Qb14102110,Qb141021102,Qb141021104,Qb14102179,Qb14102180,Qb14102236,Qb14102238,qb14102250,Qb14102276,Qb14102466

Reviewed By: Scarpenter

Date Reviewed: 11/24/2014

#	A	Description	Yes	No	NA	NR	ER#
R1	OI	<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				
R2	OI	<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				
R3	OI	<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		
R4	OI	<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				
R5	OI	<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				
R6	OI	<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			R6/6
R7	OI	<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			R7/3
		4) Were MS/MSD RPDs within laboratory QC limits?	X				
R8	OI	<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				
R9	OI	<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				



### Laboratory Review Checklist: Reportable Data

Project Name: E105-14 / Antoine Forest / Houston

Reviewed By: Carpenter

A&B Job ID: 14101030

Date Reviewed: 11/24/2014

Prep Batch Number(s): Qb14102110, Qb141021102, Qb141021104, Qb14102179, Qb14102180, Qb14102236, Qb14102238, qb14102250, Qb14102276, Qb14102466

#	A	Description	Yes	No	NA	NR	ER#
		3) Are unadjusted MQLs included in the laboratory data package?	X				
<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			S9
<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				



### Laboratory Review Checklist: Reportable Data

Project Name: E105-14 / Antoine Forest / Houston

Reviewed By: Scarpenter

A&B Job ID: 14101030

Date Reviewed: 11/24/2014

Prep Batch Number(s): Qb14102110,Qb141021102,Qb141021104,Qb14102179,Qb14102180,Qb14102236,Qb14102238,qb14102250,Qb14102276,Qb14102466

#	A	Description	Yes	No	NA	NR	ER#
S13	OI	<b>COMPOUND/ANALYTE IDENTIFICATION PROCEDURES</b>					
		Are the procedures for compound/analyte identification documented?	X				
S14	OI	<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				
S15	OI	<b>PROFICIENCY TEST REPORTS:</b>					
		Are proficiency testing or inter-laboratory comparison results on file?	X				
S16	OI	<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.
R6/6	For TPH analysis, QC Batch: Qb14102110, the RPDs were above control limits; however the %recoveries for the laboratory control sample (LCS) and laboratory control sample duplicate (LCSD) were within control limits. The parameters are qualified with a "R4".
R7/3	For Total Metals analysis by SW846 Method 6010C, QC Batch ID: Qb14102179, your sample ID "B-4 9-10' " was selected for use in A&B's quality control program. The MS recovery for barium was not calculated ("N/C") due to the native sample concentration being greater than four times the amount of spike added. The post digestion spike was not calculated ("N/C") for barium. The serial dilution for barium (4.24%D) was within the acceptance criteria of ten percent difference (%D).
R10/1	Quarterly DCS reports are kept on file at the laboratory and are available upon request.  Additional metals analyzed as per client request received via email 11/13/14.
S9	See R7/3.

O = organic analyses;

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

NA = Not applicable;

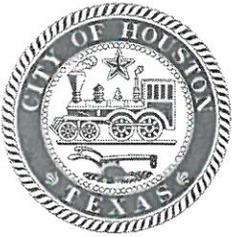
NR = Not Reviewed;

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 Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX F**

**CITY OF HOUSTON DECEMBER 9, 2014 INTEROFFICE CORRESPONDENCE**



# CITY OF HOUSTON

Public Works and Engineering  
Department

## Interoffice

Correspondence

**To:** Tina Yao, P.E.  
Supervising Engineer  
Engineering Branch  
Engineering and Construction  
Division

**From:** Supervising Engineer  
Geo-Environmental Services Branch  
Engineering and Construction Division

**Date:** December 9, 2014

**Attn:** Syed Ali

**Subject:** **PHASE II ENVIRONMENTAL SITE  
ASSESSMENT (ESA II) REPORT REVIEW  
FOR WATER LINE REPLACEMENT IN  
ANTOINE FOREST AREA  
WBS No. S-000035-0196-3**

In response to your request on December 3, 2014, we have reviewed the ESA II Revised Report (Attachment) prepared by Aviles Engineering Corporation (AEC) for Texas American Engineering, LLC., the City's design consultant for the subject project. Our comments are as follow:

- The report shall describe, based on the available information, the estimated vertical extent and lineal extent (station-to-station) of the Potentially Petroleum Contaminated Area (PPCA) at the location.
- The report shall provide recommendation for construction phase monitoring, which should take into account:
  - a. Vertical extent and lineal extent (station-to-station) of PPCA and action plan;
  - b. Worker protection and general health & safety; and
  - c. Potential contaminated media screening, testing, handling and disposal consistent with Federal, State, and City regulations and specifications.

The ESA II Report should be returned to AEC for revision per our markings in the report and issues of concern listed above. If you have any questions, please call me at 832-395-2260.

A handwritten signature in blue ink that reads "Maher Tanbouz".

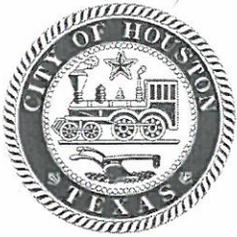
Maher Tanbouz, P.E.

JC  
MT:jc

H:\constr\A-ENV-SB\Environmental\NETS\_&\_ESA\_Memos\2014\{S-000035-0196-3}\_\{ESA\_II\_Rpt\_for\_WLR\_in\_Antoine\_Forest\_Area}.doc

Attachment: AEC's ESA II Report No. E105-14, dated November 26, 2014

ec: Daniel R. Menendez, P.E.  
Ravi Kaleyatodi, P.E., CPM  
Hamlet Hovsepian, P.E.  
MP Mike Pezeshki, P.E.



# CITY OF HOUSTON

Public Works and Engineering  
Department

## Interoffice

Correspondence

**To:** Mike Pezeshki, P.E.  
Interim Assistant Director  
Geo-Environmental Services  
Branch

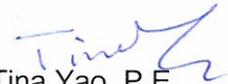
**From:** Supervising Engineer  
Water Engineering Section

**Date:** December 2, 2014

**Subject:** REVIEW OF DRAFT ESA II REPORT FOR  
WATER LINE REPLACEMENT IN ANTOINE  
FOREST AREA.  
WBS NO. S-000035-0196-3

Attached is the ESA II Draft Report prepared by Aviles Engineering Corporation (AEC) for the subject project. Please review and provide us with your comments by January 5, 2015.

If you have any questions, please contact me at (832) 395-2324 or Syed Ali at (832) 395-2421.

  
Tina Yao, P.E.

<sup>SA</sup>  
TY:SA

H:\design\A-WS-DIV\WPDATA\TY\WMR FY14\S-000035-0196\_0197-3\Phase II\Additional Services\ESA II\Antoine-0196\Request for Draft ESA II Report Review\_0196.doc

c: Arthur C. Morris, P.E.  
File S-000035-0196-3 (2.4)



**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX G**

**CITY OF HOUSTON STANDARD SPECIFICATION SECTION 02136**

SECTION 02136

WASTE MATERIAL HANDLING, TESTING AND DISPOSAL

PART 1 GENERAL

1.01 SECTION INCLUDES

Handling, testing and disposal of hazardous and non-hazardous waste material.

- A. Material present inside of existing tanks to be repaired or demolished, i.e., silt, sludge and other residue deposits generated by normal water production usage of the tanks.
- B. Existing coatings removed from existing tanks.
- C. Spent abrasives used and debris generated in the execution of the work.
- D. All spent thinners, coating materials or other products brought on site for execution of work that require disposal as a hazardous or non-hazardous waste.
- E. Soil that may be contaminated due to the execution of the work.
- F. Petroleum soaked sand foundation material removed from demolished tank sites.

1.02 MEASUREMENT AND PAYMENT

- A. No separate measurement and payment will be made for handling, testing or disposal of non-hazardous or hazardous material, debris or material identified as contaminated material on the site prior to the bid date except as indicated in section 1.02 B and 1.02 C. The Contractor shall include the cost for this work in the Contract bid price for work of which this is a component part.
- B. Payment for hazardous waste material handling, removal, testing, transporting and disposal of material identified as hazardous after the bid date will be paid for at the unit price bid for "Hazardous Waste Handling, Removal, Transporting" if such an item is provided in the contract.
- C. Removal and disposal of potentially petroleum soaked sand foundation material will be measured per cubic yard which shall include testing, removing, storing, transporting and disposing of material and will be paid for at the unit price bid for "Removal and Disposal of Potentially Petroleum Soaked Sand". Basis of payment will be Class I Industrial Waste having a Total Petroleum Hydrocarbon (TPH) level greater than 1500 ppm.

1.03 REFERENCES

The following is a list of applicable requirements to this project. It is not intended to be a complete listing of all laws and regulations to which the Contractor must comply.

A. Environmental Protection Agency - Code of Federal Regulations

1. 40 CFR Part 261 - Identification and Testing of Hazardous Waste
2. 40 CFR 261, Appendix II EPA - Toxicity Characteristic Leaching Procedure
3. 40 CFR Part 262 - Standards Applicable to Generators of Hazardous Waste
4. 40 CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste
5. 40 CFR Part 264 - Standards for Owner and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
6. 40 CFR Part 265 - Interim Status for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities
7. 40 CFR 265, Subpart C EPA - Preparedness and Prevention
8. 40 CFR 265, Subpart D EPA - Contingency Plan and Emergency Procedures
9. 40 CFR 265.16 EPA - Personnel Training
10. 40 CFR Part 268 - Land Disposal Restrictions
11. 49 CFR Parts 173,178 and 179: (USDOT/ Hazardous Materials, Shipping, Containers.)
12. 40 CFR Part 355 - Emergency Planning and Notification

B. EPA Methods

1. 3050 - Acid Digestion of Sediment, Sludge, and Soils
2. SW 846 - Test Methods for Evaluating Solid Waste - Physical/Chemical Methods

C. Texas Commission on Environmental Quality

1. TAC Title 30, Chapter 305 "Consolidated Permits"
2. TAC Title 30, Chapter 335 "Industrial Solid Waste and Municipal Hazardous Waste"
3. TAC Title 30, Chapter 343 "Oil and Hazardous Substances"

D. TWC Technical Guidelines

1. Document #1, Waste Evaluation/Classification

E. NIOSH Methods

1. 7082 Lead

F. Society for Protective Coatings

1. SSPC 91-18 - Industrial Lead Paint Removal Handbook
2. Guide 6 - Guide for Containing Debris Generated During Paint Removal Operations
3. Guide 7 - Guide for the Disposal of Lead Contaminated Surface Preparation Debris

1.04 SUBMITTALS

- A. Submittals shall conform to requirements of Section 01330 – Submittal Procedures.
- B. Submittals shall conform to appropriate codes for regulatory requirements.
- C. Obtain and submit disposal permits for proposed disposal sites, if required by local ordinances.

1.05 TESTING AND IDENTIFICATION

- A. The Owner is the Generator of the debris for permitting purposes, and will obtain the EPA Identification number, but the Contractor is responsible for assuring that all testing, handling, storage, transportation, and disposal requirements are properly implemented, including satisfactory training of job site personnel and the cleaning of all reusable items and equipment prior to removal from the site.
- B. Prior to the bid date, if testing has been performed by the City and if hazardous material has been identified in the debris material in an existing tank, the paint to be removed from an existing tank, the work site soil, or the foundation material, the material or test results will be indicated in section 01110. It is the responsibility of the Contractor to properly test and to determine if any wastes generated as a result of this project are hazardous in accordance with 40 CFR Part 261.

1.06 DEFINITIONS

(Note Definitions applicable to this section are also presented elsewhere.)

- A. Hazardous Waste (lead paint debris): Waste that is classified as hazardous due to its concentrations of regulated hazardous substances. Paint debris is classified as hazardous waste if, after testing by the Toxicity Characteristic Leaching Procedure (TCLP), the leachate contains any

of the 8 metals or other substances in concentrations at or above limits established in 40 CFR 261.

- B. Lead Containing Dust and Debris: Dust and debris generated during the project which contains lead in any amount, including but not limited to pulverized paint, spent abrasive, filters (wet and dry), and containment materials upon which lead is still present.
- C. RCRA: Resource Conservation and Recovery Act. Federal law pertaining to hazardous waste management. EPA implementing regulations are contained in 40 CFR 240-280.
- D. TACB: Texas Air Control Board. Texas State Agency joined into the TCEQ and responsible for writing and enforcement of rules and regulations relating to air quality.
- E. TCEQ: Texas Commission on Environmental Quality. State of Texas Commission responsible for planning, oversight, monitoring and management of natural resources.
- F. TCLP: Toxicity Characteristic Leaching Procedure. Laboratory tests conducted on wastes that determine the amount of hazardous materials that leach out into a test solution. The test is intended to simulate the properties of water as it leaches through a solid waste landfill. TCLP testing is defined in 40 CFR 261, Appendix II.
- G. TWC: Texas Water Commission. Texas State Agency joined into the TCEQ and responsible for writing and enforcement of rules and regulations relating to water quality and solid waste programs.

PART 2 NOT USED

PART 3 EXECUTION

3.01 WASTE HANDLING AND STORAGE

- A. All chemicals to be brought on site by the contractor must be stored and used in a safe and proper manner in accordance with all applicable Federal, State and local laws and regulations as well as the manufacturers recommendations. Material Safety Data Sheets (MSDSs) shall be maintained on-site for all hazardous chemicals used.
- B. Hazardous wastes are to be handled and stored according to the requirements of TAC 30 Chapter 335 "Industrial Solid Waste and Municipal Hazardous Waste" and 40CFR Part 262, with regard to on-site storage, and 40CFR Part 264 with regard to required notices, site security, personnel training, contingency planning and emergency procedures, recordkeeping and reporting, time of storage, amount of material stored, and use of proper containers. Hazardous waste will be stored in covered containers in accordance with the requirements of 40 CFR 262 and 49 CFR 172,178 and 179.
- C. The contractor shall provide proper, segregated storage for hazardous and non-hazardous

materials to be used in the work area in order to ensure safe work conditions.

- D. All material, waste and debris from removal of lead containing coatings, including those products and materials employed for chemical paint stripping , shall be considered hazardous waste and handled accordingly, until such time that testing and analysis indicates otherwise.
  - 1. Sampling of materials for TCLP testing of initial containers of debris shall be completed prior to or during filling. Until the TCLP test results are received, the containers shall be labeled as lead-containing debris. Hazardous waste labels shall be applied after the test results are received, if the debris tests hazardous.
  - 2. Hazardous waste shall not be stored at the project site for more than 90 days. Non-hazardous wastes shall be removed at a minimum of once per month (30 days).
  - 3. Special attention shall be given to the time of storage, storage conditions, amount of material stored at any one time, use of proper containers, and personnel training.
- E. Hazardous waste shall be placed on pallets over protected ground, be located in a secure area enclosed by a fence with signs around the perimeter, and be shielded adequately to prevent dispersion of the waste by wind or water. Under no circumstances shall the waste be stored within a flood plain area. Any evidence of improper storage shall be cause for immediate shutdown of the project until corrective action is taken. The storage area shall be within a security fence with a locked gate.

### 3.02 ENVIRONMENTAL CONTAMINATION

The contractor shall not contaminate the air, soils or surface and ground waters with any hazardous waste. Spills, releases and discharges of hazardous or toxic materials which inadvertently occur shall be reported in accordance with 40 CFR 265 and TAC 30 Chapter 343.

- A. Contingency Plan and Training: The Contractor shall comply with TCEQ Title 30 Regulations and EPA 40 CFR 265, Subpart C in the event of a spill or release of waste, EPA 40 CFR 265 Subpart D, and TCEQ regulations.
- B. All personnel associated with the handling of hazardous waste shall complete a formal training program in accordance with 40 CFR 265.16 and TCEQ Title 30 Regulations. Training records of all employees must be maintained and kept on file.

### 3.03 WASTE CLASSIFICATION

- A. Testing
  - 1. All solid waste generated by the paint removal activities shall be tested in accordance with 40 CFR 261, Appendix II, Method 1311 Toxicity Characteristic Leaching Procedure (TCLP), to determine if it is hazardous.

2. In the case of wet methods of preparation, the use of chemical strippers, or containerized hygiene water, all liquids and sludge shall also be tested. When chemical strippers are used, the testing shall include pH to determine corrosivity. All waste water shall be tested for total lead.
3. Representative samples of the debris for each waste stream generated from the work on this project shall be collected. A minimum of four of the samples representative of each waste stream shall be analyzed to establish a waste is non-hazardous. Note that more than four initial samples of each waste stream shall be collected in order to obtain the four representative samples for analysis. Results from one test sample are sufficient to identify a waste as hazardous.
4. The collection of the initial representative samples of each waste stream and selection of the minimum of four for testing shall be accomplished using a random sampling technique and shall comply with the following: a minimum of one representative sample for each 55 gallons of waste, or a minimum of four representative samples for each gondola or roll-off box of waste. Samples shall be collected in accordance with SW-846, "Test Methods for Evaluating Solid Waste - Physical/ Chemical Methods".
5. Sampling and testing shall be performed by a certified laboratory acceptable to the Owner. The name, address, and qualifications of the laboratory shall be provided for approval. The Owner shall be provided with copies of the test results as soon as they are received by the Contractor.

B. Classification

1. Lead paint debris is classified as hazardous waste if, after testing by TCLP, the leachate contains any of the 8 metals or other hazardous substances in concentrations at or above limits established in 40 CFR 261:

Arsenic -	5.0 mg/L
Barium -	100.0 mg/L
Cadmium -	1.0 mg/L
Chromium -	5.0 mg/L
Lead -	5.0 mg/L
Mercury -	0.2 mg/L
Selenium -	1.0 mg/L
Silver -	5.0 mg/L
2. The above includes only the eight (8) characteristic metals listed by EPA among which are elements typically associated with paints. Other substances may be present which may cause debris to be classified as hazardous waste as defined in 40 CFR 261 (such as a pH  $\leq 2.0$  or  $\geq 12.5$  resulting in corrosivity), and must be taken into account.

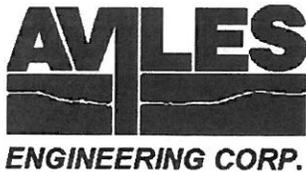
3.04 DISPOSAL

- A. The contractor shall arrange to have wastes and debris transported from the site in accordance with all City Ordinances and State and Federal Laws. If wastes and/or debris is determined to be hazardous, transporting to be in accordance with TAC 30 Chapter 335 -Industrial Solid Waste and Municipal Hazardous Waste, 40CFR Part 263 - Standards Applicable to Transporters of Hazardous Waste and the applicable sections of 49 CFR Parts 171 through 179.
- B. Manifest and Reporting: The Contractor shall comply with all of the manifesting, certification, and reporting requirements of EPA 40 CFR 262, 40 CFR 268, and Texas regulations, including certificates of final disposal for each shipment.
- C. Copies of all records and reports, test sample chain of custody forms, TCLP and other test results shall be provided to the Owner.
- D. The contractor shall dispose of wastes and debris at a licensed site acceptable to the Owner. Hazardous wastes and debris shall be disposed of in accordance with 40CFR Part 265 and 40CFR Part 268 Land Disposal Restrictions. Manifesting of hazardous wastes shall be in accordance with 40CFR Part 262, Subpart B.
- E. Waste water resulting from surface preparation, washing, personal hygiene or decontamination shall not be discharged without testing and through arrangement with the local Publicly Owned Treatment Works (POTW) or other approved means.

END OF SECTION

**Limited Phase II Environmental Site Assessment for Water Line Replacement  
In Antoine Forest Area, Houston, Texas  
City of Houston WBS No. S-000035-0196-3**

**APPENDIX H  
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.