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Site Delineation Report and Removal Action Work Plan

Former Virginia-Carolina Chemical Corporation Mobile Site
901 North Kate Street
Prichard, Alabama

August 2013

ARCADIS

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List of Acronyms and Abbreviations

1V:2H	1 foot vertical to 2 feet horizontal
ADEM	Alabama Department of Environmental Management
ALDOT	Alabama Department of Transportation
amsl	above mean sea level
ARCADIS	ARCADIS U.S., Inc.
bgs	below ground surface
bss	below sediment surface
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
COCs	constituents of concern
DOT	Department of Transportation
E&SC	erosion and sediment control
E&SC Plan	erosion and sediment control plan
EDR	Environmental Data Resources
EMES	ExxonMobil Environmental Services Company
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
Ft/d	feet per day
GPS	Global Positioning System
HASP	Health and Safety Plan
I-165	Interstate 165
IDW	investigation-derived waste
MAWSS	Mobile Area Water and Sewer System
MCLs	maximum contaminant level
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MSDS	Material Safety Data Sheet
NTU	nephelometric turbidity units
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl
PPE	personal protective equipment

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PSV	preliminary screening value
QAPP	Quality Assurance Project Plan
QC	Quality Control
RAC	Removal Action Contractor
RAWP	Removal Action Work Plan
RCRA	Resource Conservation and Recovery Act
ROW	right of way
RSE	Removal Site Evaluation
SDR	Site Delineation Report
SOP	Site Operations Plan
SSAL	Site-specific action level
SSSL	Site-specific screening level
TAL	Target Analyte List
TCLP	Toxicity Characteristic Leachate Procedure
TestAmerica	TestAmerica, Inc.
USEPA	United States Environmental Protection Agency
UTS	Universal Treatment Standards
VCC	Virginia Carolina Chemical Corporation
Work Plan	Site Delineation Work Plan, June 2012
WWSBP	Water Works and Sewer Board of Prichard
WWTP	Waste Water Treatment Plant
XRF	x-ray fluorescence

1. Introduction

This Site Delineation Report (SDR) and Removal Action Work Plan (RAWP) has been prepared by ARCADIS U.S., Inc. (ARCADIS) on behalf of ExxonMobil Environmental Services Company (EMES) to present the results of the site delineation activities at the former Virginia-Carolina Chemical Corporation (VCC) fertilizer plant located in Prichard, Mobile County, Alabama (the Site). The Site consists of approximately 24 acres of land formerly occupied by the fertilizer plant. Figure 1-1 identifies the Site location on the United States Geological Survey (USGS) 7.5-minute quadrangle map for Mobile, Alabama.

Unless otherwise specified in this report, the site delineation activities described herein were performed in accordance with the *Site Delineation Work Plan, Former Virginia-Carolina Chemical Corporation Mobile Site, Prichard, Alabama* prepared by ARCADIS on behalf of EMES and submitted to the United States Environmental Protection Agency (USEPA) Region 4 in June 2012 (ARCADIS 2012).

1.1 Project Objectives

The objective of the site delineation activities was to evaluate the magnitude and extent of Site-related constituents of concern (COCs) in soil, sediment, and groundwater associated with the former phosphate fertilizer plant. The primary COCs include arsenic and lead. These data were used to develop a removal action strategy for the Site that is protective of both human health and the environment. This report summarizes the site delineation data and presents the proposed removal action strategy.

1.2 Site Description and Background

1.2.1 Former Facility Description

The former VCC Mobile Site occupies approximately 24 acres. Virginia-Carolina Chemical Company acquired the Mobile fertilizer plant from Mobile Phosphate Company between 1895 and 1904 and operated it until declaring bankruptcy in 1924. At the conclusion of the federal reorganization proceedings in 1926, VCC of Richmond, Virginia, emerged as a new company and continued to operate the fertilizer plant in Mobile. Based on notations provided on a 1955 Sanborn® Fire Insurance Map (Sanborn® Map), the plant was “ruined” by a fire and was “not in operation”; however, the plant was evidently repaired and continued to operate until 1961, when VCC reportedly closed the plant and sold the Site. VCC merged into Socony Mobil Oil Company, Inc., in 1963, and the company name changed in 1966 to Mobil Oil Corporation. In 1999, Exxon Corporation merged with Mobil Oil Corporation to form Exxon Mobil Corporation. Mobil Oil Corporation became ExxonMobil Oil Corporation, the corporate successor to VCC. Exxon Mobil Corporation is the parent company of ExxonMobil Oil Corporation.

Based on a review of available Sanborn® Maps, the former VCC Mobile Site operated as a fertilizer manufacturing plant. Structures associated with the former plant included a fertilizer mixing and storage area (acid phosphate pits [e.g., dump pits], a rock grinding mill and a gas condenser), storage and shipping addition, acid chambers with associated burners/furnaces, sulfur heap, railroad sidings, nitre house, office, bag house, machine shop, motor room, boiler room, tractor house (with an underground gasoline tank and pump), oil house, potash storage building, dynamite store, ammonia tank house, coal shed, several electrical transformers, water supply wells (some of which were artesian), brick reservoir (approximately 100,000 gallons) and an elevated water tank (20,000 to 24,000 gallons) (Figure 1-2). Also depicted on the 1955 VCC Insurance Department map are several drainage ditches originating from the plant and an area labeled as “cinder fill for trucks.” The 1955 map also depicts a 10-foot sewer easement traversing the northeastern portion of the Site.

The former fertilizer plant structures are no longer present and the Site currently includes vacant properties and the Interstate 165 (I-165) corridor. The vacant properties, known hereinafter as Parcels 292 and 297, are undeveloped and overgrown with vegetation (i.e., shrubs, small trees and tall grasses). Notable features include a drainage ditch that transverses Parcel 297, extending from Lilly Street to New Bay Bridge Road, and long brush and rubble piles that transverse both parcels (Figure 1-2). Fencing is present around portions of both parcels.

The I-165 corridor consists of an elevated six-lane freeway deck with frontage roads (e.g., Hall Street) on both the northeast and southwest sides of I-165 and an interchange with New Bay Bridge Road. Most of the former facility structures were located within the current I-165 corridor and no longer exist. The ground surface topography slopes inward toward the centerline of the freeway toward a drainage feature. This drainage feature runs parallel with the freeway.

The Site is bounded to the southwest by the right-of-way (ROW) of the Illinois Central Railroad (a subsidiary of Canadian National) and to the east by vacant land and land occupied by the City of Prichard Water Works Wastewater Treatment Plant (WWTP).

Properties located in the vicinity of the Site are currently used for commercial, industrial and residential purposes, including the City of Prichard WWTP, which is operated by Prichard Water Works.

Figure 1-2 shows the approximate boundaries of the former VCC Site superimposed on a 2008 aerial photograph and tax map. Figure 1-2 also shows the approximate locations of major structures, improvements and other features now or formerly situated within the Site boundaries. Features associated with the former VCC Mobile Site were digitized from historical Sanborn® Maps and the 1955 VCC Insurance Department map.

1.2.2 Site Location

The current street address that most closely matches the Site is 901 North Kate Street, Prichard, Alabama (Figure 1-2). The geographical location of the center of the Site is at 30.7285° North Latitude and 88.0740° West Longitude (North American Datum of 1983).

1.2.3 Regional Geology and Hydrogeology

The Site is located in the Coastal Plain physiographic province of Alabama, which is characterized by a low-relief landscape where ground surface elevations generally vary from 19 to 30 feet amsl. The former VCC Site is situated on a topographic flat area with an elevation of approximately 22 to 25 feet amsl; however, the ground surface elevation beneath the elevated I-165 deck is considerably lower than adjacent Parcels 292 and 297.

Mobile and Prichard are underlain by Tertiary- to Quaternary-age coastal plain and terrace deposits (within the last 50 million years). The general sequence of geologic formations underlying Mobile County, listed in order of increasing depth, are the Holocene and Pleistocene Undifferentiated Series, the Citronelle Formation, the Miocene Undifferentiated Series and older sedimentary rocks to igneous and metamorphic basement rocks (Reed, 1971). The geologic units that crop out in the vicinity of the former VCC Site are alluvial, low terrace and coastal plain deposits (Alabama Department of Environmental Management [ADEM], 2001). The units are gravelly in many exposures and gray and orange sandy carbonaceous clay is present in some areas (ADEM, 2001).

Groundwater is available throughout Mobile County for industrial, irrigation and municipal purposes. Most wells are generally located in sand deposits of the Miocene Series, Citronelle Formation and Holocene Series (Reed, 1971). High-capacity wells are generally located in the deeper Miocene Series where artesian conditions may exist in sand deposits confined by clay or shale beds that are deeper than 550 feet below ground surface (bgs). Groundwater quality varies throughout the County, as the sodium chloride and dissolved solid content changes with depth and location (Robinson et al., 1956). Based on the State Soil Geographic Database (STATSGO) soil survey and the ADEM (2001) report, the depth-to-groundwater varies from approximately 6 to 25 feet bgs.

The soil type underlying the Site has been reported as urban land; and surrounding areas have been reported as containing loamy sand and mucky-peat soil types (Environmental Data Resources [EDR], 2010).

1.2.4 Site Geology and Hydrogeology

During site investigation activities performed by ARCADIS, shallow soil samples were collected across the Site at depths varying from 0.5 to 8 feet bgs. Subsurface soils generally consisted of brown-gray to yellow-brown silt with varying amounts of sand, clay, and gravel. Rootlets and gravel were generally observed from the ground surface to 0.5 feet bgs, while fill material (i.e., black cinders and brick fragments) was encountered at depths varying from 0.5 to 4 feet bgs at several locations. Fill materials were observed in several areas proximate to former VCC structures at the Site. In addition to fill materials, black slag and magenta/purple slag or staining were observed in materials recovered from five soil boring locations and three sediment sample locations (as discussed in Section 3).

During the 2012 site investigation activities, six shallow groundwater monitoring wells were installed across the Site. Shallow groundwater was generally observed at depths varying from 15 to 30 feet bgs. Additional details regarding groundwater elevations, conductivity and flow are provided in Section 3.

1.3 Surface Water Bodies

1.3.1 Surface Water

Surface water runoff originating from the Site flows offsite to the southeast via several drainage ditches to Threemile Creek. One of the drainage ditches traverses the northeastern portion of the Site from northwest to southeast and another runs parallel with I-165 (beneath the freeway deck). At its nearest point, Threemile Creek is located approximately one mile southeast of the Site. Threemile Creek discharges to the Mobile River, which in turn flows to Mobile Bay and eventually to the nearby Gulf of Mexico. On a regional scale, the Site is located within the Mobile River drainage basin.

1.3.2 Description of Drinking Water Sources

Public water service is available in the vicinity of the Site through the Mobile Area Water and Sewer System (MAWSS) and the Water Works and Sewer Board of Prichard (WWSBP). The WWSBP purchases water wholesale from MAWSS, but operates an independent distribution and billing system within the Prichard City limits. Customers within the Mobile city limits are served directly by MAWSS. The main source of water for MAWSS is Converse Reservoir at Big Creek Lake. The surface water intakes on Converse Lake are located approximately 13 miles to the west, upstream from the former VCC Site. The MAWSS distribution system supplies water to neighborhoods southwest of the I-165 corridor in the vicinity of the Site, while the WWSBP distribution system supplies water to neighborhoods northeast of the I-165 corridor in the vicinity of the Site, including properties along Kate Street, Glover Avenue and Hall Street.

The EDR Geocheck® Report (EDR, 2010) listed one public water supply well in the immediate vicinity of the Site. This well is located approximately 3,500 feet northwest of the former VCC Site. This well reportedly serves approximately 50 people and is owned by Fowl River Harbor, Inc. No private wells were observed at the Site during site investigation activities.

1.3.3 Wetlands and Floodplains

According to Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM), the Site is located in the 100-year floodplain. As part of the site investigation activities, ARCADIS completed an ecological assessment at the Site. ARCADIS confirmed the absence of any wetland habitats, protected species, designated critical habitats of protected species, and suitable protected species habitats within the Site boundaries. Additional details regarding ARCADIS' ecological assessment are described in Section 2 and are presented in Appendix A.

1.4 Summary of Previous Site Investigation

In February 2010, ARCADIS, on behalf of EMES, collected soil, sediment, and surface water samples from the Site as described in the Removal Site Evaluation (RSE) Report (ARCADIS, 2010). A total of 98 soil samples were collected from 32 soil boring locations across the Site. Soil samples were screened in the field for arsenic and lead using a portable x-ray fluorescence (XRF) instrument. Samples were generally collected from 0 to 0.5 feet bgs, 0.5 to 2 feet bgs, and 2 to 4 feet bgs. Four surface water samples and four surface sediment samples (0 to 0.5 feet below sediment surface [bss]) were also collected from the drainage ditch that traverses the Site.

All samples (soil, surface water, and sediment) were analyzed for arsenic and lead. Laboratory analytical results for soil and sediment samples were compared to USEPA Region 4 site-specific VCC screening levels (SSSLs) for arsenic and lead. The SSSLs for arsenic and lead are 27 milligrams per kilogram (mg/kg) and 800 mg/kg, respectively. The SSSLs have been used as remediation endpoints at similar commercial/industrial sites at other former VCC fertilizer sites in USEPA Region 4. Laboratory analytical results for surface water samples were compared to USEPA Maximum Contaminant Levels (MCLs) for drinking water of 10 micrograms per liter (μg/L) for arsenic and 15 μg/L for lead.

1.4.1 Soil Sample Results

Arsenic and lead concentrations above the SSSLs were most frequently detected in samples collected from the northwestern and eastern portions of the Site. The maximum arsenic and lead concentrations detected in soil were 294 mg/kg and 8,350 mg/kg, respectively, collected from soil boring MB-SB-20 at a depth of 0.5 to 2 feet bgs. The depth of impacted soil varied from 0 to 4 feet bgs across the Site. Magenta/purple staining or slag and black slag were observed in soil recovered from boring locations MB-SB-10, MB-SB-13 and MB-SB-20 at depths varying from approximately 0.5 to 4 feet bgs. The pH of the soil samples varied between 3.9 and 8.1 standard units. Soil data is discussed in detail with the 2012 data in Section 3. Additional information is presented in the RSE Report (ARCADIS, 2010).

1.4.2 Sediment Sample Results

Two of the four sediment samples (MB-SED-03 and MB-SED-04) collected from the drainage ditch had concentrations above the SSSLs. These sediment samples were located near the intersection of I-165 and New Bay Bridge Road in the vicinity of the former fertilizer plant structures. The maximum arsenic and lead concentrations detected in sediment were 98.2 mg/kg and 1,550 mg/kg, respectively. Sediment data is discussed in detail with the 2012 data in Section 3. Additional information is presented in the RSE Report (ARCADIS, 2010).

1.4.3 Surface Water Sample Results

Arsenic was detected in two of the four surface water samples collected (MB-SW-03 and MB-SW-04) at concentrations exceeding the MCL of 10 μg/L. The maximum detected arsenic concentration was 12.3 μg/L in sample MB-SW-04. Lead was not detected above the MCL of 15 μg/L in any of the samples. Additional information is presented in the RSE Report (ARCADIS, 2010).

1.5 Report Organization

This report is organized into 6 sections. The introduction provided in this section is followed in Section 2 by a description of the site delineation activities completed in 2012. Section 3 summarizes the results of the 2012 site delineation activities and incorporates the results obtained during the RSE. Section 4 presents a removal action strategy to address the impacted media, and Section 5 presents specific details of the proposed removal action. References cited in this report are included in Section 6.

This report also has six appendices. These appendices include an ecological site assessment, visual soil classifications for the soil and sediment samples collected, monitoring well construction logs, a copy of the waste manifests documenting the removal of investigation-derived waste (IDW) from the Site, a technical memorandum reporting the results of hydraulic conductivity analyses performed at the monitoring well locations, and a technical memorandum deriving site-specific action levels based on guidelines published by ADEM.

2. 2012 Site Delineation Activities

2.1 Introduction

As described in Section 1.4, data generated during the RSE indicated the presence of elevated concentrations of arsenic and lead in soil, sediment and surface water samples collected from specific areas of the Site. Additional site investigation activities were completed in 2012 to fully delineate arsenic and lead impacts so that a comprehensive removal action strategy could be developed. The 2012 site investigation activities included the following:

- Additional soil and sediment samples were collected to delineate the extent of arsenic and/or lead above the SSSLs;

- Groundwater monitoring wells were installed at the Site to evaluate the presence or absence of arsenic and/or lead in Site groundwater and identify groundwater flow patterns; and

- A ecological site assessment was performed to assess the presence or absence of any wetlands or endangered/threatened species at the Site that may affect future remediation plans.

Additional surface water samples were not collected during the 2012 site investigation activities. As described in Section 4, this report presents a removal action that addresses impacted soil and ditch sediments. Upon the removal of impacted soil and ditch sediments, surface water quality is expected to improve.

Unless otherwise specified in this SDR, investigation activities were performed in accordance with the Site Delineation Work Plan (Work Plan) (ARCADIS, 2012).

2.2 Pre-Characterization Activities

Prior to the start of sampling, EMES obtained written permission from the property owners to enter the properties and collect samples. Before beginning any subsurface activities, the locations of underground utilities were identified by the public utility locating service to minimize the possibility of disrupting services and to protect the safety of the workers. To further confirm the absence of utilities, a private utility locating company was contracted to clear all areas where subsurface work was to be performed.

2.3 Soil Boring Sampling and Analysis Activities

In 2012, a total of 189 soil samples (including 11 field duplicates) were collected from 57 soil boring locations to evaluate the horizontal and vertical extent of soil containing arsenic and/or lead above the SSSLs. As part of the soil sampling activities, soil samples were collected from borings advanced at five of the six monitoring well locations (MB-MW-01 through MB-MW-05) prior to well installation. Soil samples collected at monitoring well location MB-MW-06 were inadvertently discarded prior to classification and analysis; however, soil samples collected from boring MB-SB-74 (less than 10 feet away from MB-MW-06) were classified and analyzed. All 2012 soil boring locations are shown on Figure 2-1.

At each location, soil samples were collected using hand augers or direct-push techniques. Soil samples were generally collected at each location from 0 to 0.5 feet bgs, 0.5 to 2 feet bgs, 2 to 4 feet bgs, and in 2-foot intervals thereafter. Borings were advanced until XRF results for arsenic and lead were below the SSSLs and no magenta slag was observed, or until groundwater or refusal was encountered, whichever was shallower. If magenta slag was observed at the depth where groundwater was encountered, additional soil samples were collected below groundwater in 2-foot intervals until slag was no longer observed.

As indicated in the Work Plan, ARCADIS revisited four locations established during the RSE (MB-SB-12, MB-SB-20, MB-SB-25 and MB-SB-29) in an attempt to further delineate the vertical extent of arsenic and/or lead above the SSSLs beyond the maximum depth sampled (e.g., 4 feet bgs). At locations MB-SB-12 and -29, additional soil samples were collected from 4 to 6 feet bgs and 6 to 8 feet bgs. However, refusal was encountered at MB-SB-20 and -25 preventing the collection of deeper soil samples at these locations.

A summary of the soil sampling program is presented in Table 2-1 and physical descriptions of the soil samples are provided in Appendix B.

2.3.1 XRF Screening

Soil samples were screened in the field for arsenic and lead concentrations using a portable XRF device. The XRF device was used to determine if additional sampling was needed to achieve horizontal and vertical delineation objectives described in the Work Plan. Soil samples screened with the XRF were retained and sent to

TestAmerica, Inc. of Nashville, Tennessee (TestAmerica) for analyses as described below. All samples reported and used in this RAWP have been analyzed by TestAmerica and validated as specified in the Work Plan.

2.3.2 Laboratory Analyses

All soil samples collected from 0 to 0.5 feet bgs, 0.5 to 2 feet bgs, and 2 to 4 feet bgs were submitted to TestAmerica for arsenic, lead, and pH analyses. Samples were generally analyzed from successively deeper intervals until the concentrations of arsenic and lead were below the SSSLs levels. At seven locations, vertical delineation was not achieived. At locations MB-SB-20, -25, and -57, additional samples could not be collected due to refusal or the presence of groundwater. At four other locations (MB-MW-2, -SB-44, -SB-53, and -SB-84), XRF results indicated that arsenic and/or lead concentrations in the deepest samples were below screening levels and, as such, deeper samples were not collected.

A summary of the soil sampling program is presented in Table 2-1.

2.4 Groundwater Sampling and Analysis Activities

2.4.1 Monitoring Well Installation

Six groundwater monitoring wells were installed at the Site to evaluate arsenic and lead concentrations in shallow groundwater and to evaluate groundwater flow patterns at the Site. Monitoring wells were installed and developed in accordance with the procedures specified in the Work Plan. Monitoring well locations are shown on Figure 2-2. All monitoring wells were completed using single casings and were screened across the water table.

Groundwater monitoring well specifications are provided in Table 2-2; and monitoring well construction logs and soil boring lithology are presented in Appendix C.

2.4.2 Groundwater Sample Collection and Analyses

Groundwater monitoring wells were sampled October 18 and 19, 2012. Groundwater samples were collected from each well using low-flow/low-stress sampling techniques in accordance with the procedures specified in the Work Plan. As described in the Work Plan, groundwater samples were analyzed by TestAmerica for total and dissolved arsenic and lead. Field parameters including pH, temperature, conductivity, dissolved oxygen, oxidation-reduction potential and turbidity were recorded during purging and just prior to sample collection. A summary of the groundwater sampling program is presented in Table 2-1.

2.5 Sediment Sampling Program

A total of 12 sediment samples were collected from five locations in the drainage ditch that traverses the Site to further delineate the horizontal and vertical extent of sediments containing arsenic and/or lead above the SSSLs. Sediment sampling activities included the collection of samples from four new locations (MB-SED-05 through MB-SED-08) and two locations (MB-SED-03, and -04) previously established during the RSE. At locations MB-SED-05 through MB-SED-08, sediment samples were generally collected from 0 to 0.5, 0.5 to 2, and 2 to 4 feet bss, or until refusal was encountered, whichever was shallower. At MB-SED-03, sediment samples were collected from 0.5 to 2 feet bgs, 2 to 4 feet bgs, and 4 to 6 feet bgs. During sampling activities, ARCADIS also attempted to collect additional samples beyond 0.5 feet bgs at MB-SED-04; however, refusal was encountered at 0.5 feet bgs and, as such, no additional samples could be retrieved.

All sediment samples were submitted to TestAmerica and analyzed for arsenic, lead, and pH. A summary of the sediment sampling program is provided in Table 2-1 and sediment sampling locations are shown on Figure 2-2.

2.6 Staff Gauge Installation

Three staff gauges (MB-PZ-01, -02, and -03) were installed in the drainage ditches on October 16, 2012. The staff gauges were installed in accordance with the procedures specified in the Work Plan. Prior to gauging, these staff gauges were destroyed. As such, the locations of these staff gauges and the corresponding water levels could not be surveyed. In the event that future surface water gauging data is needed, these staff gauges will be re-established in the field.

It should be noted, however, that during the groundwater gauging event described in Section 2.7 (below), water levels at the staff gauge locations were either dry or less than 2 inches.

2.7 Groundwater Elevation Measurements

Depth-to-water measurements were recorded on January 11, 2013 at all six of the groundwater monitoring wells established at the Site. Depth-to-water measurements were performed in accordance with the procedures specified in the Work Plan. Groundwater elevations were calculated by comparing the depth-to-water measurements obtained in the field with surveyed reference points on the monitoring well casings. Groundwater elevations are provided in Table 2-3 and a groundwater potentiometric surface map is provided on Figure 2-3.

2.8 Investigation-Derived Waste Sampling

A total of 23 drums of IDW were generated during the site delineation activities. Of the 23 drums, 8 contained liquids (e.g., decontamination fluids and purge water), and 15 contained solids (e.g., soil cuttings, trash, and personal protective equipment [PPE]). Drums containing solids were analyzed for toxicity characteristic leachate procedure (TCLP) metals and pH, and drums containing liquids were analyzed for target analyte list (TAL) metals and pH. Samples were collected in accordance with the procedures specified in the Work Plan. A summary of the IDW sampling program is provided in Table 2-1.

2.9 Surveying

EMES contracted with Lowery and Associates Land Surveying, LLC to survey the horizontal and/or vertical control of soil borings, groundwater monitoring wells, and sediment sampling locations. Additional features such as roadways, utility lines, property lines, and other relevant Site features (e.g., railroad lines) were also surveyed. All survey data was referenced to the North American Datum of 1983 and the North American Vertical Datum of 1988.

2.10 Ecological Site Assessment

A site-specific ecological assessment was conducted to characterize habitat, identify the presence and extent of wetlands, provide insight to potential receptors that may inhabit the area, and document potential habitat for threatened and endangered species. A pedestrian survey of the Site was conducted and global positioning equipment (GPS) equipment was used to locate any significant ecological features onsite. Wetland identification and delineation methods conformed to the 1987 U.S. Army Corps of Engineers Wetland Delineation Manual and the October 2008 Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region. The Site was also evaluated for habitat that may support threatened or endangered species listed by the U.S. Fish and Wildlife Service as occurring in Mobile County, Alabama.

2.11 Data Validation

Laboratory analytical data were validated by ARCADIS in accordance with the procedures outlined in the Quality Assurance Project Plan (QAPP) contained in the Work Plan. Data validation entails a review of the quality control (QC) data and the raw data to verify that the laboratory was operating within required limits, the analytical results are correctly transcribed from the instrument read outs, and which, if any, environmental samples are related to any deficient QC samples. The objective of the data validation is to identify any questionable or invalid laboratory measurements and to determine if the quality is sufficient to meet the data quality objectives.

3. Summary of Results

This section presents the combined results of the soil, sediment and groundwater sampling activities obtained during the 2010 RSE and 2012 site delineation activities described in Section 2.

3.1 Soil Sample Results

3.1.1 Total Arsenic, Lead, and pH Results

A total of 276 soil samples from 87 soil borings (including the monitoring well locations) were collected and analyzed for arsenic, lead, and pH. Arsenic and lead concentrations were compared to the SSSLs described in Section 1. Arsenic and/or lead were detected above the SSSLs at 27 of the 87 soil boring locations. The majority of these locations are on Parcel 297; however, elevated concentrations of arsenic and/or lead were also noted along the I-165 corridor and the Illinois Central Railroad ROW.

The maximum concentrations of arsenic (810 mg/kg) and lead (18,800 mg/kg) were detected in a sample obtained from soil boring MB-SB-57 located on Parcel 297. This soil boring was located northwest of the intersection at Hall Street and New Bay Bridge Road in the vicinity of the former nitre house and oil house. Soil pH levels across the Site varied between 3.3 and 8.6 standard units.

Soil boring locations with arsenic and/or lead concentrations greater than the SSSLs are illustrated in Figure 3-1. Soil sample analytical data is presented in Table 3-1.

3.1.2 Soil Borings Containing Magenta Slag

Magenta/purple slag or staining was observed in soil samples collected from five locations across the Site. Four of these locations are located on Parcel 297 and the remaining location is located on the Illinois Railroad ROW. The depth of observed magenta/purple materials varied from 0.5 feet bgs to 7 feet bgs (MB-SB-12). The relative proportions of magenta/purple materials to soil, where observed, were not uniform and generally varied by both location and depth. The locations where magenta/purple materials were observed are identified in Figure 3-1. Physical descriptions of the soil samples collected at the Site are included in Appendix B.

3.2 Groundwater Sample Results

In October 2012, groundwater samples were collected from six shallow groundwater monitoring wells installed at the Site (MB-MW-01 through MB-MW-06). All groundwater samples were analyzed for total and dissolved arsenic and lead. Field parameters (including dissolved oxygen, oxidation reduction potential, pH, specific conductivity, temperature, and turbidity) were also recorded during sample collection.

Total arsenic was detected above the MCL of 10 μg/L in samples collected from two of the six monitoring wells. Detected concentrations of arsenic varied from 10.2 μg/L (MB-MW-06) to 17.9 μg/L (MB-MW-03). Dissolved arsenic concentrations were similar to the total arsenic concentrations.

Total lead was detected in samples obtained from three of the six monitoring wells; however, all detected concentrations of lead were below the MCL of 15 μg/L. Detected concentrations varied from 2.7 μg/L (MB-MW-04) to 7.7 μg/L (MB-MW-02). Dissolved lead concentrations were similar to the total lead concentrations.

Groundwater pH varied across the Site from 4.12 (MB-MW-02) to 6.54 (MB-MW-06) standard units. Turbidity was generally stable and varied from 4.11 Nephelometric turbidity units (NTUs) (MB-MW-05) to 9.24 (MB-MW-02) NTUs.

Groundwater analytical results and field parameter data are presented in Table 3-2.

3.3 Groundwater Hydraulics

3.3.1 Groundwater Gauging and Evaluation of Potentiometric Surface

Water level measurements were collected under static groundwater conditions on January 11, 2013. Observed groundwater elevations varied from 5.37 feet amsl (MB-MW-06) to 7.72 feet amsl (MB-MW-05). A groundwater potentiometric surface map for the January 2013 gauging event is depicted on Figure 2-3. The depth to water and groundwater elevations are presented in Table 2-3.

As shown on the shallow groundwater potentiometric surface map (Figure 2-3), groundwater generally flows from west to east with smaller components of flow toward the north and south. The horizontal component of the groundwater hydraulic gradient, calculated from the groundwater elevation contours, varied from approximately 0.002 feet/foot across the northeast portion of the Site (MB-MW-03 to MB-MW-01) to approximately 0.005 feet/foot near the central portion of the Site (MB-MW-05 to MB-MW-03).

3.3.2 Hydraulic Conductivity

ARCADIS performed falling- and rising-head slug tests at all six of the groundwater monitoring wells installed in 2012. Using the Bouwer-Rice solution for unconfined aquifers, reasonable values for hydraulic conductivity were estimated for all wells analyzed. In general, hydraulic conductivity values were consistent at a given well for falling- and rising-head tests, as well as at different locations across the Site. The hydraulic conductivity result for MB-MW-4 was notably lower than the other five wells analyzed. However, lithology within the screened interval at MB-MW-4 was characterized by a higher clay content than in the other wells, which is consistent with its reduced hydraulic conductivity. The hydraulic conductivity results at each of the six wells analyzed are consistent with the expected hydraulic conductivity values based on lithology at each well (typically fine to medium sand with some very fine or coarse sand). Hydraulic conductivity varied from 5.5 to 30.8 feet per day (ft/d). Hydraulic conductivity values are presented in the table below. Additional details regarding the slug tests and estimation of the hydraulic conductivity values are included in Appendix D.

Monitoring Well ID	Slug Test Type	Hydraulic Conductivity (feet/day)
MB-MW-01	Slug In	14.0
	Slug Out	30.8
MB-MW-02	Slug In	19.6
	Slug Out	17.8
MB-MW-03	Slug In	24.8
	Slug Out	15.0
MB-MW-04	Slug In	5.5
	Slug Out	6.7
MB-MW-05	Slug In	19.4
	Slug Out	26.5
MB-MW-06	Slug In	18.0
	Slug Out	25.8

3.4 Sediment Sample Results

A total of 16 sediment samples were collected from 8 locations at the Site as shown on Figure 3-2. Arsenic and/or lead concentrations were detected above the SSSLs at five of these locations. The locations of these sediment samples are located just upstream and just downstream of the intersection of New Bay Bridge Road and Hall Street. The maximum concentrations of arsenic (388 mg/kg) and lead (1,760 mg/kg) were detected in samples collected at location MB-SED-05 located approximately 200 feet upstream of the intersection. Of the five locations that contained arsenic and/or lead above the SSSLs, samples from four of these locations also contained magenta/purple staining or slag.

Sediment sample locations with arsenic and/or lead concentrations above the SSSLs are illustrated in Figure 3-2. Figure 3-2 also illustrates those locations where magenta/purple staining and/or slag were observed. Sediment sample analytical data is presented in Table 3-3; and physical descriptions of the sediment samples are included in Appendix B.

3.5 Investigation-Derived Waste Sampling and Disposal

A total of 23 drums of IDW were generated during the 2012 site investigation activities. Eight of these drums contained decontamination fluids or purge water; and the remaining 15 drums contained soil, debris and/or disposable PPE. Representative samples of solid and liquid waste materials were collected and submitted to TestAmerica for analysis. Solid samples were analyzed for TCLP metals and pH; and liquid samples were analyzed for TAL metals and pH. Sample analytical results for solid waste are presented in Table 3-4; and results for liquid waste are presented in Table 3-5.

Based on the analytical results, all waste materials were characterized as non-hazardous waste. Haz-Mat Transportation and Disposal, Inc. collected and transported all waste materials for offsite disposal. All liquid wastes were disposed of at their Charlotte, North Carolina facility, and all solid wastes were disposed of at the Allied CMS Landfill in Concord, North Carolina. A copy of the waste manifest is provided in Appendix E.

3.6 Ecological Assessment Results

As described in Section 2.10, ARCADIS completed a site-specific ecological assessment to characterize habitat, identify the presence and extent of wetlands, provide insight to potential receptors that may inhabit the area, and document potential habitat for threatened and endangered species. ARCADIS confirmed the absence of wetland habitat, protected species, designated critical habitat of protected species, and suitable protected species habitat within the Site boundaries. Additional details related to the ecological assessment are provided in Appendix A.

4. Removal Action Strategy

4.1 Introduction

As described in previous sections of this SDR, arsenic and lead were detected above the SSSLs in soil and ditch sediments at a number of locations across the Site. This section outlines the strategy of a soil removal action to address these media. As part of developing a strategy for the soil removal action, site-specific action levels (SSALs) were derived for the Site. Through the course of the removal action, efforts will be made to remove the bulk of the source material above SSALs while implementing institutional controls to mitigate any impacts of material left behind.

In developing the SSALs for this Site, three sets of remediation goals were considered. These remediation goals included USEPA Action Levels, ADEM's preliminary screening values (PSVs), and the Site-specific remediation goals based on ADEM's risk calculation criteria.

The USEPA action levels are 27 mg/kg for arsenic and 800 mg/kg for lead. The action level for arsenic is a USEPA-determined value which is used an approved remediation endpoint at similar former phosphate fertilizer sites in USEPA Region 4. The action level for lead is based on the USEPA Regional Screening Level (RSL) for lead with industrial site use.

ADEM's PSVs for arsenic and lead in soil at commercial sites are 1.6 mg/kg and 800 mg./kg, respectively. Since the maximum concentrations of arsenic and lead at the Site both exceed the PSVs, Site-specific remediation goals were developed. The site-specific remediation goals were calculated at 27 mg/kg for arsenic and 941 mg/kg for lead based upon the planned removal action and future land use criteria. Details on the procedures used for developing the Site-specific remediation goals are provided in Appendix F.

EMES desires to accomplish all soil removal objectives required by both the USEPA and the ADEM at the Site on a one-time basis to avoid future soil removal actions at the Site. Therefore, EMES has committed itself to employing the more conservative remedial goals (the USEPA action levels) for arsenic (27 mg/kg) and lead (800 mg/kg) as final remediation goals for the Site. The purpose of this section is to outline a removal action strategy to address these media.

The proposed removal action strategy includes the excavation and offsite disposal of soils and ditch sediments containing arsenic and/or lead at concentrations above the SSALs. Impacted materials will be removed to the extent practical; however, it is likely that some impacted materials may be left onsite. During the removal action, it will be imperative to maintain traffic on the existing adjacent roadways, I-165 overpass, and railway. It will also be necessary to protect utility features within the excavation areas and maintain service to downstream users. As such, excavation in or adjacent to these features and utilities may be limited. Upon approval of this RAWP, EMES will contact the respective property owners to negotiate access and identify any property-specific excavation constraints. These constraints may include sloping, benching, or limiting excavations adjacent to existing structures (e.g., bridge supports), roadways, railways, or utilities. A Site Operations Plan (SOP) defining these excavation constraints will be provided to USEPA for review and approval prior to mobilization. At a minimum, excavation will not be performed beneath the footprints of any existing structures (e.g., bridge supports), roadways, or railways. Excavations within transportation corridors and adjacent to and beneath certain utility features will also be limited as discussed in further detail in Section 5.

As indicated in Section 3, groundwater at monitoring wells MB-MW-03 and MB-MW-06 contained arsenic at just above the MCL of 10 μg/L. Upon completion of the removal action, groundwater quality at the Site is expected to improve. Following the completion of the removal action, a post-removal site control plan will be submitted for USEPA review and approval. This plan will evaluate potential future impacts to groundwater based on residual concentrations of arsenic left in place. In addition, the plan will outline provisions for implementing institutional controls to restrict the future use of groundwater (if appropriate) and excavation activities in areas where impacted soils may remain onsite at depth. The post-removal site control plan will be submitted within approximately 60 days of USEPA approval of the Removal Action Completion Report.

4.2 Soil Removal Action Overview

The proposed soil removal action for this Site was developed in consideration of a number of factors. At a minimum, the removal action must be protective of human health and the environment. Other considerations included the following:

- minimizing the disruption to traffic on I-165, the adjacent frontage road (Hall Street), New Bay Bridge Road, and the Illinois Central Railroad rail line;

- protecting the integrity of existing structures (e.g., bridge supports), roadways, railways, or utilities;

- maintaining service to downstream users for utilities that traverse the impacted soil areas;

- providing safe access for travelers and pedestrians in roadways and public ROWs; and

- restoring the affected properties in a manner and timeframe that is acceptable to EMES and the affected property owners.

Soil removal activities will be performed on four properties. Two of these properties (Parcels 292 and 297) are undeveloped and vacant and the remaining properties serve as active transportation corridors maintained by Alabama Department of Transportation (ALDOT) and Illinois Central Railroad. To the extent possible, all soil containing arsenic and/or lead at concentrations above the SSALs will be excavated and disposed of offsite. Impacted soils that cannot be excavated will be managed through institutional controls (e.g., deed restrictions) to prevent incidental contact with these soils in the future. Figure 4-1 depicts the initial horizontal and vertical limits of soil removal. The horizontal limits of the soil/ditch sediment removal are based on the presence of arsenic and/or lead above the SSALs. The vertical limits are based on the maximum depth at which arsenic and/or lead were detected above the SSALs in individual soil borings. Analytical results for those borings containing one or more soil samples above the SSALs are presented in Table 3-1.

All excavated soils will be transported offsite and disposed of at a USEPA-approved landfill. It is anticipated that all soils will be disposed of at a Resource Conservation and Recovery Act (RCRA) Subtitle D landfill. To facilitate disposal in a Subtitle D landfill, soil from select areas may need to be stabilized to reduce TCLP arsenic and/or lead concentrations to below 5 milligrams per liter (mg/L). If stabilizing the soil proves to be impractical, these materials will be transported to and disposed of at a RCRA Subtitle C landfill.

The intent of the removal action is to remove impacted soil to the extent practical. As part of this removal action, soil will not be excavated below railways or other areas that are currently paved or covered with concrete. Excavation within transportation corridors (e.g., properties maintained by ALDOT and Illinois Central Railroad) will be limited to a maximum depth of 2 feet regardless of the depth of impacted soils. Soil also will not be excavated adjacent to certain utilities that, if exposed, could fail or be damaged. Guidelines for excavating soil next to utilities are described in Section 5. Impacted soils left in place will be covered with a high visibility, degradation resistant, demarcation liner installed at the base of the excavation prior to backfilling. The purpose of this liner is to provide a visual means of identifying the boundary between backfilled soil and impacted soil to existing/future property owners or utility workers that may perform excavation work at the Site in the future.

To maintain the stability of existing structures (e.g., bridge supports), roadways, and railways the sidewalls of the excavations adjacent to these areas will be sloped or benched. Sloping or benching will also be performed adjacent to utility poles, utility pedestals, utility guy wires and select utility lines. Prior to soil removal activities, a structural analysis will be performed to determine the angle of repose for excavations adjacent to these features. Based on soil conditions observed during the site investigation activities, it is assumed that the slope of the excavation will be approximately 1 foot vertical to 2 feet horizontal (1V:2H).

Institutional controls will be implemented to limit the future uses of all properties at which arsenic and/or lead concentrations exceed the SSALs. In addition, these properties will be enrolled in a maintenance and monitoring program implemented by EMES. This program will include annual inspections/maintenance to document the condition of each property and to preserve the integrity of the restored areas and prevent exposure to, or excavation of, impacted soils by the property owners and utility workers. In the event that it becomes necessary in the future to excavate or remove additional impacted soil from an individual property, soil removal activities will be coordinated with, and performed by, representatives of EMES. Such activities may include, but are not limited to, the installation of owner-supplied landscaping materials, removal of subsurface soils to support future construction activities, and excavation associated with the repair or replacement of subsurface utilities.

5. Removal Action Work Plan

5.1 Introduction

The RAWP presented in this section has been prepared to outline the technical approach and methods for conducting a removal action at the Site based on the objectives described in Section 4. This RAWP includes the removal of impacted soil and ditch sediments and replacement with clean soil fill. As described in Section 4.2, soil will not be removed from beneath paved areas and only limited excavation will be performed adjacent to existing structures (e.g., bridge supports), roadways, and railways. Excavation also will be limited adjacent to utility poles, utility pedestals, utility guy wires and select utility lines to protect these utilities, protect site workers from accidental contact, and avoid service interruptions to downstream users.

In areas where impacted soils are left in place at depth, EMES will work with the affected property owners to implement institutional controls following the completion of the removal action. Areas where impacted soil are left in place will be enrolled in an annual monitoring program that includes inspections to maintain the integrity of the restored areas and ground cover, and assistance to affected property owners and utility companies if excavation of impacted soils is required in the future.

This RAWP provides a description of the overall strategy for implementation of the removal action at the Site. EMES' Removal Action Contractor (RAC) will prepare a SOP containing detailed plans for implementing this strategy. The contents of the SOP are described in more detail in Section 5.3.10. The SOP will be submitted to USEPA for review and comment prior to the start of work. Removal activities at the Site will not commence until USEPA has approved the SOP.

5.2 Project Organization

This section describes the roles of the various organizations involved in developing and implementing the removal action.

5.2.1 Regulators/Agencies

USEPA is the lead regulatory agency for this project. Mr. Terry Tanner, On-Scene Coordinator, will be responsible for providing and coordinating regulatory oversight and direction, as necessary, including the review, comment, and approval of required submittals.

5.2.2 Responsible Party

EMES is the party responsible for VCC-related impacts to the Site. While the interests of EMES will be represented in the field by the Engineer and RAC (as described below), representatives of EMES will also maintain an active role in the project. The EMES Project Manager for the Site is Ms. Kristen Mobyed.

5.2.3 Engineer

On behalf of EMES, ARCADIS of Raleigh, North Carolina will be responsible for the engineering aspects of the removal action. General ARCADIS responsibilities include, but are not limited to, the following:

- preparing this RAWP and appendices;
- reviewing materials prior to submittal to EMES;
- interfacing with regulatory agency personnel;
- collecting post-excavation and waste characterization samples;
- preparing and submitting status reports to EMES;
- managing field activities; and
- preparing and submitting the final report to USEPA.

ARCADIS has designated Mr. William Anckner as the Project Manager to oversee implementation of the above activities.

5.2.4 Removal Action Contractor (RAC)

EMES will retain a RAC to perform the removal action. Responsibilities of the RAC include, but are not limited to, the following:

- preparing and submitting all plans, permits, and other submittals specified in this RAWP for approval by EMES;

- providing the labor, material, and equipment necessary to complete the removal activities in accordance with this RAWP and the approved project plans;

- coordinating the handling, transport, and disposal of waste material, including soils, residuals, and PPE;

- performing surveying; and

- providing site health and safety monitoring.

The RAC will appoint one member of its onsite team as the Site Supervisor. The Site Supervisor will be a qualified professional with experience in removal actions and will coordinate all activities in accordance with the RAWP. In the event that an unexpected circumstance may hinder or prevent the RAC from adhering to the RAWP or approved project plans, the Site Supervisor will consult immediately with the Engineer.

5.2.5 Waste Disposal Facility

Excavated soil that does not contain TCLP concentrations of arsenic and lead above 5.0 mg/L may be disposed at the following RCRA Subtitle D landfill:

Republic Timberland Landfill
22800 Highway 41
Brewton, AL
USEPA ID. No. ALD98212311

Excavated soil that contains TCLP concentrations of arsenic and/or lead above 5.0 mg/L will either be stabilized onsite and disposed of at the facility described above, or will be disposed of offsite without stabilization at the following RCRA Subtitle C landfill:

Chemical Waste Management
P.O. Box 55
Highway 17 North, Mile Marker 163
Emelle, AL 35459
205-652-8156
USEPA ID No. ALD000622464

5.2.6 Analytical Laboratory

TestAmerica has been selected for the analysis of waste characterization and post-excavation confirmation soil samples collected as part of this project. Additional laboratories will not be used to process soil samples without prior approval from USEPA.

5.3 Technical Approach and Scope of Work

The removal action consists of the excavation of impacted soil and ditch sediments as shown on Figure 4-1. Excavated materials will be stockpiled and characterized for off site disposal. Select soil/sediments may be stabilized using a phosphate-based stabilization reagent (as needed to facilitate disposal of the soil at a Subtitle D landfill) prior to off site disposal. Excavated areas will then be sampled, backfilled with imported fill, and restored as appropriate.

The following sections describe these activities in more detail.

5.3.1 Securing Access Agreements for Construction

EMES and ARCADIS will work with the affected properties owners to execute reasonable access agreements prior to the start of work. No work will be performed on an affected property until a reasonable access agreement has been signed by the affected property owner.

5.3.2 Mobilization

Prior to mobilization, the RAC will prepare submittals for review and approval by EMES. These submittals include the SOP and a Health and Safety Plan (HASP). The SOP will contain the following:

- Erosion and Sedimentation Control Plan (E&SC Plan)
- Traffic Control Plan
- Dust Control Plan
- Noise Control Plan

- Stormwater Management Plan
- Decontamination Plan
- Site Security Plan
- Project Schedule
- Contingency Plan

A detailed description of the required contents of these submittals is presented in Section 5.3.10. Equipment and personnel needed to implement the removal action will then be mobilized to the Site. Local suppliers for goods and services (e.g., water, portable toilets, landscaping materials) will be identified upon mobilization to the Site.

5.3.3 Preparation of the Site for Removal Activities

The following sections describe the activities that will be performed at the Site to prepare for the intrusive phases of the removal action.

5.3.3.1 Installation of Erosion and Sediment Control Measures

Erosion and sediment control (E&SC) measures (e.g., silt fence, hay bales) will be installed at the Site to prevent the migration of soil-bound contaminants to surface water bodies. The type and location of E&SC measures will be specified in the E&SC Plan to be prepared by the RAC as part of the SOP. E&SC measures will be inspected regularly by the RAC to monitor their continued effectiveness. Additional E&SC measures will be installed, as necessary, as the removal action progresses to prevent the migration of eroded soil from the Site.

Appropriate measures will be taken to minimize the volume of water accumulating in areas of disturbed soil that potentially contain elevated arsenic and/or lead concentrations. Water that does not come into direct contact with disturbed soil will be directly discharged into the appropriate drainage feature. Water that has contacted disturbed soil that potentially contains elevated levels of arsenic or lead will be sampled and/or treated in accordance with the Stormwater Management Plan prepared by the RAC prior to removal for offsite disposal or discharge.

5.3.3.2 Subsurface Utility Markout

All necessary precautions will be taken to prevent damage to the various subsurface and aboveground utilities that exist at the Site. A review of available Site plans and/or as-builts will be conducted to identify the general location of subsurface utilities. Necessary permits and utility clearances will be obtained prior to any subsurface activities. The utility companies (and/or any private organization that is authorized by the utility companies to delineate the presence of all subsurface services) will be contacted at least 72 hours before onsite intrusive activities are started. A utility markout will be conducted at the Site to locate all subsurface utilities (e.g., gas, sewer, water, electrical, telephone). In addition, a private utility locating contractor (or equivalent) will scan the area for the presence of subsurface utilities prior to excavation. The field copy of the Site plans will then be updated with the information obtained from the markout. During the markout, the location of aboveground utilities will also be identified. Section 5.3.5 describes the minimum requirements that will be taken to protect the utilities.

5.3.4 Clearing and Grubbing

Clearing and grubbing of the soil removal areas will be performed prior to or concurrent with soil excavation activities. The aboveground portions of the trees will either be disposed of off site or chipped and reused onsite for the construction of haul roads and/or dust control. Portions of the vegetation in contact with the soil (e.g., stumps, roots) will be excavated with the soil and disposed of off site.

5.3.5 Excavation of Impacted Soil and Ditch Sediments

The removal action plan includes the excavation and off site disposal of soil and ditch sediments containing arsenic and/or lead above the SSALs. To the extent practicable, excavated soil will be loaded into trucks and transported to a RCRA Subtitle D landfill. As described in Section 5.3.6, excavated soils will be stockpiled and sampled to determine whether or not some soils may require stabilization to reduce leachable concentrations of arsenic and/or lead prior to offsite disposal at a RCRA Subtitle D landfill. If stabilizing the soil proves to be impractical, these materials will be transported to a RCRA Subtitle C landfill for disposal.

Soil will initially be excavated from the areas shown on Figure 4-1. The estimated area dimensions, depths, and in-place volumes for each excavated area are presented in Table 5-1. Soil will generally be removed using standard construction equipment (e.g., backhoe, track hoe) and manual shoveling. Large pieces of construction debris (e.g., chunks of concrete, brick foundations, railroad ties), greater than or equal to approximately 1 cubic yard, will either be left in place or will be cleaned and left onsite at a location agreeable to the property owner. This includes significant debris piles located on Parcels 292 and 297 and rip rap used within the I-165 corridor. Dry decontamination methods (e.g., brushing) will be used to remove impacted soil from the surfaces of this debris. Wet decontamination methods, such as pressure washing, may be used to remove residual soils if dry decontamination methods are not adequate. Smaller debris such as bricks will be excavated and handled with the excavated soil.

The depth of excavation at the Site will generally vary from 0.5 to 8 feet bgs; however, the actual limits of excavation will be determined in the field based on:

- the presence or absence of magenta-stained soils at the excavation surfaces;
- the results of the post-excavation confirmation soil sampling program;
- the proximity to existing structures (bridge supports), roadways, and railways; and
- the presence of subsurface utility poles, pedestals, guy wires and lines.

During soil excavation activities, equipment operators will monitor the base and sidewalls of the excavation areas. If consistent layers or seams of magenta-stained soils are observed along the excavation surfaces, the excavations may be extended vertically and/or horizontally to remove these materials to the extent practical. Extending the vertical and/or horizontal limits of the excavation will be performed at the discretion of the Engineer.

Confirmation soil samples will be collected from the base of the excavations during the removal action to evaluate residual arsenic and lead concentrations prior to backfilling. In the event that arsenic and/or lead are detected above the SSALs, additional rounds of excavation and confirmation sampling will be performed to the extent practical until confirmation soil sample results are below the SSALs. Additional details regarding the confirmation soil sampling program are provided in Section 5.3.7.

Soil will not be excavated from beneath areas that are paved or covered with concrete or railroad ballast. At a minimum, excavation sidewalls adjacent to these areas will be sloped to prevent undermining. At the elevation of the bottom of these covered areas, excavation will be performed at least 6 inches laterally from the toe of the concrete, pavement or ballast before deeper excavation continues. Additional excavation will be performed by sloping or benching the excavation adjacent to these areas at a slope no greater than a 1V:2H. The RAC will perform a structural analysis prior to mobilization to evaluate the appropriate sloping/benching requirements that will allow for a safe excavation that does not undermine these features. The structural analysis will be presented in the SOP as an appendix for USEPA's review and approval. In the event that this analysis supports a less aggressive sloping that would result in the excavation of a reduced quantity of impacted materials, this revised sloping will be used in lieu of 1V:2H slope described above.

Excavation within transportation corridors including properties maintained by ALDOT and Illinois Central Railroad will be limited to a maximum depth of 2 feet regardless of the depth of impacted soils. Restricting the depth of excavation on these properties minimizes disruption to these corridors and reduces the potential for compromising the associated infrastructure.

Excavation adjacent to utility poles, pedestals, guy wires and lines will be conducted by hand or in accordance with utility owner specifications, whichever is more stringent. No mechanical excavation (e.g., by excavators) will take place within 2.5 feet of a marked subsurface utility. All excavation to be performed within 2.5 feet of a marked subsurface utility will be performed manually. Utilities will be protected in the manner prescribed by the utility company. The following describes the general actions that will be taken to protect utilities:

1. Excavation of soil above and adjacent to a known utility will be performed manually in accordance with the methods, tolerances, and directions specified by the utility owner. At a minimum, all excavation above or within 2.5 feet of a marked utility will be performed manually.

2. Soil beneath any piped utilities or electric lines may be removed based on the ability to relocate the utility during excavation. Piped utilities include gas lines, water lines and sanitary sewer lines. Piped utilities do not include phone lines and cable television lines. These lines are generally flexible and can be relocated within the excavation areas as work progresses.

3. If piped utilities are to be left in place during excavation, a soil shelf equal to the width of the pipe, plus a minimum of 6 inches on each side of the pipe will

be left in place beneath the exposed piped utility for support. Soil beneath the piped utilities will then be sloped from the top edge of the shelf to the bottom of the excavation at a slope no greater than 1V:2H.

The soil removal plan provided in Figure 4-1 illustrates removal depths projected across the Site. These removal depths are based on arsenic and/or lead concentrations identified during previous sampling activities. In some areas, surface topography within a removal area changes drastically; particularly for those areas adjacent to Site drainage features. The removal depths adjacent to Site drainage features will be measured relative to the top-of-bank and/or the elevation of the impacted soil boring associated with that polygon dictating removal and not the existing land surface. Figure 5-1 shows a schematic of how excavation would be performed adjacent to a Site drainage feature.

Modifications to the above procedures may be proposed and, if approved, included in the Site Operations Plan (Section 5.3.10.1).

5.3.6 Soil Stabilization

Arsenic and/or lead present in the excavated soil will be stabilized, as needed, to reduce its leachability to levels that will facilitate acceptance of the soil at a RCRA Subtitle D landfill. Pending approval of the waste profile by the landfill, stabilized soil will have leachable arsenic and lead concentrations that are below the RCRA standards.

The Universal Treatment Standards (UTS) for lead and arsenic are 0.75 mg/L TCLP and 5.0 mg/L TCLP, respectively. However, based on the federal alternative treatment standards for soil (promulgated at 40 Code of Federal Regulations [CFR] 268.49), which state that successful treatment of a characteristically hazardous soil (such as the soil present at the Site) requires that the characteristic to be eliminated and that the underlying hazardous constituents are reduced by 90%, or to concentrations less than 10 times the UTS. Therefore, the alternative treatment standards for soil at this Site are 7.5 mg/L TCLP for lead and 50 mg/L TCLP for arsenic. Because this soil is to be disposed of at a Subtitle D landfill, the TCLP limits of 5.0 mg/L for lead and arsenic apply. Therefore, 5.0 mg/L TCLP for lead and arsenic will be used as the standard for treatment at the Site. The final treatment standard will be determined by the receiving landfill after its review of the waste profile.

Prior to disposal, all excavated soils will be stockpiled and sampled for waste characterization purposes. Soils will be stockpiled in the vicinity of the excavation footprints or will be transported to a common staging area onsite for waste characterization sampling. Waste characterization samples will be collected from individual stockpiles of no more than 1,000 tons. Each waste characterization sample will consist of a composite sample collected from at least 15 discrete and random locations across the pile. All waste characterization samples will be submitted to the analytical laboratory and analyzed for TCLP arsenic and lead. If TCLP arsenic and lead are below 5 mg/L, stabilization will not be required and the soils will be transported to a RCRA Subtitle D facility for disposal. If TCLP arsenic and/or lead are above 5 mg/L, stabilization will be required to reduce TCLP arsenic and lead concentrations to below 5 mg/L prior to disposal.

Stabilization (as needed) will be achieved via the mixing of a phosphate-based stabilization reagent (or equivalent) with the soil. Stabilization agents may include one or more of the following:

- Maectite® (a proprietary stabilization agent patented by Sevenson Environmental Services, Inc.);
- EnviroBlend® (or EnviroBlend 90/10®); and/or
- TerraBond®.

Mixing will be performed via mechanical means using equipment such as an excavator bucket. Soil will be treated with stabilization reagent in batches of up to approximately 300 cubic yards (approximately 500 tons) so that efficient and uniform blending of the stabilization reagent with the soil can be achieved. Soil samples will be collected to evaluate compliance with the above standards at a minimum frequency of one sample per 500 tons of soil disposed at the landfill, or at a frequency determined by the landfill. Each disposal compliance sample will consist of a composite of 15 subsamples collected from the soil pile. Each disposal compliance sample will be analyzed for TCLP arsenic and lead.

5.3.7 Post-Excavation Confirmation Soil Sampling

A post-excavation confirmation soil sampling and analysis program will be conducted during the soil removal work to guide the excavation activities and confirm that impacted materials have been removed. This program will include the collection of samples from the base of the excavations.

Following removal of the soil to the initial depths shown on Figure 4-1, field screening will be conducted at the base of the excavation using a portable XRF instrument. If XRF screening of the surficial soil at the base of the excavation indicates that arsenic and/or lead concentrations are greater than 22 mg/kg and 600 mg/kg, respectively, additional rounds of soil removal and XRF screening will be conducted, as appropriate, to verify that sufficient soil has been removed from the excavation. This XRF screening procedure may be modified in the field, as necessary, to improve its effectiveness.

Upon completion of soil removal activities, confirmation samples will be collected from individual subareas excavated to the same depth at a frequency not to exceed one sample (5-point composite) per 10,000 square feet of excavation. All samples will be collected from the base of the excavation from 0 to 6 inches bgs and will be analyzed for total arsenic and lead. All samples will be analyzed in accordance with USEPA Contract Laboratory Program procedures. Samples, including field QC samples, will be collected and analyzed in accordance with the procedures in the Field Sampling Plan and QAPP included in the Work Plan (ARCADIS, 2012).

Rapid (24- to 48-hour) turn-around of sample analyses will be requested so that results can be reviewed and evaluated prior to the onset of backfilling. If analyses indicate arsenic and lead concentrations are below the SSALs, the excavation area will be backfilled and restored as appropriate. However, if arsenic or lead are detected at concentrations above the SSALs, additional rounds of vertical soil removal and confirmation sampling will be conducted as appropriate.

5.3.8 Surveying

All soil removal areas will be surveyed prior to excavation, at the completion of excavation activities, and following restoration. Surveying will also be performed to document the location of demarcation liners installed at the Site (if appropriate) to support the implementation of institutional controls. All survey data will be referenced to the North American Horizontal Datum of 1983 and the North American Vertical Datum of 1988.

5.3.9 Transport to Disposal Facility

Stabilized and non-stabilized soil containing TCLP concentrations of arsenic and lead below 5.0 mg/L will be transported to a RCRA Subtitle D landfill for disposal; and soil containing TCLP concentrations of arsenic and/or lead above 5.0 mg/L will be transported to the RCRA Subtitle C facility. The RAC will be responsible for coordinating and scheduling the transport vehicles and loading the materials. All waste streams will be characterized before disposal, as required by applicable federal, state, and local laws, rules, and regulations, as well as any additional requirements imposed by the receiving landfill or disposal facility.

Excavated soil will be loaded into dump trucks for transport to the disposal facility. Traffic patterns will be established in the Traffic Control Plan to minimize or prevent trucks that are hauling soil offsite from traversing bare soil in impacted areas. Trucks that traverse areas containing impacted soil will be decontaminated prior to exiting the impacted areas. Decontamination procedures will be described in the RAC's SOP.

All containers used for the offsite transport of materials will be covered with tarps prior to offsite transport. The RAC will be responsible for verifying that all transportation containers are tarped, manifested, and placarded in accordance with appropriate RCRA and Department of Transportation (DOT) requirements before leaving the Site.

The weight of the transportation containers prior to departure from the Site will be within its allowable loaded capacity for subsequent transport and in compliance with any and all DOT regulations. A daily log of information that includes the date and time, container identification number, and measured weight of each loaded transportation container to have departed the Site will be compiled.

5.3.10 Submittals

The RAC will prepare a SOP and HASP that describe in detail how the project will be performed. The documents will be submitted to EMES for review and approval prior to mobilization to the Site. The contents of each of these plans are described in the following sections.

5.3.10.1 Site Operations Plan

The RAC will prepare a SOP that will include, but not be limited to, the following items:

- detailed description of the strategy and procedures to be used to accomplish the work;
- detailed description of the sequence of Site excavation and restoration activities;
- detailed description of the procedures used to document pre-removal Site conditions;
- detailed description of methods and materials used to stabilize soil and to control dust/vapors/gasses generated during soil stabilization;
- list of equipment to be used onsite;
- proposed locations for storage areas, stabilization areas, access roads, stockpile areas, and material loading areas;
- Erosion and Sedimentation Control Plan;
- Traffic Management Plan;
- Dust Control Plan;
- Noise Control Plan;
- Stormwater Management Plan;
- Excavation Equipment Decontamination Plan;
- Site Security Plan;
- Contingency Plan; and
- Project Schedule.

The SOP will summarize the materials, procedures, controls, and equipment that the RAC intends to utilize during performance of the removal action. The SOP will address all appropriate issues associated with performing the work and will include detail sufficient for EMES review and approval.

To the extent possible, all utilities within the excavation footprints will remain operable. Any temporary shutdown of utilities will be scheduled in advance and coordinated with the local utility companies, affected property owner(s), and representatives of EMES. To the extent possible, open excavation areas will also be minimized.

Erosion and Sedimentation Control Plan

During the performance of the removal action, the RAC will take all necessary precautions to protect the environment. In doing so, the RAC will protect all water courses, surface waters, groundwater, soils, and air from degradation or damage in accordance with all federal, state, and local laws and regulations.

The RAC will prepare an E&SC Plan that will describe procedures and controls that will be employed to prevent accelerated erosion of areas subject to remediation and to prevent excess sedimentation in drainage pathways. At a minimum, this will include the placement and maintenance of silt fences or other appropriate controls at the appropriate locations around all excavations and temporary material staging areas. All E&SC measures will be inspected regularly and especially after any significant rainfall event to document that maximum control continues to be provided. Following inspection, the E&SC measures will be modified, cleaned, reinforced, replaced, and/or maintained, as necessary.

Traffic Management Plan

The RAC will prepare a Traffic Management Plan that will describe procedures for the movement of trucks and equipment across the Site and to the selected disposal facility in a safe and responsible manner. The Traffic Management Plan will include descriptions of traffic and/or equipment flow patterns across the Site, descriptions of how trucks transporting materials to the landfill will be staged, and other appropriate provisions for personnel (e.g., flagmen, traffic cones, signs) that will be required to promote the safe passage of trucks/equipment across and adjacent to the Site.

Dust Control Plan

Dust will be controlled based on visual observations and the results of airborne particulate monitoring performed by the RAC. Measures will be taken to control dust produced by excavation, backfilling, loading, and other work-area activities. The RAC will develop a Dust Control Plan to address the safety of the workers. In the event that action levels are exceeded, the RAC will investigate the source of the particulates and reduce work productivity and/or employ dust-control measures. Appropriate dust-control measures include spraying equipment and excavation faces with a fine water mist and covering excavated areas and materials with polyethylene after excavation activities. A supply of water and means of dispersion (e.g., a water tank and sprayer) will be maintained onsite for immediate dust control, if necessary. The RAC's plan will identify methods for dust control and provisions for work stoppage based on the appropriate dust action levels.

Noise Control Plan

The RAC will provide for noise monitoring to evaluate employee exposure levels. The Noise Control Plan will include provisions for Site monitoring (including methods and frequency), hearing protection for workers, and limited work schedules in the event that excessive noise is anticipated. If specific work types result in unacceptable noise levels (> 85 decibels) at the perimeter of the exclusion zone around the excavations, the RAC will make provisions for installing noise control measures and/or using alternate equipment or work procedures.

Stormwater Management Plan

To the extent possible, the RAC will make all appropriate provisions to minimize the volume of water accumulating in disturbed areas (i.e., open excavation areas, stockpile areas) containing impacted soils. The RAC will prepare a Stormwater Management Plan that (1) describes the means and methods that will be used to minimize the accumulation of stormwater in these areas, and (2) identifies the requirements and procedures for sampling and disposing of water contacting impacted soils. The plan will address coordination of disposal with the publicly owned treatment works or other permitted facility and will provide procedures that will ensure that all water discharged meets all applicable standards and requirements. Water that does not come into direct contact with disturbed soil can be rerouted and directly discharged into the appropriate drainage feature. The Stormwater Management Plan will specifically include provisions for managing stormwater within the drainage ditch that traverses Parcel 297 and other Site drainage ditches located on ROWs maintained by the Illinois Central Railroad and ALDOT.

Excavation Equipment Decontamination Plan

The RAC will prepare a decontamination plan that describes the measures to be used to remove impacted materials from excavation equipment prior to leaving the exclusion zone. Portions of the excavation equipment and transport vehicles that come into contact with impacted soil will be decontaminated prior to leaving the Site or relocated to an area that does not contain elevated concentrations of arsenic. Decontamination wastes will be combined with other materials being excavated from the Site and will be transported to a RCRA Subtitle C or Subtitle D landfill, as appropriate.

Site Security Plan

The RAC will prepare a Site Security Plan that describes the measures to be used to safeguard equipment and prevent unauthorized access to open excavation areas and other work areas during the removal action. At a minimum, Site security includes restrictive barriers around all open excavation areas and other areas where hazards may be present.

Contingency Plan

The RAC will prepare a Contingency Plan that includes, at a minimum, the following items:

- Spill Prevention Control and Countermeasures Plan for all materials brought to the work area;
- emergency vehicular access/egress;
- emergency action/evacuation procedures of personnel from the work area;
- listing of all contact personnel with phone numbers, including EMES; the RAC; the Engineer; fire officials; ambulance service; local, county, and State Police; and local hospitals, including routes to local hospitals and procedures for notifying each;
- listing of all contact personnel with phone numbers for the owners of above- and below-ground utilities who are to be contacted in case of damage to any utilities; and
- Identification of responsible personnel who will be in a position at all times to receive incoming phone calls and to dispatch contractor personnel and equipment in the event of an emergency situation.

Project Schedule

A Project Schedule will be prepared that includes all elements of the removal action. Additional requirements include:

- horizontal bar chart (Gantt) with separate lines for each section of work, identifying the first work day of each week;
- at a minimum, the following work items:
  - mobilization;
  - site preparation;
  - excavation activities;
  - restoration activities;
  - demobilization; and
- revision and submittal of a construction progress schedule on a weekly basis.

5.3.10.2 Health and Safety Plan

The RAC will prepare, submit, and implement a site-specific HASP that, at a minimum, meets the requirements of 29 CFR 1910 and 29 CFR 1926 (which includes 29 CFR 1926.65) and any applicable state regulations. The HASP will be prepared by a Certified Industrial Hygienist and cover all personnel who will be employed by the RAC to perform work at the Site, including direct employees and subcontractors.

For work involving the potential for contact with or exposure to arsenic-containing soil, the HASP will comply with 29 CFR 1910, 29 CFR 1926, 40 CFR 260-267, and related regulations that call for the development and implementation of a safety and health program for employees involved in hazardous waste operations.

The HASP will be prepared in accordance with 40 CFR 1910.120 and 29 CFR 1926.65 and will address, at a minimum, the following components:

1. Identification of Key Personnel – Identify, by name and by title, the on- and offsite health and safety personnel responsible for the implementation of health and safety procedures. All onsite personnel involved in the measures must have Occupational Safety and Health Administration (OSHA) 40-hour Hazardous Waste Training (29 CFR 1910.120 and 1926.65) and the corresponding 8-hour refresher course update. In addition, all onsite personnel must have completed the initial Loss Prevention System™ and the 1-hour refresher course update safety training program required by EMES.

2. Training – Describe and provide certification of all supervisory and onsite personnel having received appropriate health and safety training. Training requirements will also include attending an initial work-area orientation before engaging in any onsite activities. Sign-off sheets acknowledging attendance will be provided.

3. Medical Surveillance – Certify that all supervisory and onsite personnel have received appropriate medical examinations and are able to conduct the tasks required for this project, including, but not limited to, working with chemicals, using respiratory protection, using PPE, and conducting hazardous waste operations in accordance with 29 CFR 1910.120 and 1926.65. Medical monitoring may also include additional clearances as required by EMES.

4. Task-Specific Hazard/Risk Analysis – Identify and provide a means of mitigating all foreseeable biological, chemical, and physical hazards associated with the work, including, but not limited to, hazards associated with exposure to contaminants of concern, heavy equipment operation, work area conditions, weather, biological hazards, materials handling, and work around excavated areas.

5. Work Zones – Provide a work area plan that depicts the designation of zones including: (1) Exclusion Zones; (2) Decontamination Zones; and (3) Support Zones. The level of personal protection for each zone must be included.

6. Personal Safety Equipment and Protective Clothing – Identify personal safety equipment and protective clothing to be used and available onsite. This will include the identification of expected levels of protection (A, B, C, D) for each task, and the action levels for PPE upgrades. A respiratory protection program that meets the requirements of 29 CFR 1910.134 and establishes specific requirements for any respirator use will be included.

7. Personal Air Monitoring – Identify protocols and criteria associated with personal air monitoring of onsite personnel.

8. Personnel Decontamination – Describe methods and procedures to be used for decontamination of site personnel and management of PPE.

9. Material Safety Data Sheets (MSDSs) – Provide MSDSs for all materials to be brought to the work area and constituents that are expected to be encountered in the course of implementation of the removal action.

10. Construction Safety Procedures (OSHA 1926.1 – 1926.652, Subpart A-P) – Provide procedures to address excavation and trenching safety procedures, as well as a daily work area safety inspection checklist to evaluate these items.

11. SOP and Safety Programs – Provide those required by applicable sections of 29 CFR 1910 and 1926.

Determination of the appropriate level of worker safety equipment, procedures, or modification to equipment and procedures based on work-area conditions will be made by the RAC as a result of work-area visit(s), review of available information, and anticipated work area activities.

5.3.11 Site Restoration

Upon completion of the excavation activities and receipt of acceptable confirmation sample analytical results, the Site will be restored as closely as possible to the pre-excavation elevations, or in an alternate manner that is agreeable to EMES and the affected property owners. Repairs will be made to any roads, hard features, etc. in the event of accidental damage during the course of the removal action activities.

In general, excavations in vegetated areas will be backfilled and compacted to within six inches of existing grade. The remaining six inches will be backfilled with topsoil to support vegetation or ground cover and seeded with grass. The fill materials proposed by the RAC for site restoration will be analyzed for pH, grain size, total organic carbon, TAL metals, Target Compound List (TCL) volatile and semi-volatile organic compounds (VOCs and SVOCs), pesticides, and polychlorinated biphenyls (PCBs). Sources that contain elevated concentrations of any of the aforementioned constituents or significantly different physical characteristics than the existing Site soils will be rejected. Sample analytical results will be submitted to USEPA for review and approval prior to use.

5.4 Reporting

5.4.1 Weekly Reports

During the soil removal action, brief written progress reports will be submitted by EMES to USEPA on a weekly basis. Each weekly report will:

- describe all significant developments of the preceding 7-day period, including actions performed and any problems encountered;
- describe developments anticipated during the next reporting period, including anticipated problems and a schedule of work to be performed; and
- discuss planned resolutions of past and anticipated future problems.

5.4.2 Final Report

A final report summarizing the actions taken will be submitted to USEPA for review and approval. The final report will include the following:

- a listing of the quantities and types of materials removed from the Site;
- a listing of the ultimate destinations of all removed materials;
- a presentation of the analytical results of all sampling and analyses performed; and
- appendices containing all relevant documentation generated during the removal action (e.g., soil/sediment disposal summary log, permits, construction documentation photographs, etc.).

The final report will also include the following certification signed by a person who supervised or directed the preparation of the report:

"Under penalty of law, I certify that, to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

5.5 Institutional Controls

Institutional controls may be implemented for the Site following completion of the removal action if all impacted soils cannot be removed. While specific language has not yet been developed, it is expected that the following issues will likely be addressed in the institutional controls:

- a description of the post-removal action site conditions;
- reference to the RAWP and the Removal Action Completion Report;
- notification that post-removal Site conditions may result in the need for implementation of additional safety procedures during future subsurface construction activities;
- a description of restrictions on future use; and
- any required land use controls including engineering controls and their maintenance.

5.6 Schedule

It is expected that the activities outlined herein will be completed within approximate 390 days, based on the following task durations.

• Obtain USEPA approval of this RAWP	30 days
• Negotiation/Execution of an Administrative Order on Consent	60 days
• Obtain Access Agreements from Property Owners	60 days
• Prepare Bid Specifications/Select RAC/Prepare RAC Submittals	30 days
• Obtain USEPA approval of RAC Submittals	30 days
• Conduct Soil/Sediment Removal Action	120 days
• Prepare/Submit Removal Action Summary Report	60 days

Certain tasks may be performed in parallel, to the extent practical, to expedite the completion of removal activities. The project schedule is dependent, in part, on securing the necessary access agreements from property owners, negotiation with property owners regarding Site restoration, and the RAC's schedule, which will be included in the SOP. Other potential issues that could lead to project delays include, but are not limited to, weather and the requisition of necessary permits.

6. References

ADEM. 2001. Phase I Environmental Assessment, Kate Street Site #9, Mobile County, Alabama, January 2001.

ARCADIS. 2010. Removal Site Evaluation Report, Former Virginia-Carolina Chemical Corporation Mobile Site, Prichard, Alabama, May 2010.

ARCADIS. 2012. Site Delineation Work Plan, Former Virginia-Carolina Chemical Corporation Mobile Site, Prichard, Alabama, June 2012.

EDR. 2010. Environmental Data Resources Geocheck® Report for Former Virginia-Carolina Chemical Corporation, 901 North Kate Street, Mobile, AL 36610. Inquiry Number: 2729784.2s. March 25, 2010.

Reed, P.C. 1971. Geology of Mobile County, Alabama. Geological Survey of Alabama: Division of Water Resources. Map 93.

Robinson, W.H., W.J. Powell, and E. Brown. 1956. Water Resources of the Mobile Area, Alabama. United States Geological Survey. Circular 373.

ARCADIS

Tables

Table 2-1
Summary of 2012 Sampling and Analytical Program
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Matrix	Sample Identification	Depth (ft bgs)	Sample Date	Total Arsenic & Lead	Dissolved Arsenic & Lead	pH	Notes - Parent sample names
GroundWater	MB-MW-01_10182012	-	10/18/12	X	X		
GroundWater	MB-MW-02_10182012	-	10/18/12	X	X		
GroundWater	MB-MW-03_10182012	-	10/18/12	X	X		
GroundWater	MB-MW-04_10192012	-	10/19/12	X	X		
GroundWater	MB-MW-05_10192012	-	10/19/12	X	X		
GroundWater	MB-MW-06_10192012	-	10/19/12	X	X		
GroundWater	MB-MW-DUP-01_10192012	-	10/19/12	X	X		MB-MW-05_10192012
Sediment	MB-SED-03_0.5_2_10172012	0.5-2	10/17/12	X		X	
Sediment	MB-SED-03_2_4_10172012	2-4	10/17/12	X		X	
Sediment	MB-SED-03_4_6_10172012	4-6	10/17/12	X		X	
Sediment	MB-SED-05_0.5_2_10172012	0.5-2	10/17/12	X		X	
Sediment	MB-SED-05_0_0.5_10172012	0-0.5	10/17/12	X		X	
Sediment	MB-SED-05_2_4_10172012	2-4	10/17/12	X		X	
Sediment	MB-SED-06_0.5_2_10172012	0.5-2	10/17/12	X		X	
Sediment	MB-SED-06_0_0.5_10172012	0-0.5	10/17/12	X		X	
Sediment	MB-SED-07_0.5_1_10172012	0.5-1	10/17/12	X		X	
Sediment	MB-SED-07_0_0.5_10162012	0-0.5	10/16/12	X		X	
Sediment	MB-SED-08_0.5_1.3	0.5-1.3	10/17/12	X		X	
Sediment	MB-SED-08_0_0.5_10162012	0-0.5	10/16/12	X		X	
Sediment	MB-SED-DUP-01_10162012	0-0.5	10/16/12	X		X	MB-SED-07_0_0.5_10162012
SOIL	DUP-01_10092012	2-4	10/9/12	X		X	MB-SB-41 (2-4)_10092012
SOIL	DUP-01_11092012	0.5-2	11/9/12	X		X	MB-SB-78_0.5_2_11092012
SOIL	DUP-02 (2-4)_10102012	2-4	10/10/12	X		X	MB-SB-51 (2-4)_10102012
SOIL	DUP-03 (0.5-2)_10112012	0.5-2	10/11/12	X		X	MB-MW-2 (0.5-2)_10112012
SOIL	DUP-04 (2-4)_10112012	2-4	10/11/12	X		X	MB-SB-54 (2-4)_10112012
SOIL	DUP-05 (2-4)_10122012	2-4	10/12/12	X		X	MB-SB-60 (2-4)_10122012
SOIL	MB-DUP-06_10162012	0-0.5	10/16/12	X		X	MB-SB-69_0_0.5_10162012
SOIL	MB-DUP-07_10162012	4-6	10/16/12	X		X	MB-SB-29_4_6_10162012
SOIL	MB-DUP-08_10182012	0-0.5	10/18/12	X		X	MB-SB-85_0_0.5_10182012
SOIL	MB-DUP-09_10182012	0.5-2	10/18/12	X		X	MB-SB-89_0.5_2_10182012
SOIL	MB-MW-05_0.5_2_10162012	0.5-2	10/16/12	X		X	
SOIL	MB-MW-05_0_0.5_10162012	0-0.5	10/16/12	X		X	
SOIL	MB-MW-05_2_4_10162012	2-4	10/16/12	X		X	
SOIL	MB-MW-1 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-MW-1 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-MW-1 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-MW-2 (0.0-0.5)	0-0.5	10/11/12	X		X	
SOIL	MB-MW-2 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-MW-2 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-MW-3 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-MW-3 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-MW-3 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-MW-4 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-MW-4 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-MW-4 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-12_4_6_10172012	4-6	10/17/12	X		X	
SOIL	MB-SB-12_6_7_10172012	6-7	10/17/12	X		X	
SOIL	MB-SB-29_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-29_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-29_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-29_4_6_10162012	4-6	10/16/12	X		X	
SOIL	MB-SB-29_6_8_10162012	6-8	10/16/12	X		X	
SOIL	MB-SB-40 (0.5-2)_10092012	0.5-2	10/9/12	X		X	
SOIL	MB-SB-40 (0-0.5)_10092012	0-0.5	10/9/12	X		X	
SOIL	MB-SB-40 (2-4)_10092012	2-4	10/9/12	X		X	
SOIL	MB-SB-41 (0.5-2)_10092012	0.5-2	10/9/12	X		X	
SOIL	MB-SB-41 (0-0.5)_10092012	0-0.5	10/9/12	X		X	
SOIL	MB-SB-41 (2-4)_10092012	2-4	10/9/12	X		X	
SOIL	MB-SB-42 (0.5-2)_10092012	0.5-2	10/9/12	X		X	
SOIL	MB-SB-42 (0-0.5)_10092012	0-0.5	10/9/12	X		X	
SOIL	MB-SB-43 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-43 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-43 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-44 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-44 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-44 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-45 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-45 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-45 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-46 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-46 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-46 (2-4)_10102012	2-4	10/10/12	X		X	

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SOIL	MB-SB-46 (4-6)_10102012	4-6	10/10/12	X		X	
SOIL	MB-SB-46 (6-8)_10112012	6-8	10/11/12	X		X	
SOIL	MB-SB-47 (0.5-2)_10092012	0.5-2	10/9/12	X		X	
SOIL	MB-SB-47 (0-0.5)_10092012	0-0.5	10/9/12	X		X	
SOIL	MB-SB-47 (2-4)_10092012	2-4	10/9/12	X		X	
SOIL	MB-SB-48 (0.5-2)_10092012	0.5-2	10/9/12	X		X	
SOIL	MB-SB-48 (0-0.5)_10092012	0-0.5	10/9/12	X		X	
SOIL	MB-SB-48 (2-4)_10092012	2-4	10/9/12	X		X	
SOIL	MB-SB-49 (0.5-2)_10092012	0.5-2	10/9/12	X		X	
SOIL	MB-SB-49 (0-0.5)_10092012	0-0.5	10/9/12	X		X	
SOIL	MB-SB-49 (2-4)_10092012	2-4	10/9/12	X		X	
SOIL	MB-SB-50 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-50 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-50 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-51 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-51 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-51 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-52 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-52 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-52 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-53 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-53 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-53 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-54 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-54 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-54 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-55 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-55 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-55 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-56 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-56 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-56 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-57 (0.5-2)_10122012	0.5-2	10/12/12	X		X	
SOIL	MB-SB-57 (0-0.5)_10122012	0-0.5	10/12/12	X		X	
SOIL	MB-SB-57 (2-4)_10122012	2-4	10/12/12	X		X	
SOIL	MB-SB-57 (4-6)_10122012	4-6	10/12/12	X		X	
SOIL	MB-SB-57 (6-8)_10122012	6-8	10/12/12	X		X	
SOIL	MB-SB-58 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-58 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-58 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-59 (0.5-2)_10122012	0.5-2	10/12/12	X		X	
SOIL	MB-SB-59 (0-0.5)_10122012	0-0.5	10/12/12	X		X	
SOIL	MB-SB-59 (2-4)_10122012	2-4	10/12/12	X		X	
SOIL	MB-SB-60 (0.5-2)_10122012	0.5-2	10/12/12	X		X	
SOIL	MB-SB-60 (0-0.5)_10122012	0-0.5	10/12/12	X		X	
SOIL	MB-SB-60 (2-4)_10122012	2-4	10/12/12	X		X	
SOIL	MB-SB-61 (0.5-2)_10122012	0.5-2	10/12/12	X		X	
SOIL	MB-SB-61 (0-0.5)_10122012	0-0.5	10/12/12	X		X	
SOIL	MB-SB-61 (2-4)_10122012	2-4	10/12/12	X		X	
SOIL	MB-SB-62 (0.5-2)_10122012	0.5-2	10/12/12	X		X	
SOIL	MB-SB-62 (0-0.5)_10122012	0-0.5	10/12/12	X		X	
SOIL	MB-SB-62 (2-4)_10122012	2-4	10/12/12	X		X	
SOIL	MB-SB-63 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-63 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-63 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-64 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-64 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-64 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-65 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-65 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-65 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-66 (0.5-2)_10112012	0.5-2	10/11/12	X		X	
SOIL	MB-SB-66 (0-0.5)_10112012	0-0.5	10/11/12	X		X	
SOIL	MB-SB-66 (2-4)_10112012	2-4	10/11/12	X		X	
SOIL	MB-SB-67_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-67_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-67_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-68_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-68_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-68_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-69_0.5_2_10162012	0.5-2	10/16/12	X		X	
SOIL	MB-SB-69_0_0.5_10162012	0-0.5	10/16/12	X		X	

Table 2-1
Summary of 2012 Sampling and Analytical Program
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Matrix	Sample Identification	Depth (ft bgs)	Sample Date	Total Arsenic & Lead	Dissolved Arsenic & Lead	pH	Notes - Parent sample names
SOIL	MB-SB-69_2_4_10162012	2-4	10/16/12	X		X	
SOIL	MB-SB-70_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-70_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-70_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-71_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-71_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-71_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-71_4_6_10162012	4-6	10/16/12	X		X	
SOIL	MB-SB-72_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-72_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-72_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-72_4_6_10162012	4-6	10/16/12	X		X	
SOIL	MB-SB-73_0.5_2_10152012	0.5-2	10/15/12	X		X	
SOIL	MB-SB-73_0_0.5_10152012	0-0.5	10/15/12	X		X	
SOIL	MB-SB-73_2_4_10152012	2-4	10/15/12	X		X	
SOIL	MB-SB-74_0.5_2_10162012	0.5-2	10/16/12	X		X	
SOIL	MB-SB-74_0_0.5_10162012	0-0.5	10/16/12	X		X	
SOIL	MB-SB-74_2_4_10162012	2-4	10/16/12	X		X	
SOIL	MB-SB-75_0.5_2_11092012	0.5-2	11/9/12	X		X	
SOIL	MB-SB-75_0_0.5_11092012	0-0.5	11/9/12	X		X	
SOIL	MB-SB-75_2_4_11092012	2-4	11/9/12	X		X	
SOIL	MB-SB-76_0.5_2_11092012	0.5-2	11/9/12	X		X	
SOIL	MB-SB-76_0_0.5_11092012	0-0.5	11/9/12	X		X	
SOIL	MB-SB-76_2_4_11092012	2-4	11/9/12	X		X	
SOIL	MB-SB-77_0.5_2_11092012	0.5-2	11/9/12	X		X	
SOIL	MB-SB-77_0_0.5_11092012	0-0.5	11/9/12	X		X	
SOIL	MB-SB-77_2_4_11092012	2-4	11/9/12	X		X	
SOIL	MB-SB-78_0.5_2_11092012	0.5-2	11/9/12	X		X	
SOIL	MB-SB-78_0_0.5_11092012	0-0.5	11/9/12	X		X	
SOIL	MB-SB-78_2_4_11092012	2-4	11/9/12	X		X	
SOIL	MB-SB-79_0.5_2_11092012	0.5-2	11/9/12	X		X	
SOIL	MB-SB-79_0_0.5_11092012	0-0.5	11/9/12	X		X	
SOIL	MB-SB-79_2_4_11092012	2-4	11/9/12	X		X	
SOIL	MB-SB-80_0.5_2_11092012	0.5-2	11/9/12	X		X	
SOIL	MB-SB-80_0_0.5_11092012	0-0.5	11/9/12	X		X	
SOIL	MB-SB-80_2_4_11092012	2-4	11/9/12	X		X	
SOIL	MB-SB-81 (0.5-2)_10102012	0.5-2	10/10/12	X		X	
SOIL	MB-SB-81 (0-0.5)_10102012	0-0.5	10/10/12	X		X	
SOIL	MB-SB-81 (2-4)_10102012	2-4	10/10/12	X		X	
SOIL	MB-SB-82_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-82_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-82_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-83_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-83_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-83_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-84_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-84_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-84_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-84_4_6_10182012	4-6	10/18/12	X		X	
SOIL	MB-SB-85_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-85_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-85_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-86_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-86_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-86_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-87_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-87_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-87_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-88_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-88_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-88_2_4_10182012	2-4	10/18/12	X		X	
SOIL	MB-SB-89_0.5_2_10182012	0.5-2	10/18/12	X		X	
SOIL	MB-SB-89_0_0.5_10182012	0-0.5	10/18/12	X		X	
SOIL	MB-SB-89_2_4_10182012	2-4	10/18/12	X		X	
WATER	EB100912_10092012	-	10/9/12	X			
WATER	EB101012A_10102012	-	10/10/12	X			
WATER	EB101012B_10102012	-	10/10/12	X			
WATER	EB101112_10112012	-	10/11/12	X			
WATER	EB101212_10122012	-	10/12/12	X			
WATER	EB-101512_10152012	-	10/15/12	X			
WATER	FB100912_10092012	-	10/9/12	X			
WATER	FB101012_10102012	-	10/10/12	X			

Table 2-1
Summary of 2012 Sampling and Analytical Program
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Matrix	Sample Identification	Depth (ft bgs)	Sample Date	Total Arsenic & Lead	Dissolved Arsenic & Lead	pH	Notes - Parent sample names
WATER	FB101112_10112012	-	10/11/12	X			
WATER	FB101212_10122012	-	10/12/12	X			
WATER	MB-QAQC_EB_01_10182012	-	10/18/12	X			
WATER	MB-QAQC_EB_02_10192012	-	10/19/12	X			
WATER	MB-QAQC-EB_101612	-	10/16/12	X			
WATER	MB-QAQC-EB_101712	-	10/17/12	X			
WATER	MB-QAQC-EB_101812	-	10/18/12	X			

Table 2-2
Groundwater Monitoring Well Specifications
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Monitoring Well ID	Installation Date	Surveyed TOC Elevation (ft amsl)	Ground Surface Elevation (ft amsl)	Screen Length (feet)	Well Casing Diameter (inches)	Well Screen Slot Size (inches)	Screened Interval (ft bgs)		Screened Interval Elevation (ft bgs)		Coordinates		Well Completion
							Top of Screen	Bottom of Screen	Top of Screen	Bottom of Screen	Northing	Easting	
MB-MW-01	10/10/2012	32.26	29.92	10	2	0.01	20	30	9.9	-0.08	1788440.618	266280.8448	10/10/2012
MB-MW-02	10/11/2012	33.95	31.00	10	2	0.01	25	35	6.0	-4.0	1787892.911	266141.9236	10/11/2012
MB-MW-03	10/16/2012	33.36	30.86	10	2	0.01	20	30	10.9	0.9	1788201.283	265798.2104	10/16/2012
MB-MW-04	10/10/2012	28.11	25.91	10	2	0.01	20	30	5.9	-4.1	1788483.72	265618.9922	10/10/2012
MB-MW-05	10/16/2012	18.45	17.31	10	2	0.01	10	20	7.3	-2.7	1787960.634	265591.2793	10/16/2012
MB-MW-06	10/17/2012	23.85	23.84	10	2	0.01	15	25	8.8	-1.2	1788483.616	265048.392	10/17/2012

Notes:

TOPC - top of PVC casing

Groundwater monitoring well locations were surveyed based on North American Datum (NAD 83).

Table 2-3
January 11, 2013 Groundwater Elevations
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID	Top of Casing Elevation (NAVD 88)[/1]	Depth to Groundwater (feet btoc)[/2]	Ground Surface Elevation (NAVD 88)[/1]	Depth to Groundwater (feet bgs)[/3]	Groundwater Elevation (NAVD 88)[/1]
MB-MW-01	32.26	26.72	29.9205	24.38	5.54
MB-MW-02	33.95	27.96	30.9968	25.01	5.99
MB-MW-03	33.36	27.17	30.86	24.67	6.19
MB-MW-04	28.11	22.30	25.9148	20.10	5.81
MB-MW-05	18.45	10.73	17.3053	9.59	7.72
MB-MW-06	23.85	18.48	23.8426	18.47	5.37

Notes:

[/1] Elevations are based in feet relative to the National American Vertical Datum of 1988.

[/2] btoc - below top of casing

[/3] bgs - below ground surface

NS - not surveyed

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-MW-1	0 - 0.5	12.6	12.2	5.60
	0.5 - 2	3.24	4.26	5.50
	2 - 4	2.61	4.53	5.10
MB-MW-2	0 - 0.5	4.03	20.8	6.90
	0.5 - 2	2.92 [3.95]	24.7 [24.1]	6.70 [7.20]
	2 - 4	**31.4**	21.8	5.60
MB-MW-3	0 - 0.5	2.54	25.2	4.40
	0.5 - 2	2.57	20.5	7.40
	2 - 4	2.49	21.7	7.30
MB-MW-4	0 - 0.5	4.60	29.0	7.00
	0.5 - 2	3.76	10.1	6.80
	2 - 4	3.95	88.5	7.30
MB-MW-05	0 - 0.5	3.14	5.11	5.00 J
	0.5 - 2	1.62	7.93	4.00 J
	2 - 4	6.14	7.24	4.00 J
MB-SB-1	0 - 0.5	**27.3**	297	7.60
	0.5 - 2	16.4 [21.5]	200 [255]	7.60 [7.60]
	2 - 4	3.97	44.0	6.20
MB-SB-2	0 - 0.5	3.07	11.2	7.40
	0.5 - 2	4.25	13.9	5.90
	2 - 4	4.03	11.4	4.80
MB-SB-3	0 - 0.5	9.05	77.4	6.90
	0.5 - 2	4.05	8.02	6.00
	2 - 4	12.1	9.97	6.00
MB-SB-4	0 - 0.5	3.91	35.0 J	5.80
	0.5 - 2	2.76	28.0 J	6.80
	2 - 4	5.40	34.9 J	5.20
MB-SB-5	0 - 0.5	17.5 [18.1]	13.9 [13.9]	6.00 [6.00]
	0.5 - 2	3.80	7.27 J	5.10
	2 - 4	4.31	8.41 J	4.70
MB-SB-6	0 - 0.5	11.1	60.0 J	6.80
	0.5 - 2	2.13	6.84 J	7.40
	2 - 4	5.66	11.7 J	4.60
MB-SB-7	0 - 0.5	**39.9**	182	6.60
	0.5 - 2	11.3	43.7	6.80
	2 - 4	2.58	8.48	6.70
MB-SB-8	0 - 0.5	6.16	13.4	5.90
	0.5 - 2	2.86	10.8	5.60
	2 - 4	3.01	12.2	6.00
MB-SB-9	0 - 0.5	**29.1**	35.4 J	6.40
	0.5 - 2	**51.2**	111 J	3.90
	2 - 4	**126 [51.4]**	**2,240 J [296 J]**	5.10 [4.70]
	4 - 5	10.2	237	6.20
MB-SB-10	0 - 0.5	3.50	28.6	5.20
	0.5 - 2	**101**	**5,130**	5.30
	2 - 4	4.10	88.1	4.80

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-SB-11	0 - 0.5	3.74	11.2	7.50
	0.5 - 2	4.71 [12.7]	12.5 [15.5]	5.00 [4.60]
	2 - 4	3.29	13.6	4.30
MB-SB-12	0 - 0.5	4.17	72.6	5.60
	0.5 - 2	6.08	27.0	5.10
	2 - 4	**35.0**	17.2	4.30
	4 - 6	3.68	46.7	7.40
	6 - 7	7.09	173	7.10
MB-SB-13	0 - 0.5	6.75	154	6.10
	0.5 - 2	25.0	671	6.20
	2 - 4	**35.2**	**2,590**	6.80
	4 - 6	7.08	461	4.70
MB-SB-14	0 - 0.5	5.01	41.1	5.60
	0.5 - 2	3.55	11.0	7.90
	2 - 4	4.82	9.23	7.50
MB-SB-15	0 - 0.5	4.05	40.0	7.00
	0.5 - 2	4.47	27.2	7.20
	2 - 4	2.60	7.34	5.60
MB-SB-16	0 - 0.5	11.6	37.1	6.70
	0.5 - 2	3.37	18.5	6.90
	2 - 4	17.2	286	7.20
MB-SB-17	0 - 0.5	9.88	10.5	6.00
	0.5 - 2	3.20	15.3	4.40
	2 - 4	1.27	5.98	4.30
MB-SB-19	0 - 0.5	6.43	55.0	6.90
	0.5 - 2	8.24	84.0	7.50
	2 - 4	2.65	12.6	6.70
MB-SB-20	0 - 0.5	16.4	338 J	6.30
	0.5 - 2	**294**	**8,350 J**	6.80
	2 - 4	**134**	**3,150 J**	7.20
MB-SB-21	0 - 0.5	3.08	12.7	7.30
	0.5 - 2	2.80	13.4	4.30
	2 - 4	1.28	6.35	3.90
MB-SB-22	0 - 0.5	2.26	7.03	4.60
	0.5 - 2	1.79	7.13	4.50
	2 - 4	2.73	7.98	4.40
MB-SB-23	0 - 0.5	**83.1**	370 J	6.60
	0.5 - 2	24.6	58.4 J	6.90
	2 - 4	19.2	38.3	7.80
MB-SB-24	0 - 0.5	8.92	12.3	5.20
	0.5 - 2	1.64	11.6	3.90
	2 - 4	3.08	13.1	3.60
MB-SB-25	0 - 0.5	**63.1**	561	7.60
	0.5 - 2	**68.4**	229	7.60
	2 - 4	**84.1**	280	6.20

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-SB-29	0 - 0.5	5.88	15.3	6.60
	0 - 0.5	6.02	11.0 J	6.70 J
	0.5 - 2	13.0	17.1	6.70
	0.5 - 2	14.5	21.0 J	5.80 J
	2 - 4	**174**	459	4.00
	2 - 4	**39.9**	84.2	4.00 J
	4 - 6	11.4 [26.5]	3.72 [4.37]	3.60 J [3.60 J]
	6 - 8	6.93	5.43	3.50 J
MB-SB-31	0 - 0.5	6.03	11.7	6.70
	0.5 - 2	2.91	38.7	7.40
	2 - 4	8.05	9.32	4.30
MB-SB-33	0 - 0.5	4.40	11.9	7.00
	0.5 - 2	3.27	28.1	7.80
	2 - 4	5.58	11.8	7.50
MB-SB-34	0 - 0.5	20.9	92.7	5.70
	0.5 - 2	6.84	5.98	5.60
	2 - 3.5	1.90	5.15	5.00
MB-SB-35	0 - 0.5	6.32	12.4	7.40
	0.5 - 2	3.37	9.19	7.60
	2 - 4	1.90	9.65	4.70
MB-SB-36	0 - 0.5	4.79	22.3	7.70
	0.5 - 2	2.89	26.7	8.10
	2 - 4	4.48	8.88	5.30
MB-SB-38	0 - 0.5	14.9 [13.9]	35.8 [31.5]	6.10 [6.00]
	0.5 - 2	9.07	5.39	6.10
	2 - 4	3.71	8.21	4.90
MB-SB-39	0 - 0.5	3.94 [5.89]	12.3 [13.2]	7.80 [7.90]
	0.5 - 2	3.87	37.5	7.80
	2 - 4	4.07	25.6	7.70
MB-SB-40	0 - 0.5	9.46 J	34.8 J	6.60
	0.5 - 2	4.58 J	5.51 J	6.40
	2 - 4	4.34 J	5.51 J	5.20
MB-SB-41	0 - 0.5	5.45 J	21.9 J	5.90
	0.5 - 2	2.87 J	5.71 J	5.40
	2 - 4	3.24 J [4.55 J]	6.42 J [12.6 J]	5.10 [5.80]
MB-SB-42	0 - 0.5	5.96 J	24.0 J	8.20
	0.5 - 2	4.87 J	15.1 J	8.30
MB-SB-43	0 - 0.5	3.96	44.8	6.90
	0.5 - 2	13.1	56.5	6.90
	2 - 4	7.04	35.3	6.60
MB-SB-44	0 - 0.5	6.74	18.4 J	4.40
	0.5 - 2	**103**	102 J	3.70
	2 - 4	**47.3**	245 J	44.0
MB-SB-45	0 - 0.5	16.5	54.7 J	5.80
	0.5 - 2	**43.2**	40.6 J	7.00
	2 - 4	10.9	59.5 J	7.10

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-SB-46	0 - 0.5	4.39	33.9	6.90
	0.5 - 2	9.41	184	7.30
	2 - 4	23.1	**1,930**	7.20
	4 - 6	16.9	**1,130 J**	7.40
	6 - 8	4.21	6.38	5.80
MB-SB-47	0 - 0.5	5.67 J	39.8 J	6.70
	0.5 - 2	4.68 J	72.3 J	6.90
	2 - 4	3.54 J	24.9 J	7.90
MB-SB-48	0 - 0.5	4.64 J	28.0 J	7.50
	0.5 - 2	3.26 J	9.97 J	7.80
	2 - 4	2.06 J	4.74 J	6.90
MB-SB-49	0 - 0.5	6.95 J	24.9 J	8.50
	0.5 - 2	4.55 J	14.9 J	8.60
	2 - 4	2.85 J	4.42 J	7.50
MB-SB-50	0 - 0.5	2.29	9.27	7.30
	0.5 - 2	2.42	4.53	6.60
	2 - 4	3.13	4.90	4.60
MB-SB-51	0 - 0.5	5.71	55.8	6.20
	0.5 - 2	2.17	10.6	6.40
	2 - 4	2.17 [2.18]	5.85 [7.16]	6.40 [6.30]
MB-SB-52	0 - 0.5	13.7	45.3	4.10
	0.5 - 2	26.9	72.5	4.20
	2 - 4	2.70	7.20	5.80
MB-SB-53	0 - 0.5	4.72	12.2	4.70
	0.5 - 2	26.0	21.4	4.00
	2 - 4	**33.6**	13.4	3.90
MB-SB-54	0 - 0.5	3.07	19.0	6.90
	0.5 - 2	4.55	18.9	6.90
	2 - 4	4.29 [4.05]	33.5 [26.0]	7.00 [6.30]
MB-SB-55	0 - 0.5	3.99	10.5	5.30
	0.5 - 2	5.20	11.4	5.60
	2 - 4	4.50	15.2	5.90
MB-SB-56	0 - 0.5	2.76	4.73	4.70
	0.5 - 2	1.91	4.73	5.10
	2 - 4	3.95	6.63	6.60
MB-SB-57	0 - 0.5	9.65	202 J	7.40
	0.5 - 2	18.9	165 J	7.40
	2 - 4	**808**	**18,800 J**	6.00
	4 - 6	**114**	112 J	6.40
	6 - 8	**50.5**	105 J	6.00
MB-SB-58	0 - 0.5	2.07	6.08	6.60
	0.5 - 2	2.43	4.28	5.30
	2 - 4	2.92	5.72	4.80
MB-SB-59	0 - 0.5	**65.7**	**865**	6.90
	0.5 - 2	4.44	25.2 J	7.40
	2 - 4	1.51	5.58 J	7.20

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-SB-60	0 - 0.5	**34.9**	450 J	7.30
	0.5 - 2	3.87	37.6 J	7.40
	2 - 4	5.32 [2.16]	50.0 J [6.90 J]	7.10 [7.20]
MB-SB-61	0 - 0.5	**30.1**	348 J	7.30
	0.5 - 2	6.95	72.8 J	7.60
	2 - 4	1.06 U	3.04 J	7.40
MB-SB-62	0 - 0.5	**35.1**	549 J	7.00
	0.5 - 2	8.55	85.8 J	7.10
	2 - 4	3.68	4.13 J	6.70
MB-SB-63	0 - 0.5	20.7	268	7.30
	0.5 - 2	4.25	39.1	7.40
	2 - 4	4.15	6.50	5.40
MB-SB-64	0 - 0.5	**34.9**	433	6.90
	0.5 - 2	13.6	142	7.14
	2 - 4	6.54	17.7	5.20
MB-SB-65	0 - 0.5	13.1	98.1 J	7.60
	0.5 - 2	21.9	31.4 J	7.50
	2 - 4	13.4	53.6 J	4.70
MB-SB-66	0 - 0.5	**126**	357	7.20
	0.5 - 2	**61.5**	260	7.30
	2 - 4	10.9	29.3	7.00
MB-SB-67	0 - 0.5	3.56	14.4 J	6.10 J
	0.5 - 2	2.71	34.5 J	6.90 J
	2 - 4	12.1	10.9 J	4.40 J
MB-SB-68	0 - 0.5	6.30	28.0 J	7.20 J
	0.5 - 2	4.44	14.8 J	7.20 J
	2 - 4	2.51	15.5 J	7.20 J
MB-SB-69	0 - 0.5	3.84 [3.11]	9.73 [9.49]	7.60 J [7.60 J]
	0.5 - 2	2.06	5.39	7.60 J
	2 - 4	2.20	16.3	7.70 J
MB-SB-70	0 - 0.5	14.9	192 J	6.80 J
	0.5 - 2	25.9	6.43 J	6.00 J
	2 - 4	7.53	6.19 J	4.00 J
MB-SB-71	0 - 0.5	**32.5**	35.5 J	5.40 J
	0.5 - 2	**92.1**	132 J	3.30 J
	2 - 4	10.3	12.5 J	3.40 J
	4 - 6	8.50	6.00	3.40 J
MB-SB-72	0 - 0.5	**27.7**	32.8 J	6.30 J
	0.5 - 2	**47.4**	36.6 J	5.60 J
	2 - 4	5.15	7.96 J	3.30 J
	4 - 6	8.42	11.1	3.30 J
MB-SB-73	0 - 0.5	7.27	12.4 J	7.70 J
	0.5 - 2	3.75	3.19 J	7.30 J
	2 - 4	2.81	2.61 J	7.10 J

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-SB-74	0 - 0.5	4.10	11.2	7.40 J
	0.5 - 2	4.08	9.16	7.40 J
	2 - 4	1.22	2.00	7.40 J
MB-SB-75	0 - 0.5	19.2	248 J	6.90
	0.5 - 2	**39.9**	546 J	6.90
	2 - 4	12.7	155 J	6.90
MB-SB-76	0 - 0.5	10.3	86.8 J	6.80
	0.5 - 2	6.63	39.5 J	7.00
	2 - 4	2.59	8.17 J	7.00
MB-SB-77	0 - 0.5	10.6	105 J	6.90
	0.5 - 2	6.28	45.2 J	7.20
	2 - 4	8.11	24.7 J	4.70
MB-SB-78	0 - 0.5	10.4	107 J	6.70
	0.5 - 2	4.85 [5.88]	42.0 J [29.8 J]	7.10 [5.10]
	2 - 4	2.29	8.22	4.40
MB-SB-79	0 - 0.5	9.36	26.4 J	7.40
	0.5 - 2	2.35	5.65 J	7.40
	2 - 4	2.49	7.30 J	5.30
MB-SB-80	0 - 0.5	12.7	16.7 J	6.80
	0.5 - 2	6.48	17.5 J	6.80
	2 - 4	3.37	4.14 J	6.90
MB-SB-81	0 - 0.5	19.4	640 J	6.40
	0.5 - 2	**33.2**	80.2 J	6.80
	2 - 4	4.14	7.56 J	6.50
MB-SB-82	0 - 0.5	9.45	26.1	5.30
	0.5 - 2	2.13	6.49	5.50
	2 - 4	1.33	6.92	5.00
MB-SB-83	0 - 0.5	14.4 J	194 J	7.30
	0.5 - 2	4.24 J	22.1 J	7.30
	2 - 4	1.34 J	6.86 J	7.30
MB-SB-84	0 - 0.5	16.5 J	22.4 J	4.10
	0.5 - 2	7.72 J	6.12 J	3.60
	2 - 4	**299 J**	3.85 J	3.60
	4 - 6	**27.2**	21.6	4.30
MB-SB-85	0 - 0.5	20.2 J [9.31]	219 J [46.7 J]	6.90 [5.70]
	0.5 - 2	1.38 J	4.75 J	6.90
	2 - 4	1.55 J	5.80 J	4.60
MB-SB-86	0 - 0.5	7.13 J	9.33 J	4.30
	0.5 - 2	1.79 J	6.01 J	3.90
	2 - 4	2.79 J	6.85 J	4.00
MB-SB-87	0 - 0.5	20.5	10.4	4.30
	0.5 - 2	1.23 U	7.63	3.40
	2 - 4	1.19 U	7.64	3.40
MB-SB-88	0 - 0.5	4.51 J	30.1 J	7.70
	0.5 - 2	2.76 J	25.3 J	7.80
	2 - 4	14.0 J	40.6 J	7.10

Table 3-1
Summary of Soil Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Location ID:	Depth (Ft BGS)	Arsenic mg/kg	Lead mg/kg	pH pH Units
USEPA SSSLs		**27**	**800**	**- -**
MB-SB-89	0 - 0.5	16.1 J	44.5 J	7.40
	0.5 - 2	18.8 J [6.10 J]	73.7 J [85.6 J]	5.30 [5.50]
	2 - 4	2.66 J	3.86 J	3.80

Notes:

J - estimated value

U - not detected

mg/kg - milligrams per kilogram

ft bgs - feet below ground surface

Duplicate sample concentrations are in brackets

USEPA SSSLs - USEPA Site-Specific Screening Levels

Shaded and bold values exceed the USEPA SSSLs

Table 3-2
Summary of Groundwater Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

			Concentration in Sample						
Analyte	**USEPA MCLs**	**Units**	**MB-MW-01 10/18/12**	**MB-MW-02 10/18/12**	**MB-MW-03 10/18/12**	**MB-MW-04 10/19/12**	**MB-MW-05 10/19/12**	**MB-MW-05-DUP 10/19/12**	**MB-MW-06 10/19/12**
Total Metals									
Arsenic	0.01	mg/L	0.0100 U	0.00600 J	0.0179	0.0100 U	0.0100 U	0.0100 U	0.0102
Lead	0.015	mg/L	0.00500 U	0.00770	0.00500	0.00270 J	0.00500 U	0.00260 J	0.00500 U
Dissolved Metals									
Arsenic	0.01	mg/L	0.0100 U	0.00480 J	0.0176	0.00410 J	0.00480 J	0.0100 U	0.0154
Lead	0.015	mg/L	0.00500 U	0.00930	0.00200 J	0.00500 U	0.00500 U	0.00500 U	0.00500 U
Miscellaneous									
Dissolved Oxygen	- -	mg/L	6.43	5.03	0.470	0.620	7.17	- -	0.370
ORP	- -	mV	204	231	-52.3	167	157	- -	78.7
pH	- -	s.u.	4.47	4.12	6.35	5.10	4.90	- -	6.54
Specific Conductance	- -	µS/Cm	0.0440	0.889	0.528	0.311	0.182	- -	0.684
Temperature of pH determinatio	- -	°C	23.0	24.6	22.7	21.9	22.7	- -	24.6
Turbidity	- -	NTU	5.95	9.24	8.39	6.61	4.11	- -	6.63

Notes:
U - not detected
J - estimated value
mg/L - milligrams per liter
Shaded values exceed screening levels
s.u. - standard units
ORP - oxidation reduction potential
mS/cm - microsiemens per centimeter

Table 3-3
Summary of Sediment Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

			Concentration in Sample			
Analyte	**Screening Values**	**Units**	**MB-SED-01 0 - 0.5 ft bss 02/08/10**	**MB-SED-01-DUP 0 - 0.5 ft bss 02/08/10**	**MB-SED-02 0 - 0.5 ft bss 02/08/10**	**MB-SED-03 0 - 0.5 ft bss 02/08/10**
Total Metals						
Arsenic	27	mg/kg	1.60	1.17 J	4.43	69.7
Lead	800	mg/kg	46.3	32.1	32.1	1,550
Miscellaneous						
% Dry Solids	- -	%	72.7	66.7	74.9	66.5
pH	- -	pH Units	6.60	6.60	6.90	7.00
Temperature of pH determination	- -	°C	21.3	21.3	21.3	21.3

Notes:
J - estimated value
mg/kg - milligrams per kilogram
ft bss - feet below sediment surface
Screening values are based on USEPA Region 4 screening values.
Shaded valued exceed screening levels.

Table 3-3
Summary of Sediment Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

			Concentration in Sample				
Analyte	**Screening Values**	**Units**	**MB-SED-03 0.5 - 2 ft bss 10/17/12**	**MB-SED-03 2 - 4 ft bss 10/17/12**	**MB-SED-03 4 - 6 ft bss 10/17/12**	**MB-SED-04 0 - 0.5 ft bss 02/11/10**	**MB-SED-05 0 - 0.5 ft bss 10/17/12**
Total Metals							
Arsenic	27	mg/kg	47.1	57.1	36.9	98.2	113
Lead	800	mg/kg	225	20.6	16.0	840	1,760
Miscellaneous							
% Dry Solids	- -	%	83.0	80.0	74.0	75.0	74.0
pH	- -	pH Units	5.90	5.50	4.80	7.10	6.70
Temperature of pH determination	- -	°C	21.1	21.1	21.1	21.4	21.9

Notes:
J - estimated value
mg/kg - milligrams per kilogram
ft bss - feet below sediment surface
Screening values are based on USEPA Region 4 screening values.
Shaded valued exceed screening levels.

Table 3-3
Summary of Sediment Sample Analytical Results
Site delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

			Concentration in Sample				
Analyte	**Screening Values**	**Units**	**MB-SED-05 0.5 - 2 ft bss 10/17/12**	**MB-SED-05 2 - 4 ft bss 10/17/12**	**MB-SED-06 0 - 0.5 ft bss 10/17/12**	**MB-SED-06 0.5 - 2 ft bss 10/17/12**	**MB-SED-07 0 - 0.5 ft bss 10/16/12**
Total Metals							
Arsenic	27	mg/kg	388	116	25.6	44.1	59.1
Lead	800	mg/kg	463	185	972	1,220	489
Miscellaneous							
% Dry Solids	- -	%	77.0	77.0	84.0	83.0	59.0
pH	- -	pH Units	6.30	6.10	7.20	7.60	6.60 J
Temperature of pH determination	- -	°C	21.1	21.1	21.1	21.1	21.9 J

Notes:
J - estimated value
mg/kg - milligrams per kilogram
ft bss - feet below sediment surface
Screening values are based on USEPA Region 4 screening values.
Shaded valued exceed screening levels.

Table 3-3
Summary of Sediment Sample Analytical Results
Site delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

			Concentration in Sample			
Analyte	**Screening Values**	**Units**	**MB-SED-07-DUP 0 - 0.5 ft bss 10/16/12**	**MB-SED-07 0.5 - 1ft bss 10/17/12**	**MB-SED-08 0 - 0.5 ft bss 10/16/12**	**MB-SED-08 0.5 - 1.3 ft bss 10/17/12**
Total Metals						
Arsenic	27	mg/kg	63.8	20.4	2.51	6.78
Lead	800	mg/kg	550	298	31.0	65.0
Miscellaneous						
% Dry Solids	- -	%	81.0	84.0	79.0	82.0
pH	- -	pH Units	7.40 J	7.70	7.30 J	8.10
Temperature of pH determination	- -	°C	21.1 J	21.1	21.9 J	21.1

Notes:
J - estimated value
mg/kg - milligrams per kilogram
ft bss - feet below sediment surface
Screening values are based on USEPA Region 4 screening values.
Shaded valued exceed screening levels.

Table 3-4
Summary of Solid IDW Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Analyte	Screening Criteria	Units	Concentration in Sample MB-IDW-Soil_10182012 10/18/2012	
TCLP Metals				
Arsenic	5.0	mg/L	0.0670	JB
Barium	100	mg/L	0.670	B
Cadmium	1.0	mg/L	0.00300	J
Chromium	5.0	mg/L	0.0500	U
Lead	5.0	mg/L	0.0310	J
Mercury	0.2	mg/L	0.00200	U
Selenium	1.0	mg/L	0.100	U
Silver	5.0	mg/L	0.0500	U
Miscellaneous				
% Dry Solids		%	87.0	
pH		pH Units	7.40	
Temperature of pH determination		°C	21.4	

Notes:

mg/L - milligrams per liter

U - not detected

J - estimated value

B - Analyte was detected in the associated Method Blank.

IDW - investigation-derived waste

Table 3-5
Summary of Liquid IDW Sample Analytical Results
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

			Concentration in Sample	
	Screening		MB-IDW-Deconwater	MB-IDW-Purge_10182012
Analyte	Criteria	Units	10/18/2012	10/18/2012
Total Metals				
Aluminum	- -	mg/L	18.0	5.0
Antimony	- -	mg/L	0.0350	0.00600 U
Arsenic	5	mg/L	0.190	0.0100 U
Barium	100	mg/L	0.110	0.950
Beryllium	- -	mg/L	0.000400 J	0.00140 J
Cadmium	1	mg/L	0.00120	0.000700 J
Calcium	- -	mg/L	10.0	48.0
Chromium	5	mg/L	0.0520	0.0110
Cobalt	- -	mg/L	0.00370 J	0.0190 J
Copper	- -	mg/L	0.290	0.0210
Iron	- -	mg/L	15.0	4.50
Lead	5	mg/L	1.10	0.0570
Magnesium	- -	mg/L	1.00	6.70
Manganese	- -	mg/L	0.200	0.790
Mercury	0.2	mg/L	0.00400	0.000230
Nickel	- -	mg/L	0.0260	0.0160
Potassium	- -	mg/L	2.20	7.40
Selenium	1	mg/L	0.0100 U	0.0100 U
Silver	5	mg/L	0.00500 U	0.00500 U
Sodium	- -	mg/L	290	2.40
Thallium	- -	mg/L	0.00500 U	0.00500 U
Vanadium	- -	mg/L	0.0430	0.0420
Zinc	- -	mg/L	11.0	0.160
Miscellaneous				
pH		s.u.	8.60	5.90
Temperature of pH determination		°C	23.6	23.6

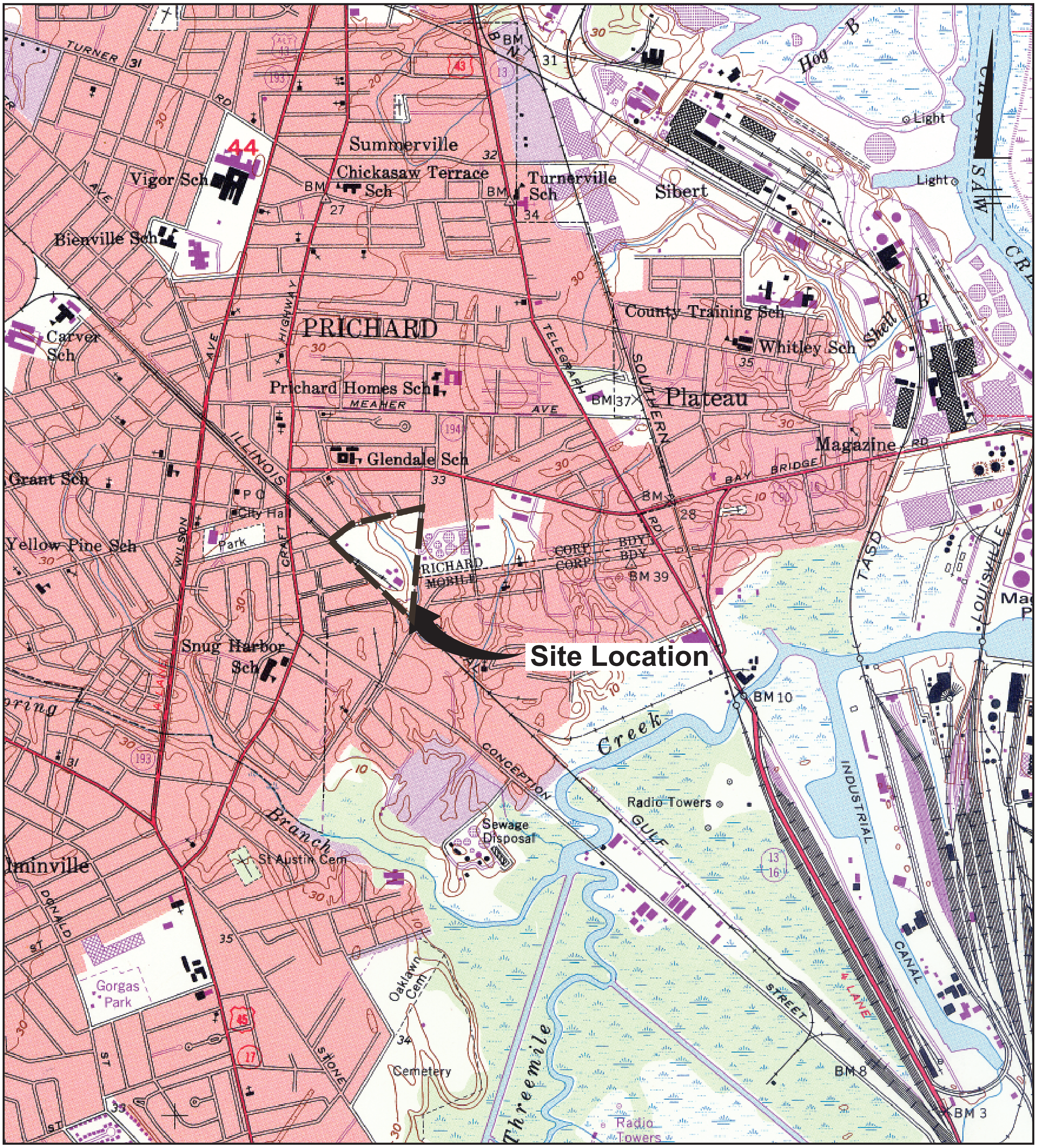
Notes:
mg/L - milligrams per liter
U - not detected
J - estimated value
B - Analyte was detected in the associated Method Blank.
detected in the
s.u. - standard units
°C - degrees Celsius
IDW - investigation-derived waste

Table 5-1
Soil Removal Volume Estimate
Site Delineation Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

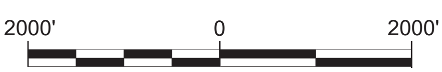
Excavation Depth	Approximate Surface Area of Impacted Soil (ft^2)	Approximate Depth of Impacted Soil (ft bgs)	Estimated In-Place Excavation Volume	
			cubic yards	tons
0.5'	29,696	0.5	550	935
2'	71,936	2	5,329	9,059
4'	26,880	4	3,982	6,770
6'	20,224	6	4,494	7,640
8'	5120	8	1,517	2,579
Total of all Excavation Areas	**153,856**		**15,872**	**26,982**

Notes:
ft^2 - square feet
ft bgs - feet below ground surface
The calculation of cubic yards to tons is based on a conversion factor of 1.7.
Excavation depths are based on vertical cuts. Actual depths may vary based on sloping requirements, presence of utilities, and/or site drainage features.

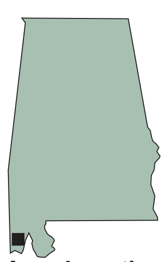
Figures



REFERENCE: Base Map USGS 7.5 Min. Quad., Mobile, Alabama, 1953, Photorevised 1982.



Approximate Scale: 1" = 2000'



Area Location

EXXONMOBIL
MOBILE, ALABAMA
SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

SITE LOCATION MAP

ARCADIS

FIGURE
1-1

01/17/13 SYR-D85-LBR CAR-85-LEE
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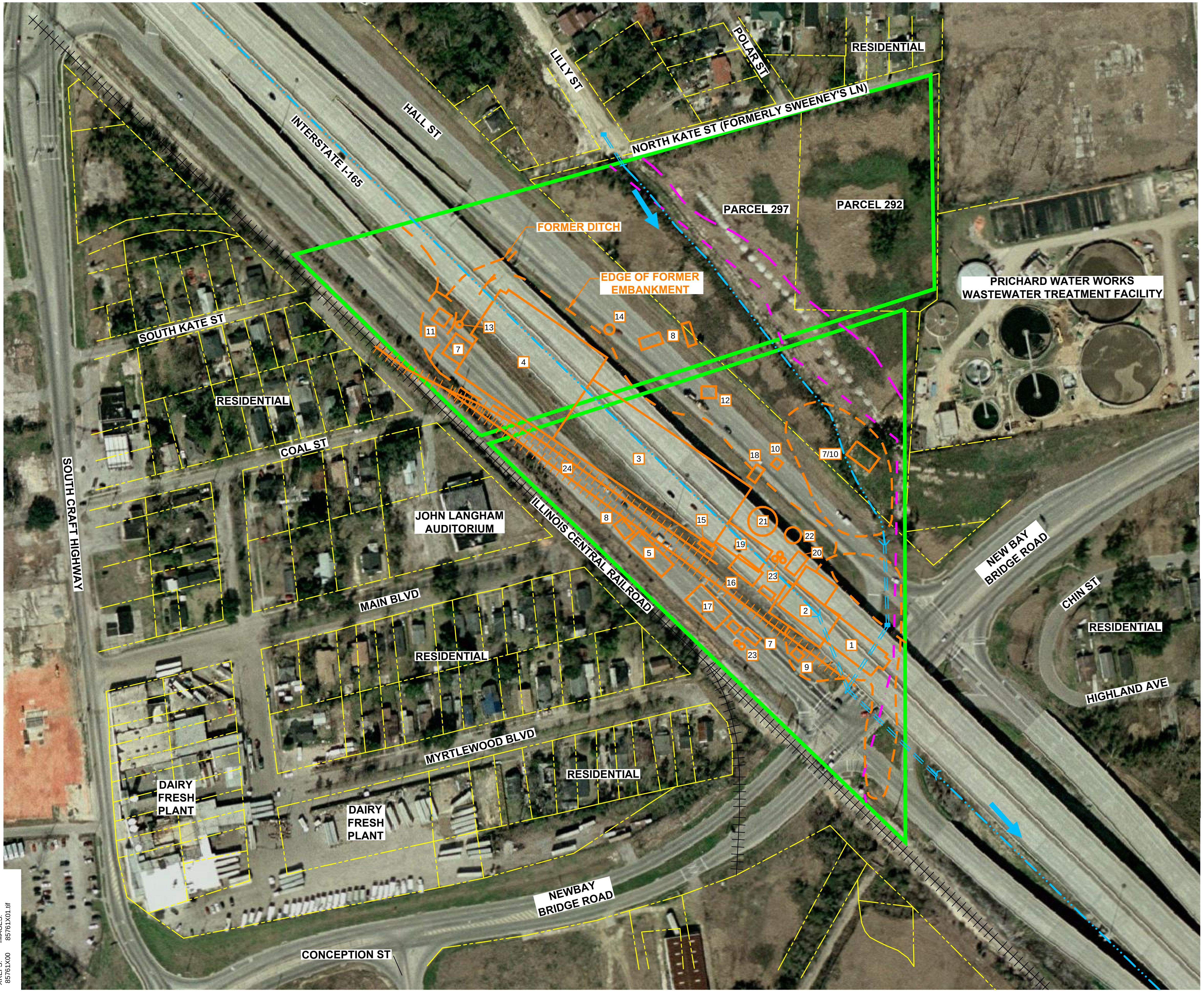

LEGEND:

- APPROXIMATE BOUNDARY OF THE FORMER VCC MOBILE PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- DRAINAGE FLOW DIRECTION
- RAILROAD

HISTORICAL VCC SITE FEATURES:

- STRUCTURES
- RAILROAD SIDING
- EDGE OF EMBANKMENT
- ROAD
- DISTURBED AREA AS SHOWN ON 1960 HISTORICAL AERIAL PHOTO

HISTORICAL NON–VCC SITE FEATURES (WITHIN BOUNDARIES OF FORMER VCC PROPERTY AND POST DATING 1961 SALE OF PROPERTY BY VCC):

- ROAD
- APPROXIMATE LOCATION OF 10–FOOT SEWERAGE RIGHT–OF–WAY AS SHOWN ON 1956 VCC PROPERTY PLANT MAP; POSSIBLY A CURRENT SITE FEATURE

KEY TO HISTORICAL SITE FEATURES: #

1. ACID CHAMBER (1981)
2. ACID CHAMBER (1904)
3. FERTILIZER MIXING AND STORAGE (ACID PHOSPHATE PITS, ROCK GRINDING MILL, AND GAS CONDENSER)
4. SHIPPING AND STORAGE ADDITION
5. BAG HOUSE
6. ELECTRICAL TRANSFORMERS
7. NITRE HOUSE
8. OFFICE
9. AMMONIA TANK HOUSE
10. OIL HOUSE
11. TRACTOR HOUSE
12. R.C. DYNAMITE STORE
13. 500–GALLON BURIED GASOLINE TANK
14. DEEP WELL PUMP (100 GPM)
15. COAL SHED
16. SULFUR HEAP
17. POTASH STORAGE
18. MACHINE SHOP
19. MOTOR ROOM
20. BOILER ROOM
21. 100,000–GALLON RESERVOIR
22. 20,000–GALLON STEEL WATER TOWER
23. ARTESIAN WELLS
24. CINDER FILL FOR TRUCKS

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. HISTORICAL VCC FEATURES DIGITIZED FROM 1891 AND 1904 SANBORN MAPS AND 1955 (REVISED) VCC INSURANCE DEPARTMENT MAP PROVIDED BY EXXONMOBIL.
5. ALL LOCATIONS ARE APPROXIMATE.

0 200' 400'

GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA

SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

SITE PLAN WITH HISTORICAL AND CURRENT SITE FEATURES

ARCADIS

FIGURE **1-2**

CITY:SYRACUSE DIV/GROUP:ENVCAD DB:R.PETRIE LD:(Opt) PIC:(Opt) PM:W.ANCKNER TM:J.PRITCHARD LYR:(Opt)ON=*;OFF=*REF*
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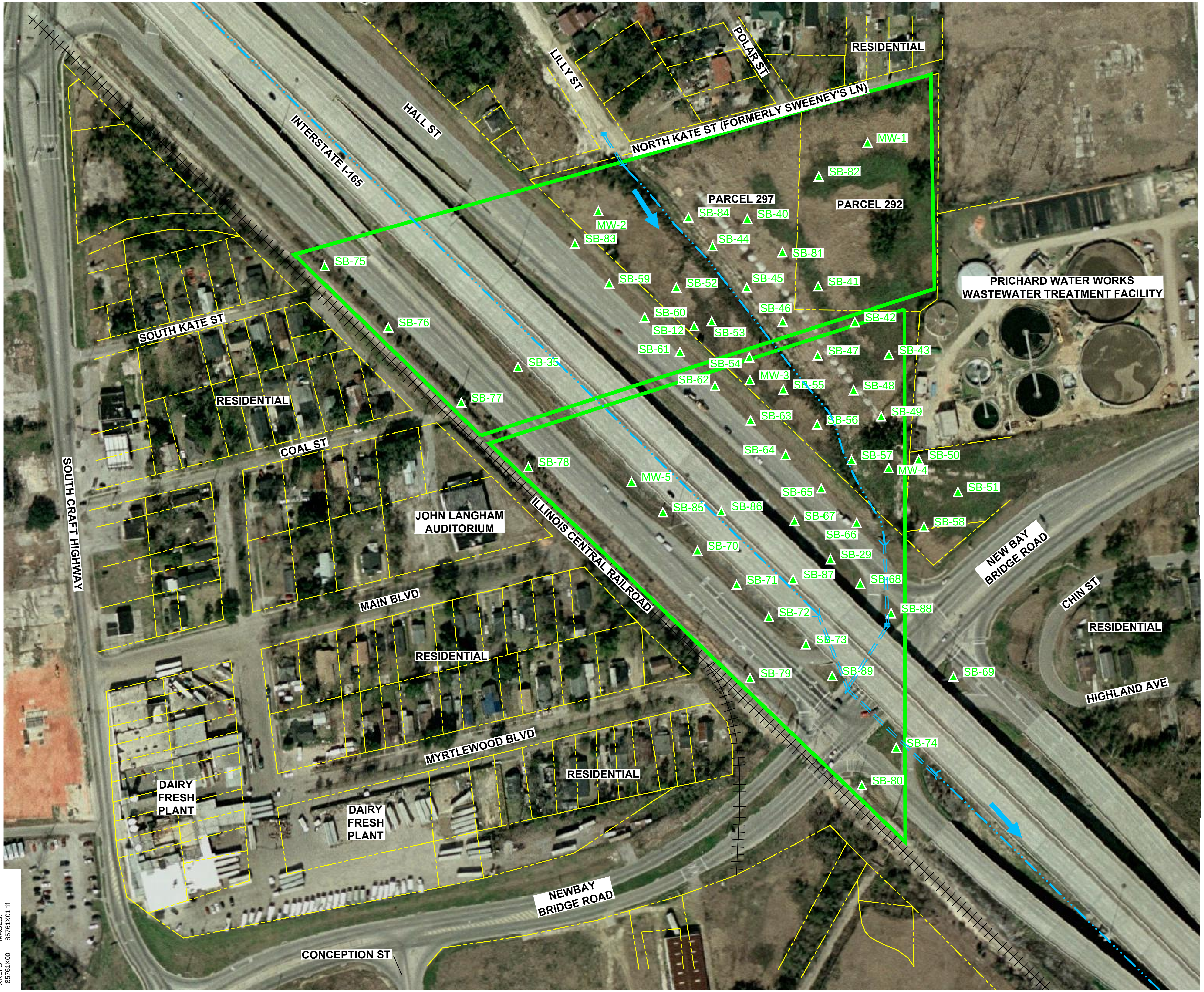

LEGEND:

- SB-40 ▲ APPROXIMATE LOCATION OF SOIL BORING
- APPROXIMATE BOUNDARY OF THE FORMER VCC PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- DRAINAGE FLOW DIRECTION
- RAILROAD

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. 2012 SOIL BORING LOCATIONS WERE SURVEYED BY LOWERY AND ASSOCIATES LAND SURVEYING, LLC, CARTERSVILLE, GA.
5. SAMPLE LOCATION NAMES BEGIN WITH PREFIX "MB–".

0 200' 400'

GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA

SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

2012 SOIL SAMPLE LOCATIONS

ARCADIS

FIGURE
2-1

CITY:SYRACUSE DIV/GROUP:ENVCAD DB:R.PETRIE LD:(Opt) PIC:(Opt) PM:W.ANCKNER TM:J.PRITCHARD LYR:(Opt)ON=*;OFF=*REF* PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/15/2013 11:58 AM BY: ELLIS, LEKOREY
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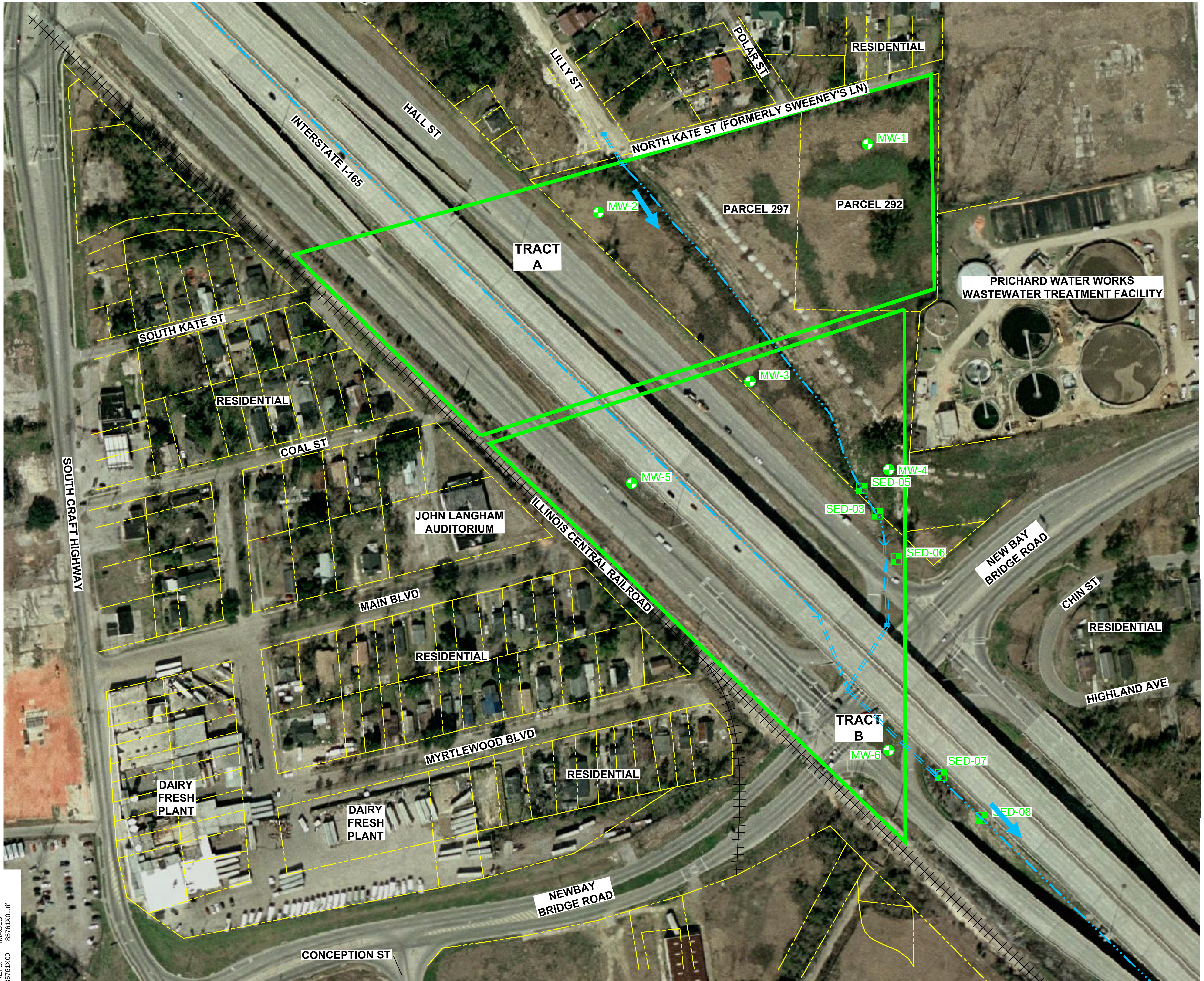
XREFS: 85761X00 IMAGES: 85761X01.tif



LEGEND:

- MW-1 — APPROXIMATE LOCATION OF GROUNDWATER MONITORING WELL
- SED-03 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE
- APPROXIMATE BOUNDARY OF THE FORMER VCC PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- DRAINAGE FLOW DIRECTION
- RAILROAD

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. 2012 MONITORING WELL AND SEDIMENT SAMPLE LOCATIONS WERE SURVEYED BY LOWERY AND ASSOCIATES LAND SURVEYING, LLC, CARTERSVILLE, GA.
5. SAMPLE LOCATION NAMES BEGIN WITH PREFIX "MB–".

0 200' 400'
GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA
SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

2012 GROUNDWATER MONITORING WELL AND SEDIMENT SAMPLE LOCATIONS

ARCADIS

FIGURE
2-2

CITY:SYRACUSE DIV/GROUP:ENVCAD DB:R.PETRIE LD:(Opt) PIC:(Opt) PM:W.ANCKNER TMJ.PRITCHARD LYR:(Opt)ON=*;OFF=*REF*
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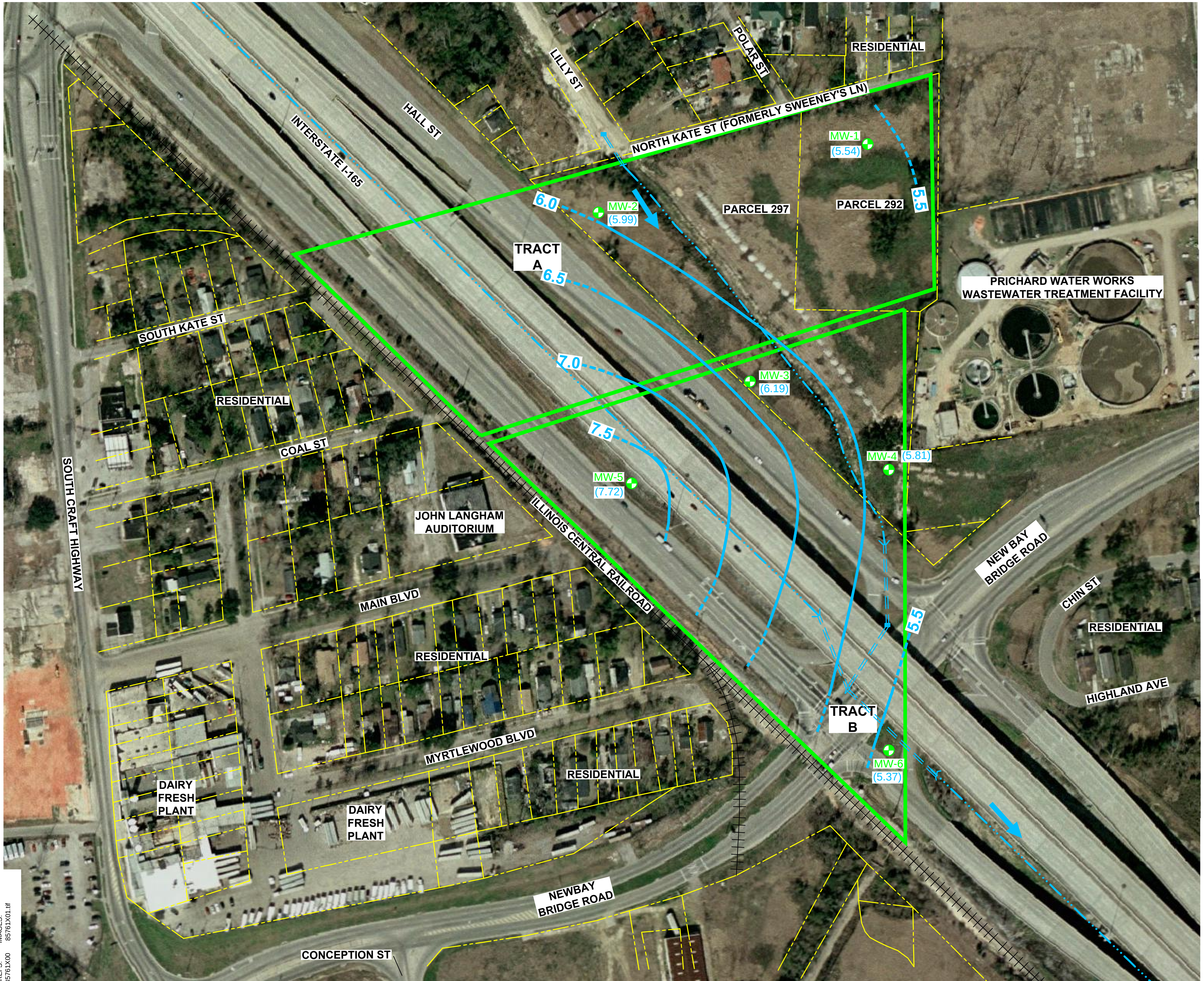
XREFS: 85761X00 IMAGES: 85761X01.tif



LEGEND:

- MW-1 — APPROXIMATE LOCATION OF GROUNDWATER MONITORING WELL
- APPROXIMATE BOUNDARY OF THE FORMER VCC PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- 5.5 — SHALLOW GROUNDWATER POTENTIOMETRIC CONTOUR (DASHED WHERE INFERRED)
- DRAINAGE FLOW DIRECTION
- RAILROAD

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. 2012 MONITORING WELL LOCATIONS WERE SURVEYED BY LOWERY AND ASSOCIATES LAND SURVEYING, LLC, CARTERSVILLE, GA.
5. SAMPLE LOCATION NAMES BEGIN WITH PREFIX "MB–".

0 200' 400'
GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA
SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

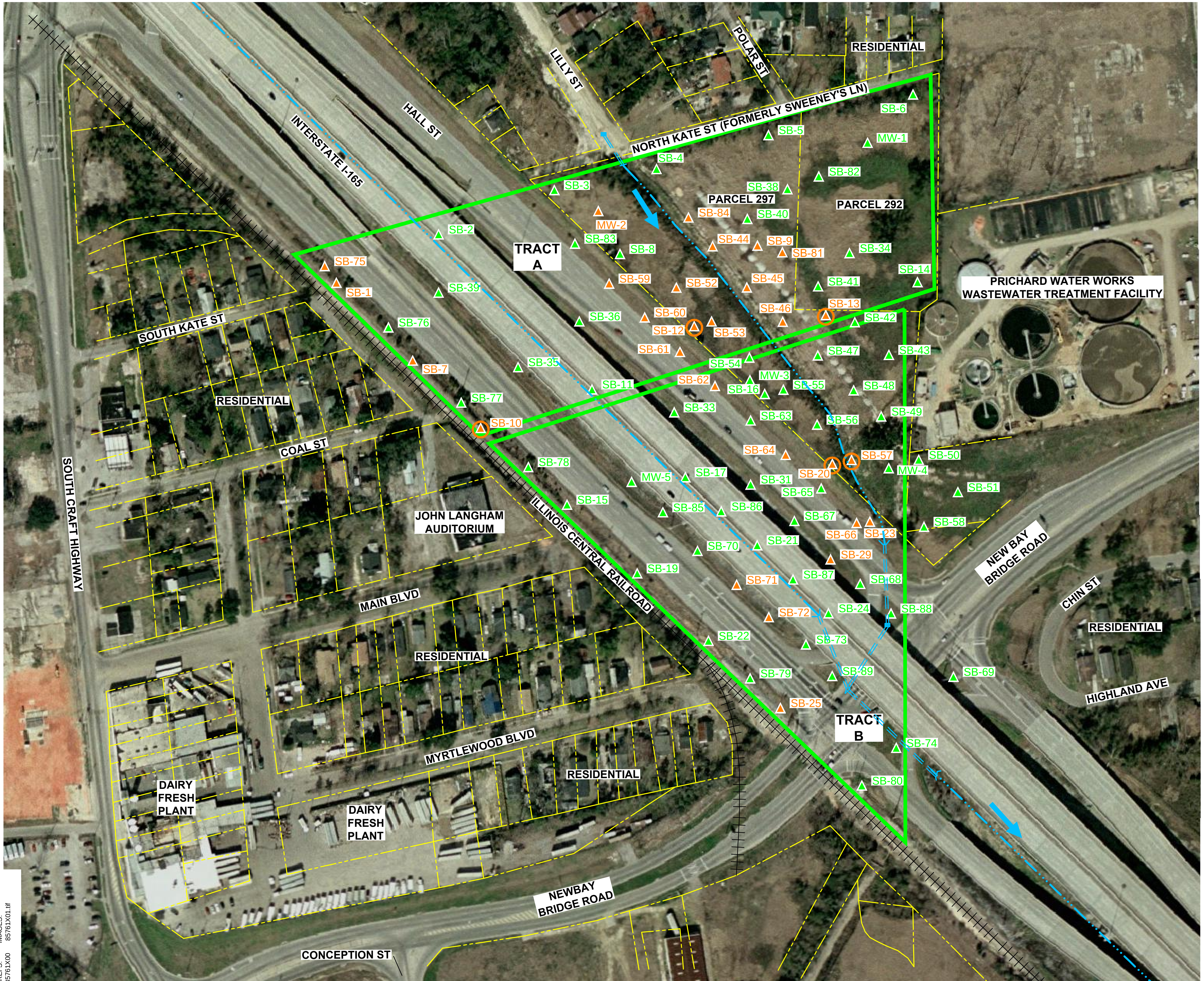
SHALLOW GROUNDWATER POTENTIOMETRIC SURFACE MAP - JANUARY 11, 2013

ARCADIS

FIGURE
2-3

CITY:SYRACUSE DIV/GROUP:ENVCAD DB:R.PETRIE LD:(Opt) PIC:(Opt) PM:W.ANCKNER TMJ.PRITCHARD LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Raleigh\ACT\B0085761\1201\00008\DWG\85761G07.dwg LAYOUT: 3-1 SAVED: 3/15/2013 11:54 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/15/2013 11:58 AM BY: ELLIS, LEKOREY

XREFS: 85761X00 IMAGES: 85761X01.tif



LEGEND:

- SB-12 ▲ APPROXIMATE LOCATION OF SOIL BORING WITH As OR Pb ABOVE SCREENING LEVELS
- SB-14 ▲ APPROXIMATE LOCATION OF SOIL BORING WITH As OR Pb BELOW SCREENING LEVELS
- SB-13 ⓐ APPROXIMATE LOCATION OF SOIL BORING WHERE MAGENTA STAINING OR SLAG WAS NOTED
- APPROXIMATE BOUNDARY OF THE FORMER VCC PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- DRAINAGE FLOW DIRECTION
- RAILROAD

USEPA REGION 4 INDUSTRIAL CRITERIA (mg/kg)	
ARSENIC	27
LEAD	800

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. 2010 SOIL BORING LOCATIONS WERE RECORDED IN THE FIELD USING A HANDHELD GPS UNIT. 2012 SOIL BORING LOCATIONS WERE SURVEYED BY LOWERY AND ASSOCIATES LAND SURVEYING, LLC, CARTERSVILLE, GA.
5. SAMPLE LOCATION NAMES BEGIN WITH PREFIX "MB–".
6. USEPA = UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.
7. mg/kg = MILLIGRAMS PER KILOGRAM.

0 200' 400'

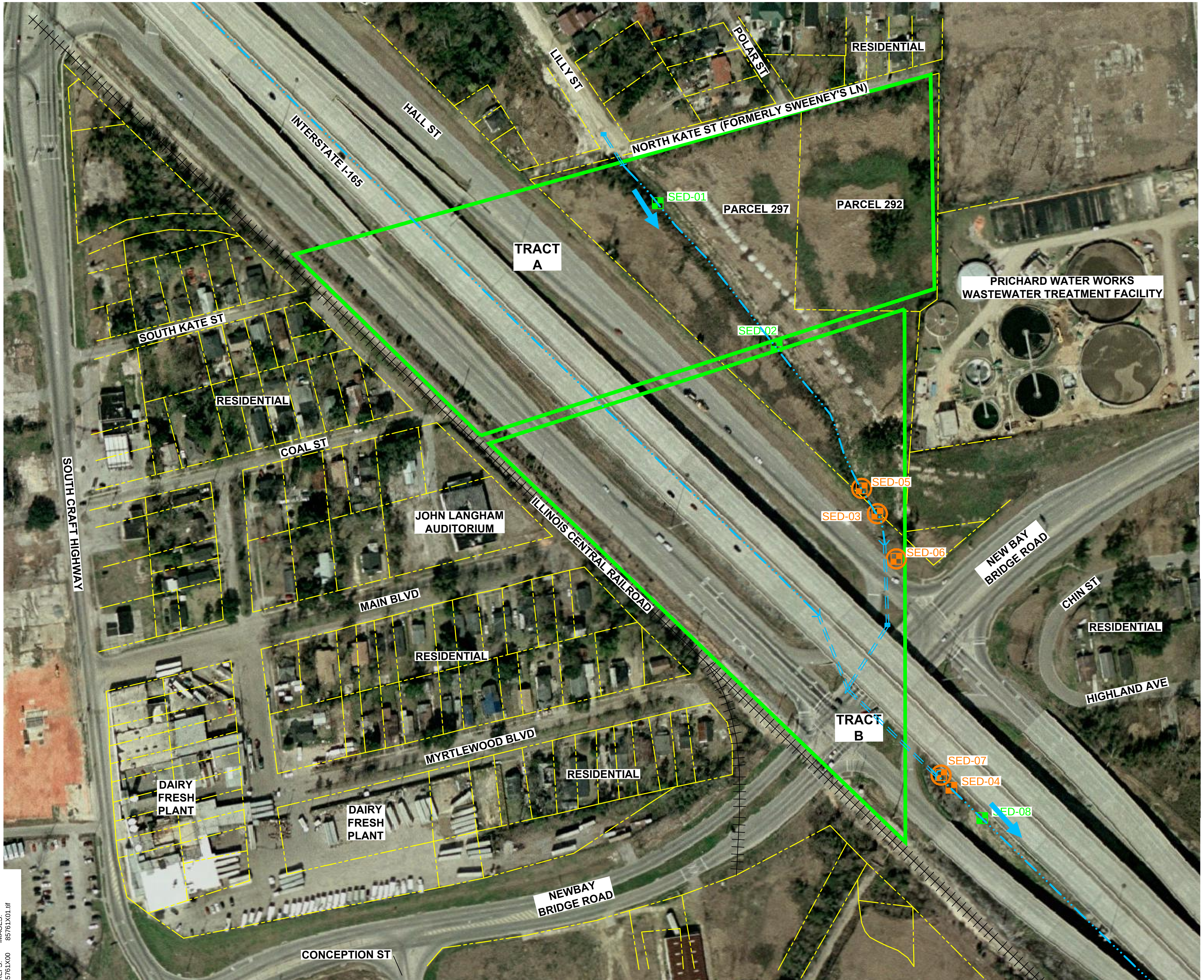
GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA
SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

SOIL SAMPLE ANALYTICAL RESULTS

ARCADIS

FIGURE
3-1



LEGEND:

- SED-04 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE WITH As OR Pb ABOVE SCREENING LEVELS
- SED-08 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE WITH As OR Pb BELOW SCREENING LEVELS
- SED-03 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE WHERE MAGENTA STAINING OR SLAG WAS NOTED
- APPROXIMATE BOUNDARY OF THE FORMER VCC PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- DRAINAGE FLOW DIRECTION
- RAILROAD

USEPA REGION 4 INDUSTRIAL CRITERIA (mg/kg)	
ARSENIC	27
LEAD	800

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. 2010 SEDIMENT SAMPLE LOCATIONS WERE RECORDED IN THE FIELD USING A HANDHELD GPS UNIT. 2012 SEDIMENT SAMPLE LOCATIONS WERE SURVEYED BY LOWERY AND ASSOCIATES LAND SURVEYING, LLC, CARTERSVILLE, GA.
5. SAMPLE LOCATION NAMES BEGIN WITH PREFIX "MB–".
6. USEPA = UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.
7. mg/kg = MILLIGRAMS PER KILOGRAM.

0 200' 400'

GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA

SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

SEDIMENT SAMPLE ANALYTICAL RESULTS

ARCADIS

FIGURE **3-2**

CITY:SYRACUSE DIV/GROUP:ENVCAD DB:R.PETRIE LD:(Opt) PIC:(Opt) PM:W.ANCKNER TM:J.PRITCHARD LYR:(Opt)ON=*;OFF=*REF*
G:\ENVCAD\Raleigh\ACT\B0085761\1201\00008\DWG\85761G08.dwg LAYOUT: 3-2 SAVED: 3/15/2013 11:54 AM ACADVER: 18.1S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/15/2013 11:59 AM BY: ELLIS, LEKOREY
XREFS: 85761X00 IMAGES: 85761X01.tif

LEGEND:

- SB-40 — APPROXIMATE LOCATION OF SOIL BORING WITH As OR Pb ABOVE SCREENING LEVELS
- SB-14 — APPROXIMATE LOCATION OF SOIL BORING WITH As OR Pb BELOW SCREENING LEVELS
- SB-13 — APPROXIMATE LOCATION OF SOIL BORING WHERE MAGENTA STAINING OR SLAG WAS NOTED
- SED-04 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE WITH As OR Pb ABOVE SCREENING LEVELS
- SED-01 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE WITH As OR Pb BELOW SCREENING LEVELS
- SED-03 — APPROXIMATE LOCATION OF SEDIMENT SAMPLE WHERE MAGENTA STAINING OR SLAG WAS NOTED
- APPROXIMATE BOUNDARY OF THE FORMER VCC PROPERTY
- APPROXIMATE LOCATION OF CURRENT PROPERTY LINES
- DRAINAGE DITCH
- DRAINAGE FLOW DIRECTION
- RAILROAD

USEPA REGION 4 INDUSTRIAL CRITERIA (mg/kg)	
ARSENIC	27
LEAD	800

EXCAVATION LEGEND:

- 0.5 FOOT EXCAVATION
- 2 FOOT EXCAVATION
- 4 FOOT EXCAVATION
- 6 FOOT EXCAVATION
- 8 FOOT EXCAVATION

NOTES:

1. FORMER VCC PROPERTY BOUNDARY BASED ON HISTORICAL DEEDS.
2. PARCEL BOUNDARIES DIGITIZED FROM TAX MAPS PROVIDED BY MOBILE COUNTY GEOGRAPHIC INFORMATION SYSTEM.
3. IMAGERY FROM 2008 USGS SEAMLESS ORTHO PHOTOS.
4. 2010 SOIL BORING AND SEDIMENT SAMPLE LOCATIONS WERE RECORDED IN THE FIELD USING A HANDHELD GPS UNIT. 2012 SOIL BORING AND SEDIMENT SAMPLE LOCATIONS WERE SURVEYED BY LOWERY AND ASSOCIATES LAND SURVEYING, LLC, CARTERSVILLE, GA.
5. SAMPLE LOCATION NAMES BEGIN WITH PREFIX "MB–".
6. USEPA = UNITED STATES ENVIRONMENTAL PROTECTION AGENCY.
7. mg/kg = MILLIGRAMS PER KILOGRAM.

0 160' 320'

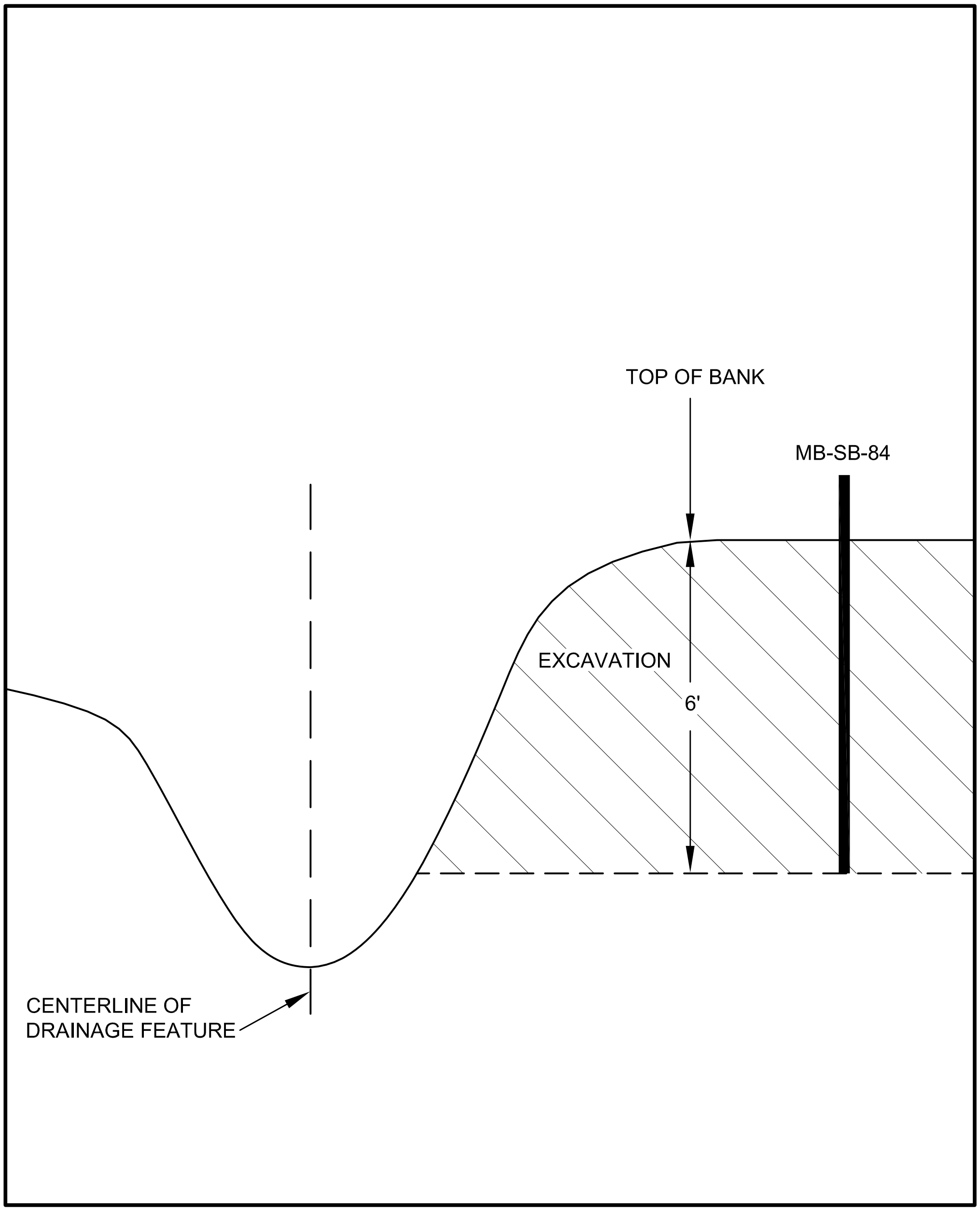
GRAPHIC SCALE

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA
SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

PROPOSED SOIL REMOVAL AREAS

ARCADIS

FIGURE
4-1



NOT TO SCALE

NOTES:

1. THE REMOVAL DEPTHS ADJACENT TO SITE DRAINAGE FEATURES WILL BE MEASURED RELATIVE TO THE TOP-OF-BANK AND/OR THE ELEVATION OF THE IMPACTED SOIL BORING DICTATING REMOVAL AND NOT THE EXISTING LAND SURFACE.

2. THIS FIGURE ILLUSTRATES THE EXTENT OF REMOVAL ADJACENT TO MB-SB-84.

EXXONMOBIL
VCC MOBIL - MOBILE, ALABAMA
SITE DELINEATION REPORT AND REMOVAL ACTION WORK PLAN

PROPOSED EXCAVATION PLAN ADJACENT TO SITE DRAINAGE FEATURES

ARCADIS

FIGURE
5-1

ARCADIS

Appendix A

Ecological Site Assessment

ARCADIS U.S., Inc.
6009 Monticello Drive
Suite A
Montgomery
Alabama 36117
Tel 334 273 0200
Fax 334 272 3881

MEMORANDUM

To:
Jamie Pritchard – ARCADIS U.S., Inc.

Copies:
Bill Anckner – ARCADIS U.S., Inc.

From:
Bo Sawyer – ARCADIS U.S., Inc.

Date:
November 19, 2012

ARCADIS Project No.:
B0085761.1201

Subject:
Ecological Site Assessment of the Virginia-Carolina Chemical Corporation Project Site – Mobile County, Alabama

Introduction and Site Assessment Methodology

ARCADIS, on behalf of ExxonMobil Corporation, completed an ecological assessment of the former Virginia-Carolina Chemical Corporation (VCC) property located in the city of Prichard, Mobile County, Alabama. Figure 1 depicts the location of the evaluated VCC property. The VCC property was surveyed for the presence of aquatic resources and protected species for the purpose of supporting preliminary project planning, permitting and feasibility evaluation efforts for an impending remediation project. Site assessment efforts were focused upon the primary project area located within the 10-acre VCC property, but a reconnaissance-level survey was also performed for the two peripheral soil sampling tracts located west of the VCC property. Estimated areal extents of the peripheral parcels consist of 5.50 acres located beneath an elevated section of the Interstate 165 (I-165) right-of-way (ROW), and 1.25 acres located between West Rebel Road and the Canadian National Railroad (CN Railroad) ROW.

Prior to the field evaluation of the project site, ARCADIS performed a desktop survey of the general project area that radially extended at least one mile from the center of the VCC property. The desktop survey consisted of researching Federal and State of Alabama natural resource databases to establish baseline ecological, geological and hydrological trends of general project area. Data, maps and aerial photographs reviewed during the desktop investigation included the following: Natural Resource Conservation Service (NRCS), *Mobile County Soil Survey*; digital U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) maps; U.S. Geological Survey (USGS) orthophoto and topographic quarter quadrangle imagery; as well as databases of the Alabama Department of Natural Resources (ADCNR), the Geological Survey of Alabama, the U.S. Army Corps of Engineers (USACE), the U.S. Environmental Protection Agency (USEPA), and the USFWS.

The field survey of the project site occurred on October 09, 2012, and consisted of a qualified ARCADIS biologist with expertise of the project area performing a pedestrian survey of the entire project site. Due to access limitations, the peripheral ALDOT and CN Railroad ROW soil sampling tracts were visually evaluated from outside the boundary of these easements. Wetland habitat presence determinations were performed in accordance with the 1987 USACE *Wetland Delineation Manual* and the November 2010 *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region*. A sampling radius of 30 feet was used at each sampling point to catalog flora, and the revised *National Wetland Plant List* (Final Draft; May 2012) was used to confirm the wetland indicator status of identified species. Soils were profiled to a minimum depth of 16 inches below ground surface at each sample boring. Soil sampling observations were compared with soil characteristics defined by NRCS Mobile Soil Survey data. The soil survey data are provided within Attachment 3.

Stream characteristics were assessed and documented using a combination of NRCS, USACE, USEPA, and USGS stream classification standards. Wetland determination and stream assessment field forms were completed for each sampling point, and are provided within Attachment 4. Presence/absence determinations for protected species identified during the desktop survey were performed according to peer-reviewed survey methodologies specific to each listed species. Photographs were taken to document site conditions at the time of observation, and are provided by the photographic log within Attachment 5.

Desktop Evaluation Results

The VCC property is bordered to the north by North Kate Street, to the east by the City of Prichard water treatment facility, to the south by New Bay Bridge Road, and by I-165 to west. The general project area occurs within the Coastal Lowlands district of the East Gulf Coastal Plain physiographic region of Alabama. The review of available aerial photography and topographical quadrangle maps determined the physical characteristics of the project area to be typical of lands within the Coastal Lowlands. Topography of the project site and surrounding areas is flat, with a slight slope to the southeast that sheds surficial water flow toward Three Mile Creek. Current land use of the project site is fallow, prior-disturbed land, with an interior herbaceous/shrubby land cover and a narrow stand of mixed, semi-mature hardwoods along the property perimeter. Adjacent land uses consist of commercial, residential, municipal utility, and transportation developments.

The USGS indicates that the project site lies within Hydrologic Unit Code (HUC) No. 031602040504, which is defined as the Three Mile Creek Watershed. One perennial stream feature was identified as potentially occurring within the project site during a review of USGS, Mobile, AL 7.5-minute Series Topographical (1953; Photorevised 1982) and Orthophoto (2011) Quadrangles. This feature is an unnamed tributary to Three Mile Creek, and appears to begin 900 feet northwest of the project site; at a point located south of Bay Bridge Road and west of Lilly Street. An estimated 700 linear feet of this stream feature reaches southeastwardly across the western portion of the VCC property before leaving the project site via a culvert inlet located near the southwestern property corner at Hall Street. The stream southeastwardly flows for over 4,000 feet from the VCC property before discharging into Three Mile Creek. Figures 2 and 3 depict hydrological details of the project area.

As shown by Figure 4, no NWI wetland habitats were identified as occurring inside, or within a 0.50 mile radius, of the project site during a search of the USFWS Wetlands Mapper database (a digital NWI resource). The NRCS *Mobile County Soil Survey* classifies soils of the entire project area as Urban Land Series soils (Unit Symbol – 57), which are non-hydric soils with no drainage class rating. The *U.S. Drought Monitor*, managed by the NRCS and the National Oceanic and Atmospheric Administration, was consulted to support hydric soil determination efforts during the field survey. The October 04, 2012, *U.S. Drought Monitor* report confirmed that the project area is within the range of typical annual precipitation. Results of the *Mobile County Soil Survey* and the *U.S. Drought Monitor* queries are provided as Attachment 2.

A total of 13 species were listed by the ADCNR and the USFWS as having potential or known occurrences within Mobile County. These species are identified by Table 1, and consist of two avian, one fish, one mammalian, and eight reptilian species that are federally-protected by the *Endangered Species Act* (ESA). The bald eagle was delisted from the ESA, but is still afforded protection under the *Bald and Golden Eagle Protection Act.*

Table 1. Species listed by the ADCNR and the USFWS as occurring within Mobile County, Alabama.

Common Name	Scientific Name	Federal Listing Status	Critical Habitat[†]	Project Site Occurrence Potential
Bald eagle[1]	*Haliaeetus leucocephalus*	Recovery	No	None
Wood stork	*Mycteria americana*	Endangered	No	None
Piping plover	*Charadrius melodus*	Threatened	Yes	None
Gulf sturgeon	*Acipenser oxyrinchus desotoi*	Threatened	Yes	None
West Indian manatee	*Trichechus manatus*	Endangered	No	None
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	No	None
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	No	None
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	No	None
Green sea turtle	*Chelonia mydas*	Threatened	No	None
Alabama red-belly turtle	*Pseudemys alabamensis*	Endangered	No	None
Eastern indigo snake	*Drymarchon corais couperi*	Threatened	No	Minimal
Black pine snake[2]	*Pituophis melanoleucus lodingi*	Candidate	No	Minimal
Gopher tortoise	*Gopherus polyphemus*	Threatened	No	Minimal

[†] Non-marine critical habitat occurring within Mobile County, Alabama.
[1] The bald eagle no longer has protection under the ESA after being officially delisted on August 08, 2007 (72 FR 130). Protection from "take" and "disturbance" is still provided by the *Bald and Golden Eagle Protection Act* (50 CFR 22).
[2] Candidate species have no formal protection under the ESA.

Of the 13 species identified by Table 1, the black pine and eastern indigo snakes, and the gopher tortoise are the only species that have potential to occur within or near the immediate project area. However, suitable pine snake habitat does not appear to occur within the project area, and the presence of eastern indigo snakes within the habitat type observed during the desktop review is almost entirely dependent upon the presence of gopher tortoise burrows. The piping plover is the only federally-listed, non-aquatic species within Mobile County with designated critical habitat. No critical habitat of the piping plover, or of any other species, occurs within the project area. The nearest parcel of designated critical habitat is located 30 miles south of the project site. No marine, estuarine or riverine habitats occur within the project site.

Field Evaluation Results

General Ecology and Site Characteristics

The October 09, 2012, field evaluation confirmed the general characteristics of the project area noted by the desktop survey. Sampling point locations and ecological resources identified during the field survey are shown by Figure 5. Predominant land cover of the VCC property consists of facultative upland herbaceous/shrubby vegetation and early successional tree species typical of prior-disturbed sites within the lower Gulf coastal plain. Species of dominant flora observed within the site interior include *Ampelopsis arborea* (peppervine), *Baccharis halimifolia* (groundseltree), *Juniperus virginiana* (eastern red cedar), *Liquidambar styraciflua* (sweet gum), *Paspalum* spp., *Solidago altissima* (tall goldenrod), and *Verbena bonariensis* (purple-top vervain). A thin stand of semi-mature hardwoods, predominately comprised of *Cornus florida* (flowering dogwood), *J. virginiana*, *L. styraciflua*, and *Quercus nigra* (water oak), lines the perimeter of the site. As shown by the photographs provided within Attachment 3, these two trees are substantial features of the project landscape. Current land use of the VCC property was confirmed during the site assessment to be open, fallow land. The prior industrial land use of the site was evidenced by a line of demolition debris piles (concrete, asphalt and metal) that stretches more than 500 feet across the western center of the property. Site drainage is primarily via overland sheet flow that trends south-southeastwardly toward the unnamed Three Mile Creek tributary channel located inside the property boundary.

Stream and Drainage Features

The Three Mile Creek tributary was confirmed as a first-order, highly channelized (no meander) streambed that enters the VCC property from North Kate Street via a 42-inch diameter, reinforced concrete pipe (RCP). This feature is identified as Stream 01 by Figure 5. Existing impacts to Stream 01 observed during the field investigation include channelization, piping, moderate bank erosion, and surrounding land uses. The estimated bankfull width of this feature is 20 feet, and the bankfull depth averaged eight feet. The channel is shaded and the substrate is predominately comprised of clay, with a nearly equal mix of sand and silt constituents. The wooded riparian zone was greater than 20 feet in width, and consisted of various semi-mature tree species.

The USGS topographical quadrangle identifies Stream 01 as a perennial stream, but the field assessment concluded this stream feature to be intermittent due to the following rationale. No flow was present at the time of observation, despite the project area being within a period of typical precipitation. Groundwater connectivity is a primary indicator of perennial stream classification, but appeared to be absent within the 700-foot sampling reach of Stream 01. The entire central reach of the streambed was dry, and rooted vegetation was present within the stream bed throughout much of the sampling reach. Moss trim lines and bank scour delineated the ordinary high water mark (OHWM) of the channel, but no evidence of substrate or basal bank section saturation was observed. Pools of tannin-stained water were observed within the streambed for distances of 35 linear feet downstream from the RCP at North Kate Street, and about 75 feet toward the culvert inlet at Hall Street. These pools were likely remnants of a recent flow event related to the 0.03 inch rain event (as reported by the National Weather Service) received by the project area the week prior to the field evaluation. Minnows and evidence of crayfish were observed within the section of pooled water at the North Kate Street culvert, but not within the pool at the Hall Street culvert. Though this stream feature displayed strong ephemeral characteristics, the presence of an OHWM and the observation of minnows classify this stream as intermittent.

One non-stream drainage channel, identified as WWC 01 by Figure 5, is located within the southeastern quadrant of the VCC property. This narrow, obscurely defined, stormwater conveyance feature originates from the Prichard wastewater treatment facility property and follows a southwestwardly course for 200 feet before discharging to Stream 01. Flow events of this conveyance feature appear to be entirely dependent upon rain events. Flora within and immediately adjacent to the WWC 01 channel consist of facultative species, with the occurrence of an obligate wetland species (*Salix nigra*) within the upper and central reaches of the channel. An eight-inch, metal pipe culvert occurs within the WWC 01 channel near the location of the remediation project soil sampling point identified as SB-49.

Wetlands

Wetland determination efforts conducted during the field evaluation concluded that no wetland habitat occurs within the project site. Two sampling points were selected to confirm the apparent upland status of the project site. Figure 5 identifies both sampling point locations, and the Wetland Determination Data Forms located within Attachment 4, provide specific characteristics of each location. The first sampling location (SS-01) was selected within an area of the site that displayed the most probability for containing wetland habitat. Vegetation was dominated by facultative and facultative upland species, and soils consisted of non-hydric, fine-sand silt that displayed dark chroma to a depth of 13 inches. No hydrology indicators were present. Vegetation and soils observed within SS-01 are representative of VCC property areas located east of Stream 01.

Sampling of the second location (SS-02) was conducted at a point located west of Stream 01. Elevations of the VCC property that occur west of Stream 01 appear to be higher than those of property areas east of Stream 01. The general area of SS-02 displayed more distinctive upland features, and hydrology indicators were absent. Facultative upland flora species dominated sampled vegetation, and observed soil types regressed from silty loam to tight clay at depths greater than 14 inches.

Protected Species

The pedestrian survey of the project site confirmed that no individuals or habitats suitable to sustain endangered, threatened or candidate species occur within the project area. The black pine snake, eastern indigo snake, and the gopher tortoise were identified during the desktop investigation as having potential to occur within the project area. The presence/absence determination survey for these species was based upon sandy soil habitat requirements shared by all three species, with consideration to additional habitat requirements specific to each species. In addition to the presence of sandy soils, black pine snakes prefer xeric, fire-managed pine forest habitats, and are occasionally found within undisturbed tracts of mature hardwood forest. The eastern indigo snake is often closely associated with the presence of active/inactive gopher tortoise burrows, but preferred habitat typically also includes interspersed, proximally-located stream or wetland habitats within sandhill-type environments.

No active or abandoned gopher tortoise burrows were observed within the VCC property. None of the habitat requirements specific to the black pine and eastern indigo snake species are present within the project area. Additional limiting factors for the presence of these three species include the prior industrial land use of the site, the presence of the I-165 corridor, and the heavily developed nature of the surrounding area.

Peripheral Soil Sampling Tracts

Active, transportation-based land uses of the ALDOT and CN Railroad rights-of-way were confirmed during the project area assessment. Locations of these two peripheral project areas are depicted by Figure 5. The project area beneath the I-165 ROW is upland and mostly void of vegetation due to shading by the elevated roadway structure. A narrow, rip rap-lined stormwater conveyance channel (non-stream feature) was observed beneath the median segment of the elevated I-165 structure, and appears to convey stormwater toward a culvert located on the northern edge of New Bay Bridge Road. The section of CN Railroad ROW within the project area is upland and contains a road-side stormwater drainage ditch located between the railroad ROW and West Rebel Road.

Conclusion

ARCADIS confirmed the absence of wetland habitat, protected species, designated critical habitats of protected species, and suitable protected species habitats within the project area. The project would have no effect upon these ecological resources. The WWC 01 stormwater conveyance channel is not a stream feature and does not directly discharge to a traditional navigable waterway (TNW). This non-stream feature is therefore exempt from regulation by Section 404 of the Clean Water Act (CWA), and is not subject to USACE permitting requirements.

Stream 01 is an intermittent stream feature that directly discharges to Three Mile Creek at a point located less than one mile south of the project area. Three Mile Creek is an ecologically sensitive, third-order stream listed by the Final 2010 and the Draft 2012 *Alabama 303(d) List*, and confluences with the Mobile River less than two miles from the confluence with Stream 01. The proximity of the Stream 01 – Three Mile Creek confluence to the Mobile River (a known TNW) would likely be the basis for classifying Stream 01 as jurisdictional by the USACE, with would deem Stream 01 subject to impact permitting and mitigation provisions defined by Section 404 of the CWA. However, completion of the project (as currently proposed) would not require Section 404 permitting through the USACE since no fill impacts, stream relocation, or work below the OHWM are planned to occur during project activities. If the current project scope is revised to include potential impacts to Stream 01, the Mobile District of the USACE would be contacted to obtain an official jurisdictional determination and to establish potential permitting requirements. Relevant scope revisions to consider consist of fill material (soil, rip rap, culverts, etc.) placement within the streambed, channel alterations, and/or any type of work below the OHWM of Stream 01.

ARCADIS U.S., Inc.

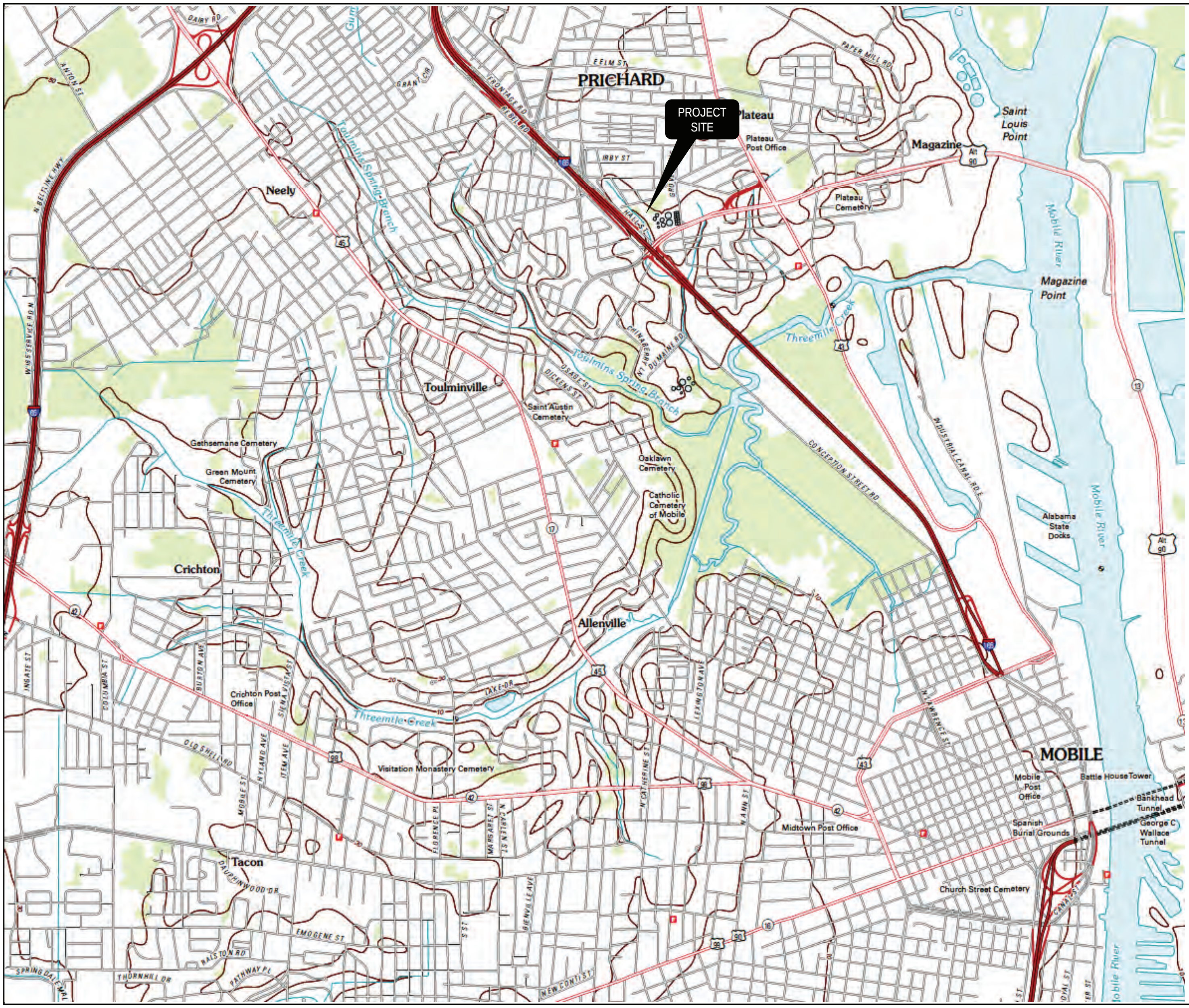
____

Bo Sawyer, MS, CPESC
Senior Scientist

ARCADIS

Attachment 1

Maps and Figures



ARCADIS

Figure 1
Project Location Map

Ecological Assessment – Former VCC Property
Prichard, Alabama (Mobile County)

N

0 2,000 ft

Source: USGS 7.5-minute Series Topographic Quadrangle; Mobile, AL (2011).

B0085761.1201

Figure 2
Overview of Project Site Hydrology

Ecological Assessment – Former VCC Property

Prichard, Alabama (Mobile County)

0 2,000 ft

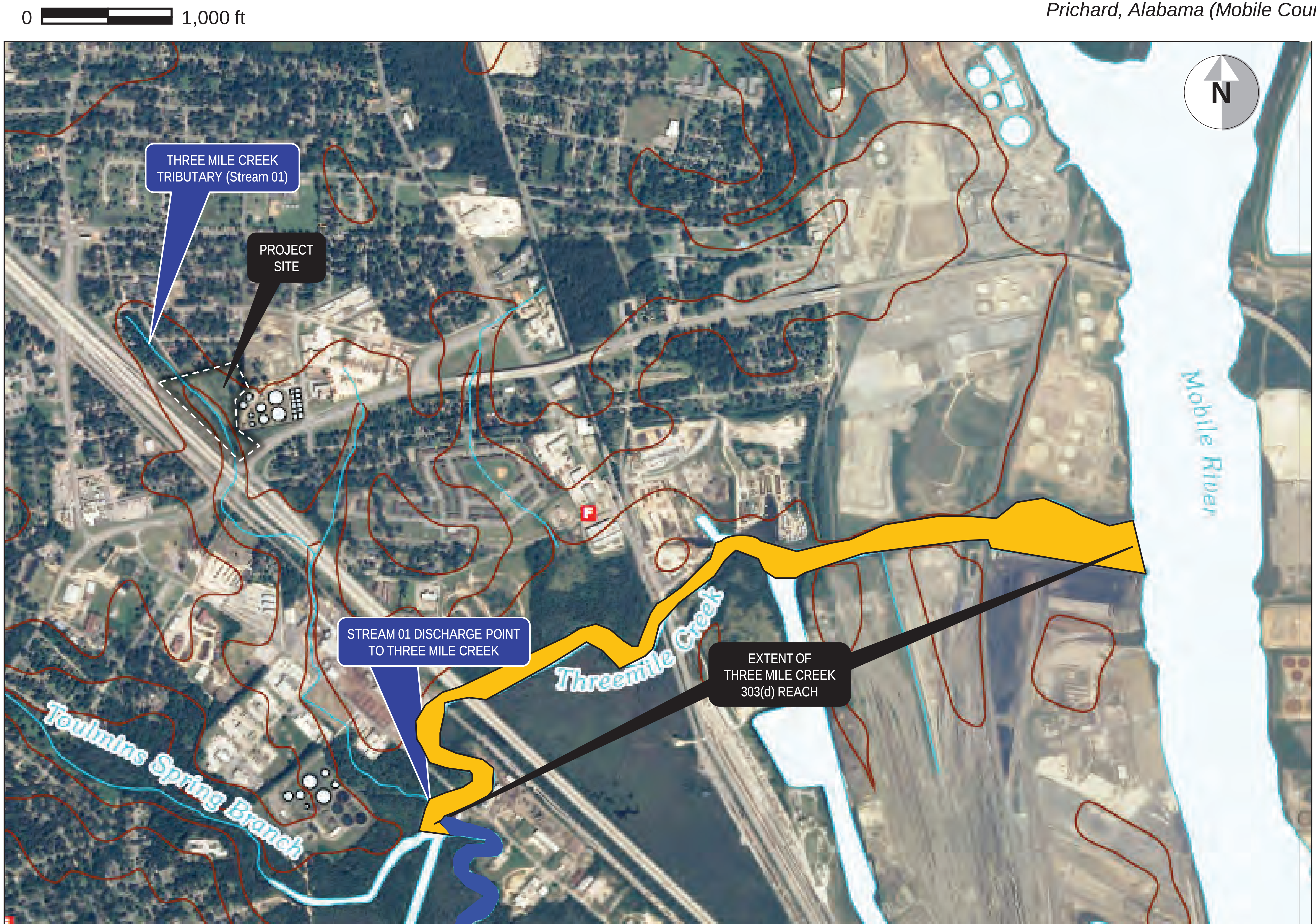
Source: USGS 7.5-minute Series Topographic Quadrangle, Mobile, AL (1953; Photorevised 1982).

B0085761.1201

Figure 3
Overview of Project Site Hydrology

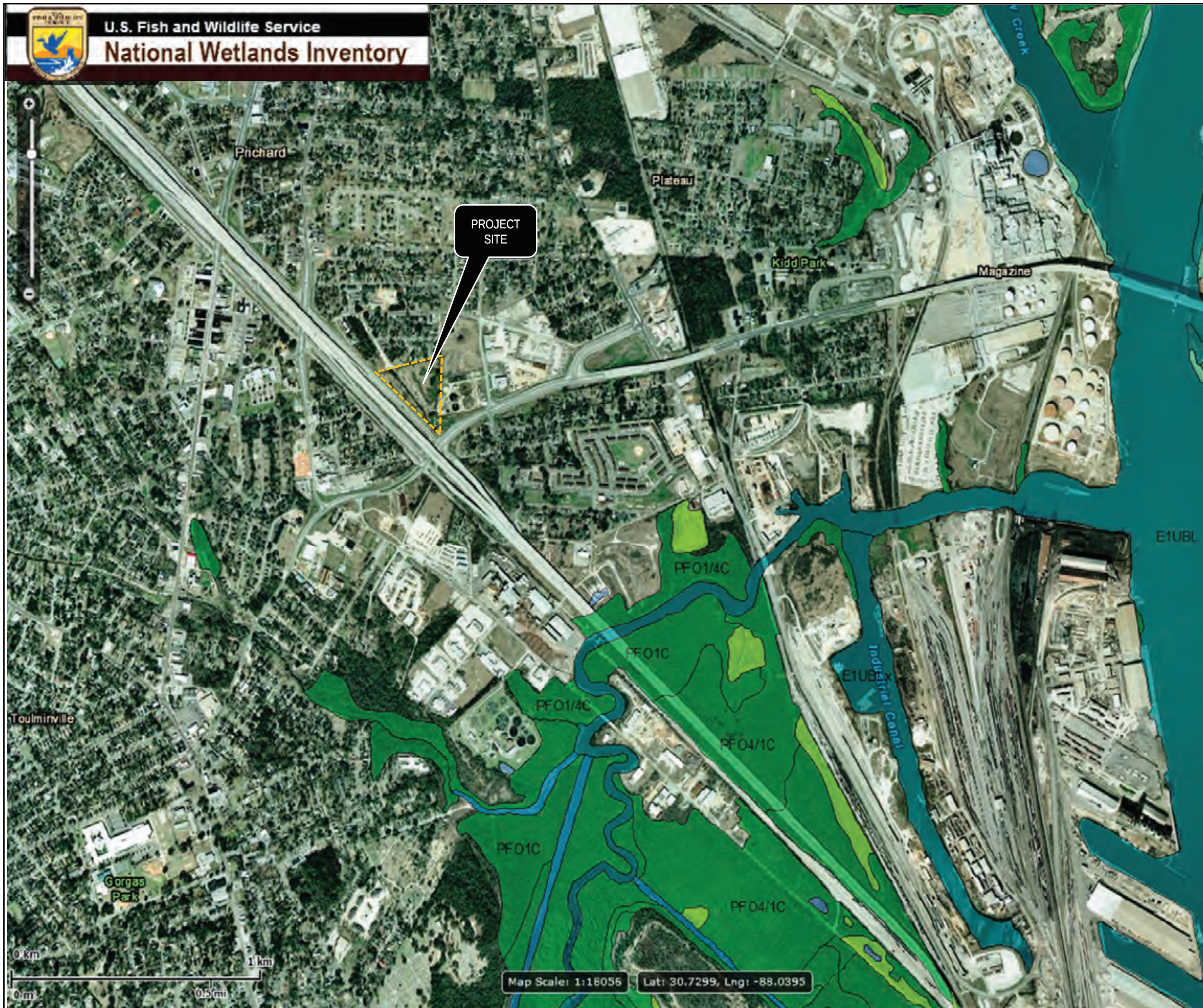
Ecological Assessment – Former VCC Property

Prichard, Alabama (Mobile County)



Source: USGS 7.5-minute Series Orthophoto Topographic Quadrangle, Mobile, AL (2011).

B0085761.1201



ARCADIS

Figure 4
Project Area NWI Imagery

Ecological Assessment – Former VCC Property
Prichard, Alabama (Mobile County)

N

0 1,320 ft

Source: USFWS National Wetlands Inventory, Wetlands Mapper; http://www.fws.gov/wetlands/Data/Mapper.html (October 10, 2012).

B0085761.1201

ARCADIS

Figure 5
Field-verified Ecological Features

Ecological Assessment – Former VCC Property
Prichard, Alabama (Mobile County)

Source: USGS 7.5-minute Series Orthophoto Topographic Quadrangle; Mobile, AL (2011).

B0085761.1201

Attachment 2

NRCS Mobile County
Soil Survey Data

Soil Map—Mobile County, Alabama
(Mobile VCC Site)

Map Scale: 1:6,820 if printed on B size (11" x 17") sheet.

N

Meters: 0, 100, 200, 400, 600

Feet: 0, 450, 900, 1,800, 2,700

USDA Natural Resources Conservation Service

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Units

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other

Special Line Features
- Gully
- Short Steep Slope
- Other

Political Features
- Cities

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:6,820 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Mobile County, Alabama
Survey Area Data: Version 6, Dec 24, 2009

Date(s) aerial images were photographed: 6/23/2006; 8/18/2006

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Mobile County, Alabama (AL097)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
12	Benndale-Urban land complex, 0 to 8 percent slopes	53.5	9.9%
14	Dorovan-Levy association, 0 to 1 percent slopes	5.7	1.1%
17	Escambia-Urban land complex, 0 to 2 percent slopes	43.7	8.1%
57	Urban land	434.8	80.9%
Totals for Area of Interest		**537.8**	**100.0%**

Mobile County, Alabama

57—Urban land

Map Unit Setting

Mean annual precipitation: 48 to 54 inches
Mean annual air temperature: 63 to 66 degrees F
Frost-free period: 200 to 240 days

Map Unit Composition

Urban land: 90 percent

Data Source Information

Soil Survey Area: Mobile County, Alabama
Survey Area Data: Version 6, Dec 24, 2009

Hydric Rating by Map Unit—Mobile County, Alabama
(Mobile VCC Site)

Map Scale: 1:6,820 if printed on B size (11" x 17") sheet.

N

Meters: 0 100 200 400 600

Feet: 0 450 900 1,800 2,700

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- All Hydric
- Partially Hydric
- Not Hydric
- Unknown Hydric
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

MAP INFORMATION

Map Scale: 1:6,820 if printed on B size (11" × 17") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydric Rating by Map Unit

Hydric Rating by Map Unit— Summary by Map Unit — Mobile County, Alabama (AL097)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
12	Benndale-Urban land complex, 0 to 8 percent slopes	Partially Hydric	53.5	9.9%
14	Dorovan-Levy association, 0 to 1 percent slopes	All Hydric	5.7	1.1%
17	Escambia-Urban land complex, 0 to 2 percent slopes	Partially Hydric	43.7	8.1%
57	Urban land	Not Hydric	434.8	80.9%
Totals for Area of Interest			**537.8**	**100.0%**

Description

This rating indicates the proportion of map units that meets the criteria for hydric soils. Map units are composed of one or more map unit components or soil types, each of which is rated as hydric soil or not hydric. Map units that are made up dominantly of hydric soils may have small areas of minor nonhydric components in the higher positions on the landform, and map units that are made up dominantly of nonhydric soils may have small areas of minor hydric components in the lower positions on the landform. Each map unit is designated as "all hydric," "partially hydric," "not hydric," or "unknown hydric," depending on the rating of its respective components.

"All hydric" means that all components listed for a given map unit are rated as being hydric, while "not hydric" means that all components are rated as not hydric. "Partially hydric" means that at least one component of the map unit is rated as hydric, and at least one component is rated as not hydric. "Unknown hydric" indicates that at least one component is not rated so a definitive rating for the map unit cannot be made.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). Under natural conditions, these soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2006) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (Hurt and Vasilas, 2006).

References:

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18.

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. Keys to soil taxonomy. 10th edition. U.S. Department of Agriculture, Natural Resources Conservation Service.

Rating Options

Aggregation Method: Absence/Presence

Tie-break Rule: Lower

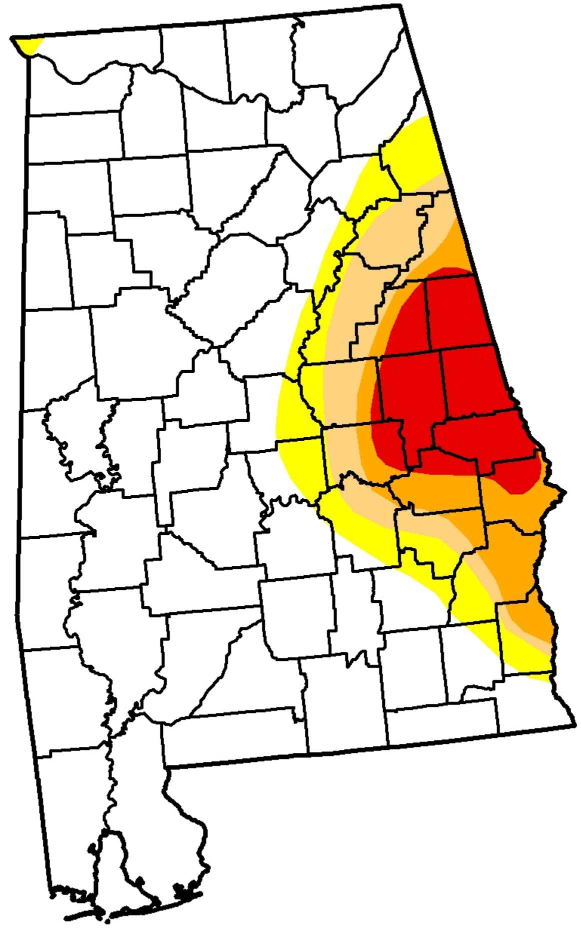
U.S. Drought Monitor

Alabama

October 2, 2012
Valid 7 a.m. EST

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	75.58	24.42	17.17	11.69	6.82	0.00
Last Week (09/25/2012 map)	71.58	28.42	19.42	15.36	8.69	0.00
3 Months Ago (07/03/2012 map)	8.52	91.48	58.00	31.53	15.64	1.08
Start of Calendar Year (12/27/2011 map)	39.32	60.68	49.64	27.97	14.47	0.00
Start of Water Year (09/25/2012 map)	71.58	28.42	19.42	15.36	8.69	0.00
One Year Ago (09/27/2011 map)	52.55	47.45	39.68	29.11	14.38	0.00



Intensity:

- *D0 Abnormally Dry*
- *D1 Drought - Moderate*
- *D2 Drought - Severe*
- *D3 Drought - Extreme*
- *D4 Drought - Exceptional*

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://droughtmonitor.unl.edu

Released Thursday, October 4, 2012

Anthony Artusa, NOAA/NWS/NCEP/CPC

Attachment 3

Site Assessment Field Forms

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: XOM - VCC SITE City/County: MOBILE Sampling Date: 09 OCT 2012

Applicant/Owner: EXXON MOBIL State: AL Sampling Point: SS-01

Investigator(s): B SAWYER / C. PACE [ARCADIS] Section, Township, Range: X : T4S : R1W

Landform (hillslope, terrace, etc.): ____ Local relief (concave, convex, none): SLIGHT CONCAVE Slope (%): 1-2

Subregion (LRR or MLRA): LRR-P Lat: 30°43'50.69"N Long: 88°04'26.39"W Datum: ____

Soil Map Unit Name: (57) URBAN LAND NWI classification: N/A

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____ No X	
Wetland Hydrology Present?	Yes ____ No X	

Remarks:

SITE FORMER VIRGINIA CHEMICAL CO. PLANT SITE. ALL STRUCTURES REMOVED + SITE IS NOW FALLOW LAND

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ Marl Deposits (B15) (LRR U)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ FAC-Neutral Test (D5)
- ___ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____

Water Table Present? Yes ____ No X Depth (inches): ____

Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

Photos 14:40 - 15:05

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: SS-01

Tree Stratum (Plot size: 30ft(r))	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus nigra	01	N	FAC
2. Triadica sebifera	05	Y	FAC
3.			
4.			
5.			
6.			
7.			
8.			
	06 = Total Cover		
50% of total cover:	20% of total cover:		

Sapling/Shrub Stratum (Plot size: 30ft(r))	Absolute % Cover	Dominant Species?	Indicator Status
1. Liquidambar styraciflua	01	N	FAC
2. Ligustrum sinense	20	Y	FACU
3. Triadica sebifera	20	Y	FAC
4. Carya cordiformus	01	N	FACU
5. Baccharis halimifolia	05	N	FAC
6. ~~Lygodium japonicum~~			
7. Melia azedarach	01	N	UPL
8.			
	48 = Total Cover		
50% of total cover:	20% of total cover:		

Herb Stratum (Plot size: 30ft(r))	Absolute % Cover	Dominant Species?	Indicator Status
1. Solidago altissima	20	Y	FACU
2. Paspalum spp.	20	Y	FAC
3. ~~Verbena brasiliensis~~			~~F~~
4. Verbena bonariensis	10	Y	FAC
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	40 = Total Cover		
50% of total cover:	20% of total cover:		

Woody Vine Stratum (Plot size: 30ft(r))	Absolute % Cover	Dominant Species?	Indicator Status
1. Ampelopsis arborea	01	N	FACW
2. Lonicera japonica	01	N	FAC
3.			
4.			
5.			
	02 = Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ______ (A)

Total Number of Dominant Species Across All Strata: ______ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ______ (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	0	x 1 = 0
FACW species	0.01	x 2 = 0.02
FAC species	0.53	x 3 = 1.59
FACU species	0.41	x 4 = 1.64
UPL species	0.01	x 5 = 0.05
Column Totals:	0.96 (A)	3.30 (B)

Prevalence Index = B/A = 3.44

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ____ No X

Remarks: (If observed, list morphological adaptations below).

Paspalum sp could be/similar to P. laeve [FACW]

SOIL

Sampling Point: SS-01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2	7.5YR 3/1							Fine Sand Silt
2-13	7.5YR 4/1	60	7.5YR 3/1	40				F
13-16	7.5YR 5/4	95	7.5YR 4/2	05				↓

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ Organic Bodies (A6) **(LRR P, T, U)**
- ___ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
- ___ Muck Presence (A8) **(LRR U)**
- ___ 1 cm Muck (A9) **(LRR P, T)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Coast Prairie Redox (A16) **(MLRA 150A)**
- ___ Sandy Mucky Mineral (S1) **(LRR O, S)**
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7) **(LRR P, S, T, U)**
- ___ Polyvalue Below Surface (S8) **(LRR S, T, U)**
- ___ Thin Dark Surface (S9) **(LRR S, T, U)**
- ___ Loamy Mucky Mineral (F1) **(LRR O)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Marl (F10) **(LRR U)**
- ___ Depleted Ochric (F11) **(MLRA 151)**
- ___ Iron-Manganese Masses (F12) **(LRR O, P, T)**
- ___ Umbric Surface (F13) **(LRR P, T, U)**
- ___ Delta Ochric (F17) **(MLRA 151)**
- ___ Reduced Vertic (F18) **(MLRA 150A, 150B)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

- ___ 1 cm Muck (A9) **(LRR O)**
- ___ 2 cm Muck (A10) **(LRR S)**
- ___ Reduced Vertic (F18) **(outside MLRA 150A,B)**
- ___ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
- ___ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
- ___ Red Parent Material (TF2)
- ___ Very Shallow Dark Surface (TF12)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: N/A

Depth (inches): ______

Hydric Soil Present? Yes ___ No X

Remarks:

Photo - Soil - 14:45

WETLAND DETERMINATION DATA FORM – Atlantic and Gulf Coastal Plain Region

Project/Site: XOM- VCC SITE City/County: MOBILE Sampling Date: 09 Oct 2012
Applicant/Owner: EXXON MOBIL State: AL Sampling Point: SS-02
Investigator(s): B Sawyer/C. Pake [Arcadis] Section, Township, Range: X : T4S: R1W
Landform (hillslope, terrace, etc.): TERRACE (Fill) Local relief (concave, convex, none): None Slope (%): 1-2
Subregion (LRR or MLRA): LRR-T Lat: 30°43'46.58" N Long: 88°04'25.71" W Datum: ____
Soil Map Unit Name: (57) URBAN LAND NWI classification: N/A
Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)
Are Vegetation ____, Soil ____, or Hydrology ____ significantly disturbed? Are "Normal Circumstances" present? Yes X No ____
Are Vegetation ____, Soil ____, or Hydrology ____ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____ No X	Is the Sampled Area within a Wetland? Yes ____ No X
Hydric Soil Present?	Yes ____ No X	
Wetland Hydrology Present?	Yes ____ No X	

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- __ Surface Water (A1)
- __ High Water Table (A2)
- __ Saturation (A3)
- __ Water Marks (B1)
- __ Sediment Deposits (B2)
- __ Drift Deposits (B3)
- __ Algal Mat or Crust (B4)
- __ Iron Deposits (B5)
- __ Inundation Visible on Aerial Imagery (B7)
- __ Water-Stained Leaves (B9)
- __ Aquatic Fauna (B13)
- __ Marl Deposits (B15) (LRR U)
- __ Hydrogen Sulfide Odor (C1)
- __ Oxidized Rhizospheres along Living Roots (C3)
- __ Presence of Reduced Iron (C4)
- __ Recent Iron Reduction in Tilled Soils (C6)
- __ Thin Muck Surface (C7)
- __ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- __ Surface Soil Cracks (B6)
- __ Sparsely Vegetated Concave Surface (B8)
- __ Drainage Patterns (B10)
- __ Moss Trim Lines (B16)
- __ Dry-Season Water Table (C2)
- __ Crayfish Burrows (C8)
- __ Saturation Visible on Aerial Imagery (C9)
- __ Geomorphic Position (D2)
- __ Shallow Aquitard (D3)
- __ FAC-Neutral Test (D5)
- __ Sphagnum moss (D8) (LRR T, U)

Field Observations:

Surface Water Present? Yes ____ No X Depth (inches): ____
Water Table Present? Yes ____ No X Depth (inches): ____
Saturation Present? (includes capillary fringe) Yes ____ No X Depth (inches): ____

Wetland Hydrology Present? Yes ____ No X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

VEGETATION (Four Strata) – Use scientific names of plants.

Sampling Point: SS-02

Tree Stratum (Plot size: 30ft(r))	Absolute % Cover	Dominant Species?	Indicator Status
1. Juniperus virginiana			FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
	___ = Total Cover		
50% of total cover: ___	20% of total cover: ___		

Sapling/Shrub Stratum (Plot size: 30ft(r))	Absolute % Cover	Dominant Species?	Indicator Status
1. Quercus nigra			FAC
2. Triadica sebifera			FAC
3. Ligustrum sinense			FACU
4. Rubus sp.			
5.			
6.			
7.			
8.			
	___ = Total Cover		
50% of total cover: ___	20% of total cover: ___		

Herb Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1. Paspalum spp.		Y	
2. Sorghum halepense		No	FACU
3. Solidago altissima		No	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
	___ = Total Cover		
50% of total cover: ___	20% of total cover: ___		

Woody Vine Stratum (Plot size: ___)	Absolute % Cover	Dominant Species?	Indicator Status
1.			
2.			
3.			
4.			
5.			
	___ = Total Cover		
50% of total cover: ___	20% of total cover: ___		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: ___ (A)

Total Number of Dominant Species Across All Strata: ___ (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: ___ (A/B)

Prevalence Index worksheet:

Total % Cover of:	Multiply by:
OBL species ___	x 1 = ___
FACW species ___	x 2 = ___
FAC species ___	x 3 = ___
FACU species ___	x 4 = ___
UPL species ___	x 5 = ___
Column Totals: ___ (A)	___ (B)

Prevalence Index = B/A = ___

Hydrophytic Vegetation Indicators:

X 1 - Rapid Test for Hydrophytic Vegetation
___ 2 - Dominance Test is >50%
___ 3 - Prevalence Index is ≤3.0[1]
___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? Yes ___ No X

Remarks: (If observed, list morphological adaptations below).

~~Paspalum sp. similar to~~

SOIL

Sampling Point: SS-02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-9	5YR 3/3	100						Silty loam
9-14	5YR 3/3	95	7.5YR 5/6	05				Loamy Silt
14-16	5YR 6/4	100						Clay

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators: (Applicable to all LRRs, unless otherwise noted.)

__ Histosol (A1)
__ Histic Epipedon (A2)
__ Black Histic (A3)
__ Hydrogen Sulfide (A4)
__ Stratified Layers (A5)
__ Organic Bodies (A6) **(LRR P, T, U)**
__ 5 cm Mucky Mineral (A7) **(LRR P, T, U)**
__ Muck Presence (A8) **(LRR U)**
__ 1 cm Muck (A9) **(LRR P, T)**
__ Depleted Below Dark Surface (A11)
__ Thick Dark Surface (A12)
__ Coast Prairie Redox (A16) **(MLRA 150A)**
__ Sandy Mucky Mineral (S1) **(LRR O, S)**
__ Sandy Gleyed Matrix (S4)
__ Sandy Redox (S5)
__ Stripped Matrix (S6)
__ Dark Surface (S7) **(LRR P, S, T, U)**
__ Polyvalue Below Surface (S8) **(LRR S, T, U)**
__ Thin Dark Surface (S9) **(LRR S, T, U)**
__ Loamy Mucky Mineral (F1) **(LRR O)**
__ Loamy Gleyed Matrix (F2)
__ Depleted Matrix (F3)
__ Redox Dark Surface (F6)
__ Depleted Dark Surface (F7)
__ Redox Depressions (F8)
__ Marl (F10) **(LRR U)**
__ Depleted Ochric (F11) **(MLRA 151)**
__ Iron-Manganese Masses (F12) **(LRR O, P, T)**
__ Umbric Surface (F13) **(LRR P, T, U)**
__ Delta Ochric (F17) **(MLRA 151)**
__ Reduced Vertic (F18) **(MLRA 150A, 150B)**
__ Piedmont Floodplain Soils (F19) **(MLRA 149A)**
__ Anomalous Bright Loamy Soils (F20) **(MLRA 149A, 153C, 153D)**

Indicators for Problematic Hydric Soils[3]:

__ 1 cm Muck (A9) **(LRR O)**
__ 2 cm Muck (A10) **(LRR S)**
__ Reduced Vertic (F18) **(outside MLRA 150A,B)**
__ Piedmont Floodplain Soils (F19) **(LRR P, S, T)**
__ Anomalous Bright Loamy Soils (F20) **(MLRA 153B)**
__ Red Parent Material (TF2)
__ Very Shallow Dark Surface (TF12)
__ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: Tight Clay

Depth (inches): 14+

Hydric Soil Present? Yes ___ No X

Remarks:

STREAM 01

Stream Assessment Field Sheet

Stream Name: UNT of Three Mile Creek   River Basin: Mobile River
Lat: 30°43'50.54"N   Long: 88°04'28.45"W   Date: 10/9/12   Time: 1415

WATERSHED FEATURES   Photograph Time & # Taken: ______

Predominant Surrounding Landscape Use:
Forest ____ Commercial ____ Agriculture ____ Other ____
Field/Pasture ____ Industrial X Residential X

Local Watershed NPS Pollution
No evidence ____
Some Potential Sources ____ Explain
Obvious Sources X Explain: Prichard POTW + RESIDENTIAL

Local Watershed Erosion
None ____ Moderate X Heavy ____

RIPARIAN VEGETATION
Dominant Type and Species
Trees ____ Shrubs ____ Grasses ____ Herbaceous ____
Dominant species present: See Notes   Width of Riparian Zone: 720 Ft

INSTREAM FEATURES

Estimated Sampling Reach Length	700 ft	Velocity	0 ft/sec
Estimated Stream Wet Width	2.5 ft	Canopy Cover	
Estimated Stream Wet Depth	2 (in) ft	___ Partially Open	X Shaded
Estimated Bankfull Width	20 ft	___ Partially Shaded	
Estimated Bankfull Depth	8 ft		
Oridinary High Water Mark	0.50 ft	*Sampling Reach Morphology Types*	
		Riffle	___ %
Channelized X Yes ___ No	LWD ___ Yes X No	Pool	___ %
Dam Present ___ Yes X No	LWD Area ___ sq ft	Run	100 %

AQUATIC VEGETATION (Dominants)
X Rooted emergent ___ Rooted submergent ___ Rooted floating ___ Free Floating
___ Floating algae ___ Attached algae   Dominant Species: Alternanthera philoxeroides; Polygonum sp.; Peltandra virginica
Portion of sampling reach w/ aquatic vegetation ____ %

WATER QUALITY
Temperature: N/A °F
Water Odors
X Normal/None ___ Sewage ___ Petroleum ___ Fishy ___ Other ____
Water Surface Oils
___ Slick ___ Sheen ___ Globs ___ Flecks X None ___ Other ____
Turbidity
___ Clear ___ Slightly turbid ___ Turbid ___ Opaque X Stained ___ Other: TANNIN STAINING

SEDIMENT/SUBSTRATE
Odors
X Normal ___ Sewage ___ Petroleum ___ Chemical ___ Anaerobic ___ None ___ Other ____
Deposits
___ Sludge ___ Sawdust ___ Paper fiber X Sand ___ Relict shells X Other: Debris/Trash
Oils
X Absent ___ Slight ___ Moderate ___ Profuse
Are stones in stream black on bottom? ___ Yes ___ No — N/A

INORGANIC SUBSTRATE COMPOSITION
(Should add up to 100%)

Type	Diameter	% Comp in Sampling Reach
Bedrock	N/A	–
Boulder	>10"	–
Cobble	2.5" - 10"	–
Gravel	.1" - 2.5"	05
Sand	N/A	25
Silt	N/A	30
Clay	N/A	40

ORGANIC SUBSTRATE COMPOSITION
(Does not have to add up to 100%)

Type	Characteristic	% Comp in Sampling Reach
Detritus	sticks, wood, coarse plant material (CPOM)	–
Muck-Mud	black, very fine organic (FPOM)	–
Marl	grey, shell frags	–

Stream Type
___ Coldwater X Warmwater
Catchment Area ____ sq mi

Weather Conditions

Now		Past 24 Hr
	Storm	
	Stdy Rain	
	Showers	
	% Cloud Cvr	
X	Clear/Sunny	X

Impaired? (circle one)
(Impared) — Somewhat Impaired — Fully Functional

Is stream w/in corridor? X Yes ___ No

STREAM CHARACTERIZATION
Stream Subsystem
___ Perennial X Intermittent ___ Tidal
Stream Origin: 1° Stormwater
___ Glacial ___ Spring Fed ___ Non-glacial X Mix of Origins
___ Swamp and Bog ___ Other ____

Has there been rain in last 7 days? Yes
Air Temp: 85 °F
Note: ____
Channel Evolution Type: G (Gloc)
Stream Order: First
Stream Class: Channelized
Impact to stream by: Channelization/Land Use
Is stream within 25 or 50' outside of corridor? ___ Yes ___ No
If so, how far? ____

Draw map/details of area sampled.

[SMZ FLORA] = Baccharis halimifolia; Conoclinium coelestinum; ~~Populus deltoides~~; Lygodium japonicum; Salix nigra; Quercus nigra; Polystichum acrostichoides; Ligustrum sinense; Paulownia tomentosa; Liquidambar styraciflua; Carya cordiformis; Sassafras albidum; Osmunda cinnamomea

NOTE: SAMPLE POINT 01b - Same Habitat OBSERVATIONS

Attachment 4

Site Assessment Photographs

Photo 01: Overview of VCC project site; looking north from property center.

Photo 02: Overview of VCC project site; looking north-northwest from property center.

Photo 03: Overview of VCC project site; looking northwest from property center.

Photo 04: Overview of VCC project site; looking west from property center.

Photo 05: Overview of VCC project site; looking south-southwest from property center.

Photo 06: Overview of VCC project site; looking south-southeast from property center.

Photo 07: Overview of VCC project site; looking east-northeast from property center.

Photo 08: Overview of VCC project site; looking north-northeast from property center.

Photo 09: Southeastern overview of eastern area of the VCC project site.

Photo 10: View of typical herbaceous/shrubby groundcover of the VCC project site located east of Stream 01.

Photo 11: Looking southeast over the VCC project site located west of Stream 01.

Photo 12: Looking south toward the southeastern property corner of the VCC project site located west of Stream 01.

Photo 13: View of SS-02 soils at depths of 0 to 8 inches. Soils displayed strong upland characteristics.

Photo 14: View of SS-02 soils at depths of 8 to 16 inches. A tight-clay soil material occurred at depths greater than 14 inches within soil sample.

Photo 15: View of the 42-inch RCP culvert where Stream 01 enters the VCC property at North Kate Street.

Photo 16: Looking upstream toward North Kate Street RCP over example of pooled water within the channel of Stream 01. Minnows and evidence of crayfish were observed at this location.

Photo 17: Looking downstream within Stream 01 channel from location of Photo 16. The downstream end of pooled water is shown at bottom right corner of photograph.

Photo 18: Downstream view of the Stream 01 channel. Note the amount of vegetation present within the streambed.

Photo 19: Looking upstream from Stream 01b sampling point. Note the moss trim lines at the edges of streambed; indicating an ordinary high water mark.

Photo 20: Looking downstream from Stream 01b sampling point; toward culvert inlet at Hall Street. The entire reach of pooled water within this segment of the Stream 01 channel is shown by this photograph.

Photo 21: Looking south at origin of WWC-01 from the fence line of the Prichard water treatment facility.

Photo 22: View of the beginning of WWC-01 showing evidence of the stormwater-based origin of this non-stream feature.

Photo 23: View of WWC-01 channel vegetation a few feet up-channel from soil sampling point SB-49.

Photo 24: View of the 8-inch diameter metal pipe culvert of WCC-01 located near remediation project soil sampling point SB-49.

Photo 25: Looking down the channel of WWC-01 from soil sampling point SB-49. A lath and flagging denotes the location of SB-49.

Photo 26: View of the 0 to 8 inches soil matrix at wetland sampling point SS-01. Observed soils displayed upland characteristics, with no hydric indicators noted.

Photo 27: View of 0 to 4 inches soil depth matrix characteristics of wetland sampling point SS-01. Hydric soil indicators were absent from the sample.

Photo 28: View of 2 to 13 inches soil matrix characteristics. Soils were predominantly fine sandy silt. Variations in soil chroma appeared to result from non-distinct stratification; potentially from prior soil disturbance activities.

Photo 29: View of distinct soil stratification observed at 13 to 16 inches sample depths.

Photo 30: Southeastern view of Live Oak No. 01.

Photo 31: Looking south at Live Oak No. 02.

Photo 32: View of Live Oak No. 02 characteristics.

ARCADIS

Appendix B

Visual Soil/Sediment Sample Classifications

Appendix B
Visual Soil/Sediment Classifications
Site Delineation Report and Removal Action Work Plan
VCC-Mobile, Mobile, Alabama

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MB-SB-1	0-0.5'	SM	silty SAND, black, fine, loose, few roots and fine subrounded gravel, dry, no odor.
MB-SB-1	0.5-2'	SM	silty SAND, black, fine, loose, few fine subrounded gravel, dry, no odor.
MB-SB-1	2-4'	ML	SILT, yellowish brown, soft, few fine sand, moist, no odor.
MB-SB-2	0-0.5'	GW	silty SAND and GRAVEL, grayish brown, loose, fine sand, fine angular gravel, dry, no odor.
MB-SB-2	0.5-2'	CL	CLAY, pink with light gray and yellowish brown mottling, very stiff, moderately plastic, few silty sand lenses, dry, no odor.
MB-SB-2	2-4'	CL	CLAY, pink with light gray and yellowish brown mottling, very stiff, moderately plastic, dry, no odor.
MB-SB-3	0-0.5'	ML	clayey SILT, brownish gray, soft, slightly plastic, moist, no odor.
MB-SB-3	0.5-2'	ML	SILT, yellowish brown, medium dense, few clay lenses, dry, no odor.
MB-SB-3	2-4'	ML	SILT, yellowish brown to gray, medium dense, few clay lenses, dry, no odor.
MB-SB-4	0-0.5'	ML	clayey SILT, brownish gray, soft, slightly plastic, some organics/roots, moist to wet from standing water, no odor.
MB-SB-4	0.5-2'	ML	SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-4	2-4'	ML	SILT, yellowish brown, to dark gray, soft, nonplastic, few silty clay lenses and black wood fragments, dry, no odor.
MB-SB-5	0-0.5'	ML	sandy SILT, brownish gray, soft, nonplastic, dry to moist, no odor.
MB-SB-5	0.5-2'	ML	clayey SILT, yellowish brown, soft, slightly plastic, dry, no odor.
MB-SB-5	2-4'	CL	silty CLAY, yellowish brown, medium stiff, slight to low plasticity, dry, no odor.
MB-SB-6	0-0.5'	ML	sandy SILT, dark brownish gray, soft, little clay, moist to wet from standing water, no odor.
MB-SB-6	0.5-2'	ML	SILT, yellowish brown, soft, nonplastic, little very fine sand, dry, no odor.
MB-SB-6	2-4'	CL	silty CLAY, yellowish brown with reddish orange mottling, soft, low plasticity, moist, no odor.
MB-SB-7	0-0.5'	SM	silty SAND, dark grayish brown, fine, loose, few organics and fine subrounded gravel, dry, no odor.
MB-SB-7	0.5-2'	SM	silty SAND, yellow brown, fine, loose, some black cinders, little red brick, dry, no odor.
MB-SB-7	2-4'	ML	sandy SILT and BRICK (FILL), yellowish brown, red brick, loose, moist, no odor.
MB-SB-8	0-0.5'	ML	SILT, gray to yellowish brown, soft, nonplastic, moist, no odor.
MB-SB-8	0.5-2'	ML	SILT, yellowish brown, soft to dense, few light gray silty clay lenses, trace red brick, no odor.
MB-SB-8	2-4'	ML	SILT, light brown, soft, nonplastic, few light gray silty clay lenses, dry, no odor.
MB-SB-9	0-0.5'	ML	clayey SILT, brownish gray, very soft, some organics, wet from standing water, no odor.
MB-SB-9	0.5-2'	ML	SILT, yellowish brown, dense, dry, no odor.
MB-SB-9	2-4'	ML	SILT, yellowish brown to black, soft, little glass fragments, few wood fragments and silty clay lenses, dry, slight organic odor.
MB-SB-9	4-5'	SM	silty SAND, gray to black, very fine, loose, some glass fragments, wet, no odor.
MB-SB-10	0-0.5'	ML	SILT, yellowish brown, soft, nonplastic, little clay, few organics, dry, no odor.
MB-SB-10	0.5-2'	ML/FILL	sandy SILT and SLAG (FILL), purple, loose, few fine subrounded gravel, dry, no odor.
MB-SB-10	2-4'	ML	clayey SILT, gray, soft, slightly plastic, few organics/roots, wet, no odor.
MB-SB-11	0-0.5'	CL	silty CLAY, yellowish brown, stiff, low plasticity, few fine angular gravel, dry, no odor.
MB-SB-11	0.5-2'	CL	CLAY, pink to yellowish brown, very stiff, moderately plastic, trace fine sand lenses, dry, no odor.
MB-SB-11	2-4'	CL	CLAY, pink to yellowish brown, very stiff, moderately plastic, trace fine sand lenses, dry, no odor.
MB-SB-12	0-0.5'	ML	SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-12	0.5-2'	ML	SILT, yellowish brown, dense, nonplastic, few silty clay lenses, dry, no odor.
MB-SB-12	2-4'	ML	SILT, yellowish brown, dense, nonplastic, few silty clay lenses, dry, no odor.
MB-SB-12	4-6'	CL/ML	silty CLAY and SILT, yellow brown to light brown to gray brown, soft, low plasticity, dry, no odor
MB-SB-12	6-7'	ML	SILT, few fine sand, gray, few magenta colored areas, dry, no odor

Appendix B
Visual Soil/Sediment Classifications
Site Delineation Report and Removal Action Work Plan
VCC-Mobile, Mobile, Alabama

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MB-SB-13	0-0.5'	ML	clayey SILT, dark brownish gray, soft, slightly plastic, few organics/roots, dry to moist, no odor.
MB-SB-13	0.5-2'	SM/FILL	silty SAND, brown, fine, loose, little glass fragments, few metal pieces and black slag, dry, no odor, fill.
MB-SB-13	2-4'	FILL	FILL, loose, glass, metal, ceramic fragments, little silty sand, dry, no odor.
MB-SB-13	4-6'	FILL	FILL, yellowish brown silt, red brick, glass, metal, loose, dry to moist, no odor.
MB-SB-14	0-0.5'	ML	clayey SILT, brownish gray to yellowish brown, soft, slightly plastic, few roots and wood fragments, moist, no odor.
MB-SB-14	0.5-2'	ML	sandy SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-14	2-4'	CL	silty CLAY, yellowish brown, soft to medium stiff, low plasticity, dry, no odor.
MB-SB-15	0-0.5'	ML	sandy SILT, brown, soft, few roots and organics, wet from standing water, no odor.
MB-SB-15	0.5-2'	CL	silty CLAY, yellowish brown with light gray and pink mottling, medium stiff, low plasticity, dry, no odor.
MB-SB-15	2-4'	ML	SILT, yellowish brown, soft, nonplastic, few very fine sand and silty clay lenses, dry to moist, no odor.
MB-SB-16	0-0.5'	ML	SILT, brownish gray to yellowish brown, soft, nonplastic, little clay and organics, dry to moist.
MB-SB-16	0.5-2'	ML	SILT, yellowish brown, soft, nonplastic, few wood fragments and medium angular gravel, no odor.
MB-SB-16	2-4'	ML	SILT, brownish gray to yellowish brown, soft, nonplastic, few wood fragments and medium angular gravel, trace metal and red brick, no odor.
MB-SB-17	0-0.5'	CL	CLAY, yellowish brown with light gray and red mottling, stiff, medium to high plasticity, dry, no odor.
MB-SB-17	0.5-2'	CL	CLAY, yellowish brown with light gray and red mottling, stiff, medium to high plasticity, dry, no odor.
MB-SB-17	2-4'	SM	silty SAND, yellowish brown, fine, loose, dry, no odor.
MB-SB-19	0-0.5'	ML	clayey SILT, grayish brown, soft, slightly plastic, moist, no odor.
MB-SB-19	0.5-2'	ML	clayey SILT, grayish brown, soft, slightly plastic, moist, no odor.
MB-SB-19	2-4'	ML	clayey SILT, yellowish brown, soft, slightly plastic, dry to moist, no odor.
MB-SB-20	0-0.5'	ML	clayey SILT, dark gray, soft, slightly plastic, moist, no odor.
MB-SB-20	0.5-2'	ML	SILT, purple, soft, nonplastic, little purple slag, moist, no odor.
MB-SB-20	2-4'	ML	SILT, bluish gray, soft, few purple slag, moist, no odor.
MB-SB-21	0-0.5'	SM	silty SAND, yellowish brown, very fine, loose, little fine angular gravel, dry, no odor.
MB-SB-21	0.5-2'	CL	CLAY, yellowish brown with light gray mottling, stiff, medium to high plasticity, dry, no odor.
MB-SB-21	2-4'	SM	silty SAND, yellowish brown, very fine, loose, dry, no odor.
MB-SB-22	0-0.5'	ML	sandy SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-22	0.5-2'	ML	clayey SILT, yellowish to orange, soft, slightly plastic, dry, no odor.
MB-SB-22	2-4'	ML	clayey SILT, yellowish to orange, soft, slightly plastic, dry, no odor.
MB-SB-23	0-0.5'	ML	clayey SILT, grayish brown, soft, slightly plastic, some organics, moist, no odor.
MB-SB-23	0.5-2'	SM	silty SAND, dark orange, loose, moist, no odor.
MB-SB-23	2-4'	SM	silty SAND, dark orange, loose, moist to wet, no odor.
MB-SB-24	0-0.5'	CL	CLAY, tan to pink, soft, high plasticity, trace fine angular gravel, dry, no odor.
MB-SB-24	0.5-2'	CL	CLAY, tan to pink to light gray, soft, high plasticity, trace fine angular gravel, dry, no odor.
MB-SB-24	2-4'	CL	CLAY, tan to pink to light gray, soft, high plasticity, some silty clay/clayey silt lenses with moderate plasticity, trace fine angular gravel, dry, no odor.
MB-SB-25	0-0.5'	ML	clayey SILT, yellowish brown to grayish brown, soft, slightly plastic, dry, no odor.
MB-SB-25	0.5-2'	ML	clayey SILT, yellowish brown, soft, slightly plastic, dry, no odor.
MB-SB-25	2-4'	SM	silty SAND, black, fine, loose, black cinders, dry, no odor.

Appendix B
Visual Soil/Sediment Classifications
Site Delineation Report and Removal Action Work Plan
VCC-Mobile, Mobile, Alabama

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MB-SB-29	0-0.5'	ML	clayey SILT, yellowish brown to gray, soft, slightly plastic, few roots and organics, dry, no odor.
MB-SB-29	0.5-2'	CL	CLAY, orangish brown to pink, soft to medium stiff, moderately plastic, few fine silty sand lenses, dry, no odor.
MB-SB-29	2-4'	CL	CLAY, orangish brown to pink, soft to medium stiff, moderately plastic, dry, no odor.
MB-SB-29	4-6'	CL/ML	CLAY and SILT, yellow brown, soft, low plasticity, moist, no odor
MB-SB-29	6-8'	CL/ML	CLAY and SILT, yellow brown to light gray, soft, medium plasticity, dry, no odor
MB-SB-29	8-10'	CL	CLAY, yellow brown to light gray, stiff, high plasticity, dry
MB-SB-31	0-0.5'	SM	silty SAND, dark gray, very fine, loose, few roots and organics, dry, no odor.
MB-SB-31	0.5-2'	SM	silty SAND, grayish brown, very fine, loose, trace fine subrounded gravel, dry, no odor.
MB-SB-31	2-4'	CL	CLAY, yellowish brown to light gray to pink, stiff, moderately plastic, dry, no odor.
MB-SB-33	0-0.5'	SM	silty SAND, dark grayish brown, very fine, loose, few roots, dry, no odor.
MB-SB-33	0.5-2'	ML	sandy SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-33	2-4'	CL	silty CLAY, yellowish brown, soft, slightly plastic, some very fine sand, dry, no odor.
MB-SB-34	0-0.5'	ML	sandy SILT, dark brown, soft, few roots, dry, no odor.
MB-SB-34	0.5-2'	ML	clayey SILT, yellowish brown, soft, moist to wet, no odor.
MB-SB-34	2-3.5'	ML/CL	clayey SILT/silty CLAY, yellowish brown, soft, low plasticity, moist, no odor. Wet at 3.5'
MB-SB-35	0-0.5'	ML	sandy SILT, dark grayish brown, soft, nonplastic, few roots/organics, moist, no odor.
MB-SB-35	0.5-2'	CL	silty CLAY, yellowish brown, soft, slightly plastic, some very fine sand, dry, no odor.
MB-SB-35	2-4'	CL	CLAY, yellowish brown to reddish orange to light gray, stiff, moderately plastic, dry, no odor.
MB-SB-36	0-0.5'	SM	silty SAND, brownish gray, very fine, loose, few roots, dry, no odor.
MB-SB-36	0.5-2'	SM	silty SAND, grayish brown, very fine, loose, few fine subrounded gravel, dry, no odor.
MB-SB-36	2-4'	CL	silty CLAY, yellowish brown, stiff, low plasticity, dry, no odor.
MB-SB-38	0-0.5'	ML	sandy SILT, dark brownish gray, soft, nonplastic, dry, no odor.
MB-SB-38	0.5-2'	ML	clayey SILT, yellowish brown, soft, slightly plastic, moist, no odor.
MB-SB-38	2-4'	CL	silty CLAY, yellowish brown, stiff, low plasticity, dry, no odor.
MB-SB-39	0-0.5'	SM	silty SAND, dark gray, very fine, loose, few roots and organics, dry, no odor.
MB-SB-39	0.5-2'	ML	sandy SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-39	2-4'	ML	sandy SILT, yellowish brown, soft, nonplastic, dry, no odor.
MB-SB-40	0-0.5'	ML	SILT, some clay and fine sand, dark brown, dry
MB-SB-40	0.5-2'	ML	SILT, little clay and fine sand, light brown, dry
MB-SB-40	2-4'	ML/CL	SITL and CLAY, little fine sand, light to dark brown, moist
MB-SB-41	0-0.5'	ML	SILT, some fine sand, little clay, light brown, dry
MB-SB-41	0.5-2'	ML	SILT, little fine sand and clay, light to dark brown, moist
MB-SB-41	2-4'	ML	SILT, little clay, trace fine sand, light to dark brown, moist
MB-SB-42	0-0.5'	ML	SILT, little clay and fine sand, brown, moist
MB-SB-42	0.5-2'	ML	SILT, little clay and fine sand, brown, moist
MB-SB-43	0-0.5'	ML	SILT, some clay, trace fine sand, light brown to brown, moist
MB-SB-43	0.5-2'	ML	SILT, little clay and fine sand, brown, moist
MB-SB-43	2-4'	ML	SILT, little clay and fine sand, brown, moist

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MB-SB-44	0-0.5'	ML/CL	SILT and CLAY, little fine snad, orange brown to brown, moist
MB-SB-44	0.5-2'	ML/CL	SILT and CLAY, little fine sand, orange brown to brown, moist
MB-SB-44	2-4'	ML	SILT, little clay and fine sand, light brown, moist
MB-SB-45	0-0.5'	ML	SILT, little clay and fine sand, dark brown, moist
MB-SB-45	0.5-2'	ML	SILT, little clay and fine sand, light brown to dark brown, moist
MB-SB-45	2-4'	ML	SILT some clay, little fine sand, brown, moist
MB-SB-46	0-0.5'	CL/ML	CLAY and SILT, little fine to coarse sand or construction debris, brown, moist
MB-SB-46	0.5-2'	ML	SILT, some fine sand, little clay, trace fine gravel, dark brown, moist
MB-SB-46	2-4'	SMML	SILT and fine SAND, little debris (glass/garbage), dark brown, moist
MB-SB-46	4-6'	SM/ML	SILT, SAND, dark brown
MB-SB-46	6-8'	CL	CLAY, little silt and fine sand, moist
MB-SB-47	0-0.5'	ML	SILT, some clay, trace fine sand, brown, moist
MB-SB-47	0.5-2'	ML	SILT, little clay and fine sand, trace fine gravel, glass, light brown, moist
MB-SB-47	2-4'	ML	SILT, little clay and fine sand, trace fine gravel, glass, brown, moist
MB-SB-48	0-0.5'	ML	SILT, little clay and fine sand, light brown, moist
MB-SB-48	0.5-2'	ML	SILT, little clay and fine sand, light brown, moist
MB-SB-48	2-4'	ML	SILT, some fine sand, little clay, light brown, moist
MB-SB-49	0-0.5'	ML	SILT, little fine sand and clay, brown, moist
MB-SB-49	0.5-2'	ML/CL	SILT and CLAY, little fine sand, brown, moist
MB-SB-49	2-4'	ML/CL	SILT and CLAY, little fine sand, light brown to dark brown, moist
MB-SB-50	0-0.5'	ML	SILT, little fine sand and clay, light brown to brown, moist
MB-SB-50	0.5-2'	ML	SILT, little fine sand and clay, light brown, moist
MB-SB-50	2-4'	ML/CL	SILT and CLAY, trace fine sand, light brown to dark brown, moist
MB-SB-51	0-0.5'	ML	SILT, little fine sand and clay, dark brown, dry
MB-SB-51	0.5-2'	ML	SILT, little fine sand and clay, light brown to dark brown, moist
MB-SB-51	2-4'	ML	SILT, little fine sane and clay, light brown, moist
MB-SB-52	0-0.5'	ML	SILT, some clay, little fine sand, light brown to brown, moist
MB-SB-52	0.5-2'	CL/ML	CLAY and SILT, little fine sand, light brown, moist
MB-SB-52	2-4'	CL	CLAY, some silt, trace fine sand, green to light brown, moist
MB-SB-53	0-0.5'	ML	SILT, little clay and fine sand, orange brown, moist
MB-SB-53	0.5-2'	ML	SILT, little clay and fine sand, orange brown, moist
MB-SB-53	2-4'	ML	SILT, some clay and fine sand, orange brown, moist
MB-SB-54	0-0.5'	ML	SILT, little clay and fine to medium sand, brown, moist
MB-SB-54	0.5-2'	ML	SILT, little clay and fine sand, brown, moist
MB-SB-54	2-4'	ML/CL	SILT and CLAY, little fine sand, light brown to brown, moist
MB-SB-55	0-0.5'	ML	SILT, some fine sand and clay, light brown, moist
MB-SB-55	0.5-2'	ML	SILT, some fine sand and clay, light brown to orange brown, moist
MB-SB-55	2-4'	ML	SILT, some fine sand and clay, light brown to orange brown, moist

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MB-SB-56	0-0.5'	ML	SILT, little clay and fine sand, light brown to orange brown, moist
MB-SB-56	0.5-2'	ML	SILT, little clay and fine sand, light brown to orange brown, moist
MB-SB-56	2-4'	ML	SILT, little clay and fine sand, orange brown, moist
MB-SB-57	0-0.5'	ML	SILT, some fine sand, dark brown, moist
MB-SB-57	0.5-2'	SM	fine SAND, some silt, light brown to brown, moist
MB-SB-57	2-4'	SM	fine to medium SAND, some clay and silt, dark brown with magenta stains, wet
MB-SB-57	4-6'	ML/SM	SILT and fine SAND, little clay, dark brown, wet
MB-SB-57	6-8'	CL/SM	CLAY and fine SAND, little silt, light brown, wet
MB-SB-58	0-0.5'	ML	SILT, some fine sand, little clay, light brown, dry
MB-SB-58	0.5-2'	ML	SILT, some clay, little fine sand, light brown to brown, moist
MB-SB-58	2-4'	CL/ML	CLAY and SILT, trace fine sand, light brown to brown, moist
MB-SB-59	0-0.5'	ML	SILT, little clay and fine sand, brown, moist
MB-SB-59	0.5-2'	ML	SILT, little clay and fine sand, brown, moist
MB-SB-59	2-4'	SM	fine SAND, some silt, little clay, red brown to brown, moist
MB-SB-60	0-0.5'	ML	SILT, some clay, little fine sand, trace shells, brown, moist
MB-SB-60	0.5-2'	ML	SILT, some clay, trace fine sand, dark brown to brown, moist
MB-SB-60	2-4'	SM	fine SAND, some silt and clay, orange brown to brown, moist
MB-SB-61	0-0.5'	ML	SILT, little clay and fine sand, brown to dark brown, moist
MB-SB-61	0.5-2'	ML	SILT, little clay and fine sand, light brown to brown, moist
MB-SB-61	2-4'	SM	fine SAND, little silt, red brown, moist
MB-SB-62	0-0.5'	ML	SILT, little clay and fine sand, dark brown, moist
MB-SB-62	0.5-2'	SM/ML	fine SAND and SILT, little clay, light brown to brown, moist
MB-SB-62	2-4'	SM	fine SAND, little silt, red brown, moist
MB-SB-63	0-0.5'	ML	SILT, little clay and fine sand, brown to dark brown, moist
MB-SB-63	0.5-2'	ML	SILT, some fine sand, little clay, light brown to dark brown, moist
MB-SB-63	2-4'	ML/SM	SILT and SAND, little clay, light brown to red brown, moist
MB-SB-64	0-0.5'	ML	SILT, little fine sand and clay, dark brown, moist
MB-SB-64	0.5-2'	ML/SM	SILT and fine SAND, little clay, dark brown to red brown, moist
MB-SB-64	2-4'	ML/SM	SILT and fine SAND, little clay, light brown to orange brown, moist
MB-SB-65	0-0.5'	ML	SILT, little sand and clay, dark brown, moist
MB-SB-65	0.5-2'	ML/CL	SILT and CLAY, some fine to medium sand, dark brown to orange brown, moist
MB-SB-65	2-4'	SM	fine SAND, some clay, little silt, brown to red brown
MB-SB-66	0-0.5'	ML	SILT, some sand, little clay, red brown to brown, moist
MB-SB-66	0.5-2'	ML	SILT, some sand, little clay, brown to light brown, moist
MB-SB-66	2-4'	ML/SM	SILT and SAND, some clay, red brown to brown, moist
MB-SB-67	0-0.5'	SM	silty SAND, few clay lenses, brown, loose, dry, no odor
MB-SB-67	0.5-2'	SM	silty SAND, few clay lenses, brown, loose, dry, no odor
MB-SB-67	2-4'	CL	sandy CLAY, few fine sand, yellow brown, soft, low plasticity, dry to moist

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MB-SB-68	0-0.5'	SM	silty SAND, few roots and clay lenses, brown, loose, no odor
MB-SB-68	0.5-2'	SM	silty SAND, fine sand, few clay lenses, orange brown, loose, dry, no odor
MB-SB-68	2-4'	SM	fine SAND, orane brown, loose, dry, no odor
MB-SB-69	0-0.5'	ML	clayey SILT, yellow brown, soft, low plasticity, dry
MB-SB-69	0.5-2'	CL	CLAY, few dark orange fine sand lenses, yellow brown, soft, medium plasticity, dry
MB-SB-69	2-4'	ML	clayey SILT, few fine sand, yellow brown, soft, dry to moist
MB-SB-70	0-0.5'	CL	CLAY, fine to very fine sand, yellow brown, soft, low plasticity, dry, no odor
MB-SB-70	0.5-2'	SM	silty SAND, few clay, orange brown, loose, moist
MB-SB-70	2-4'	CL/SM	CLAY and SAND, orange brown, soft, loose, moist
MB-SB-71	0-0.5'	CL	CLAY, yellow brown, stiff, medium plasticity, dry, no odor
MB-SB-71	0.5-2'	CL	CLAY, yellow brown, soft, medium plasticity, moist, no odor
MB-SB-71	2-4'	CL	CLAY, yellow brown, soft, medium plasticity, moist, no odor
MB-SB-71	4-6'	CL/ML	CLAY and SILT, light gray to light yellow brown, soft, medium plasticity, dry, no odor
MB-SB-71	6-8'	CL	CLAY, yellow brown to light gray with pink mottling, stiff, high plasticity, dry
MB-SB-72	0-0.5'	CL	sandy CLAY, few roots, orange brown, soft, low plasticity, dry, no odor
MB-SB-72	0.5-2'	CL	CLAY, few sand, orange brown to light gray, soft, medium plasticity
MB-SB-72	2-4'	CL	CLAY, orange brown to light gray, soft, medium plasticity
MB-SB-72	4-6'	CL	CLAY, yellow brown with light gray and pink mottling, stiff, high plasticity, dry
MB-SB-72	6-8'	ML/CL	SILT and CLAY, yellow brown, soft, clay high plasticity, dry, no odor
MB-SB-73	0-0.5'	SM	very fine silty SAND, orange brown, loose, dry, no odor
MB-SB-73	0.5-2'	SM	fine SAND, reddish orange, loose, dry, no odor
MB-SB-73	2-4'	SM	fine SAND, reddish orange, loose, dry, no odor
MB-SB-74	0-0.5'	ML	sandy SILT, orange brown, soft, nonplastic, dry
MB-SB-74	0.5-2'	ML	clayey SILT, orange brown, soft, low plasticity, dry
MB-SB-74	2-4'	SM	fine silty SAND, dark orange, loose, dry to moist
MB-SB-81	0-0.5'	ML	SILT, little clay and fine sand, dark brown, dry
MB-SB-81	0.5-2'	ML	SILT, some clay, trace fine sand and glass, brown to light brown, moist
MB-SB-81	2-4'	CL	CLAY, little silt and fine sand, trace glass, orange brown, moist

MW-1	0-0.5'	ML	SILT, little fine sand, brown, dry
MW-1	0.5-2'	ML	SILT, little clay and fine sand, light brown, dry
MW-1	2-4'	ML	SILT, some clay, light brown to dark brown, moist
MW-1	4-5'	ML	SILT, some clay, light brown to dark brown, moist
MW-2	0-0.5'	ML	SILT, little fine snad, brown, dry
MW-2	0.5-2'	ML	SILT, little fine sand and caly, brown, moist
MW-2	2-4'	ML	SILT, some fine sand, little clay, light brown to orange brown, moist
MW-2	4-5'	CL	CLAY, some silt, little fine snd, light brown, moist
MW-3	0-0.5'	ML	SILT, little clay and fine sand, brown, moist
MW-3	0.5-2'	ML	SILT, little clay and fine sand, brown, moist
MW-3	2-4'	ML	SILT, little clay and fine sand, brown, moist
MW-3	4-5'	ML	SILT, little fine to coarse sand, dark brown, moist

Appendix B
Visual Soil/Sediment Classifications
Site Delineation Report and Removal Action Work Plan
VCC-Mobile, Mobile, Alabama

Soil/Sediment Boring	Depth Interval (feet)	USCS Classification	Soil Lithology/Characteristics
MW-4	0-0.5'	ML	SILT, little fine sand and clay, dark brown, dry
MW-4	0.5-2'	ML	SILT, little fine sand and clay, light brown, moist
MW-4	2-4'	ML	SILT, some some fine sand, little clay, light brown, moist
MW-4	4-5'	ML	SILT, some fine sand, little clay, light brown to brown, moist
MW-5	0-0.5'	SM	fine silty SAND, few clay lenses, yellow brown, loose, dry
MW-5	0.5-2'	CL	CLAY, yellow brown to gray to pink, stiff, high plasticity, dry, no odor
MW-5	2-4'	CL	CLAY, yellow brown to gray to pink, stiff, high plasticity, dry, no odor
MW-5	4-5'	SM/ML	SAND and SILT, yellow brown, loose, soft, dry to moist, no odor

MB-SED-01	0-0.5'	SM	silty SAND, trace organic debris, slight organic odor
MB-SED-02	0-0.5'	ML	clayey SILT, some fine to medium sand, dark brown and gray, some organic debris, soft, slight organic odor
MB-SED-03	0-0.5'	SM	silty SAND, some magenta slag and organic debris, moderate organic odor
MB-SED-03	0.5-2'	SM	silty SAND, very light brown, loose, moist, no odor
MB-SED-03	2-4'	SM/CL/ML	SAND, CLAY, and SILT, light brown, moist to wet, no odor
MB-SED-03	4-6'	CL	CLAY, light brown, soft, high plasticity, wet, no odor
MB-SED-04	0-0.5'	SM	silty SAND, brown, loose, wet, no odor
MB-SED-05	0-0.5'	SM	silty SAND, few purple slag, MAGENTA, loose, moist to wet, no odor
MB-SED-05	0.5-2'	ML/CL/SM	SILT, CLAY, and SAND, few purple slag, MAGENTA and dark gray, soft, wet
MB-SED-05	2-4'	SM	SAND, gray, loose, wet, no odor
MB-SED-06	0-0.5'	SM	SAND, little fine gravel sized MAGENTA slag, loose, moist, no odor
MB-SED-06	0.5-1'	SM	SAND, little fine gravel sized MAGENTA slag, loose, moist, no odor
MB-SED-07	0-0.5'	SM	fine to medium SAND, few organic matter, dark brown, loose, dry to moist
MB-SED-07	0.5-1'	SM	fine to medium SAND, little magenta slag, loose, moist, no odor
MB-SED-08	0-0.5'	SM	fine SAND, yellow brown, loose, dry, no odor
MB-SED-08	0.5-1.3'	SM	fine SAND, light brown, loose, moist, no odor

Notes:
Shaded locations contain purple/magenta staining or slag.

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Appendix C

Monitoring Well Construction Logs

Date Start/Finish:	10/10/12	**Northing:**	1788431.79
Drilling Company:	M & W Drillling	**Easting:**	266275.29
Driller's Name:	Anthony Foster	**Casing Elevation:**	32.26'
Drilling Method:	HSA	**Surface Elevation:**	29.85'
Sampler Size:	2.25"	**Borehole Depth:**	30' bgs
Auger Size:	4.25"	**Geologist:**	Cole Pace
Rig Type:	Direct Push/Auger Combo		

Well ID: **MW-1**

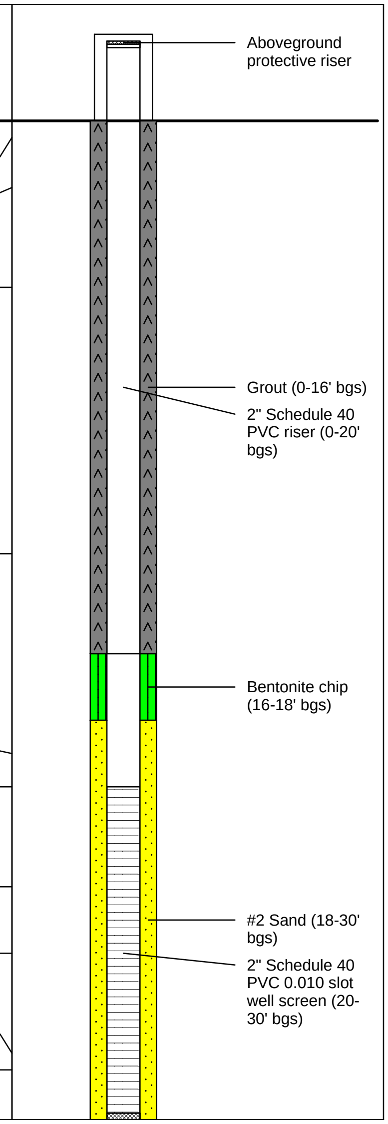
Client: ExxonMobil Environmental Services

Location: Mobile, Alabama

Depth (ft. bgs)	Sample Run Number	Recovery (feet)	Sample/Int/Type	Field XRF Arsenic (As)	Field XRF Lead (Pb)
0–5	1	5/5	0-0.5	17.4±1.1	11.9±1.2
			0.5-2	7.9±0.9	7.7±1.2
			2-4	<2.6	8.0±1.2
			4-5	6.2±1.0	9.1±1.3
5–10	2	5/5	6-8	<2.7	7.9±1.2
			8-10	5.4±0.9	8.4±1.2
10–15	3	5/5	10-12	4.9±1.0	11.0±1.4
			12-14	<4.5	15.0±2.0
15–20	4	5/5	14-16	4.0±1.1	19.0±1.5
			16-18	<5.2	14.0±2
			18-20	<2.3	4.9±1.1
20–25	5	5/5	20-22	3.6±0.8	<3.4
			22-24	<2.5	4.6±1.1
25–30	6	5/5	24-26	2.8±0.9	5.4±1.1
			26-28	<3.4	<4.4
			28-30	<2.2	<3.0

USCS Code	Stratigraphic Description
ML	SILT, little fine sand, brown, dry
	SILT, little clay and fine sand, light brown, dry
	SILT, some clay, light brown to dark brown, moist
SW	clayey SAND, reddish-yellow, medium to fine-grain, moist
CL	CLAY, yellowish-brown to gray, plastic
SW	SAND, light yellow-brown to white, coarse to medium-grain, dry
SW/SC	SAND, white to pale yellow, coarse to medium-grain with occassional 6-inch pale red, plastic clay lenses.
	SAND, yellowish-brown with white, damp, coarse to medium-grain with occassional 6-inch pale red, plastic clay lenses
SW	SAND, yellowish-brown to white, medium to coarse-grain, saturated
CL	CLAY LENSE, pale red, plastic
SW	SAND, yellowish-brown to white, medium to coarse-grain, very damp

Well Construction



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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available

Survey Datum; Vertical - NAVD 1988

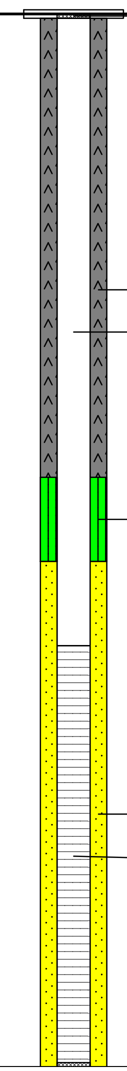
Hand Augered to 5' bgs

Date Start/Finish: 10/17/2012	**Northing:** 1788473.16	**Well ID:** **MW-6**	
Drilling Company: M & W Drillling	**Easting:** 265062.53	**Client:** ExxonMobil Environmental Services	
Driller's Name: Anthony Foster	**Casing Elevation:** 24.16	**Location:** Mobile, Alabama	
Drilling Method: HSA	**Surface Elevation:**		
Sampler Size: 2.25"	**Borehole Depth:** 25' bgs		
Auger Size: 4.25"	**Geologist:** Cole Pace		
Rig Type: Direct Push/Auger Combo			

Depth (ft. bgs)	Sample Run Number	Recovery (feet)	Sample/Int/Type	Field XRF Arsenic (As)	Field XRF Lead (Pb)	USCS Code	Stratigraphic Description
0-5	1						No descriptions available
5-8	2	5/5	6-8	<2.3	7.3±1.1	SW	SAND, reddish-brown, medium to fine-grain, moist
8-10			8-10	5.2±1.0	13.2±1.3	SC	sandy CLAY, reddish-yellow, moist, plastic
10-17	3	5/5	10-12	5.8±1.0	12.3±1.3	CL	CLAY, plastic, yellowish-brown to gray to pale red, moist
			12-14	4.5±1.0	12.4±1.3		
	4	5/5	14-16	<3.1	18.9±1.4		
17-20			16-18	5.0±1.0	14.7±1.3	SC	SAND, with gravel, with clay lenses, yellowish-brown, damp
			18-20	<4.4	13.6±1.9		
20-23	5	5/5	20-22	NA (wet)	NA (wet)	SM	silty SAND, yellowish-brown, saturated
23-25			22-24	NA (wet)	NA (wet)	SC-SW	sand, white, fine to very fine grain, wet

Elevation (NAVD 1988): 25, 20, 15, 10, 5, 0

Well Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available

Survey Datum; Vertical - NAVD 1988

Hand Augered to 5' bgs

Project: B0085761.1201 Template:
Data File:
Date: 11/9/2012 Created/Edited by: K.Doll

Date Start/Finish: 10/16/2012
Drilling Company: M & W Drillling
Driller's Name: Anthony Foster
Drilling Method: HSA

Sampler Size: 2.25"
Auger Size: 4.25"
Rig Type: Direct Push/Auger Combo

Northing: 1787985.24
Easting: 265615.01

Casing Elevation: 18.45
Surface Elevation:
Borehole Depth: 20' bgs

Geologist: Cole Pace

Well ID: **MW-5**

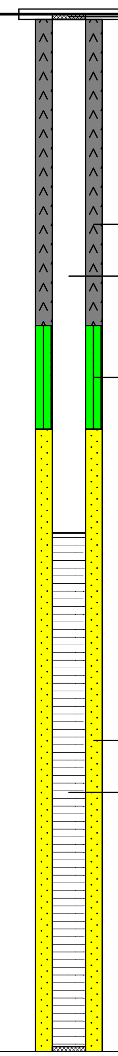
Client: ExxonMobil Environmental Services

Location: Mobile, Alabama

Depth (ft. bgs)	Sample Run Number	Recovery (feet)	Sample/Int/Type	Field XRF Arsenic (As)	Field XRF Lead (Pb)	USCS Code	Stratigraphic Description
0	1	5/5	0-0.5	<2.7	13.8±1.3	SM	silty SAND, fine, loose, dry, yellow-brown, few clay lenses
			0.5-2	5.1±1.2	20.7±1.5	CL	CLAY, stiff, highly plastic, dry, no odor, yellow-brown to gray to pink
			2-4	5.6±1.2	23.2±1.6		
			4-5	<2.5	6.0±1.1	SW-SM	SAND and SILT, loose/soft, dry to moist, no odor, yellow-brown
5	2	5/5	6-8	<2.4	5.8±1.1	SW	SAND, fine to medium grain, dry, yellowish-red to gray
			8-10	<2.6	4.5±1.2		SAND, medium to fine grain, dark reddish-brown, damp
10	3	5/5	10-12	<2.5	<3.3		SAND, yellowish-red, wet, medium-fine grain
			12-14	6.1±1	<3.8		
15	4	5/5	14-16	<2.4	<3.1		SAND, light brown to white, fine to very fine grained, saturated
			16-18	<4.3	<5.4		
20			18-20	<3.0	<4.1		

Elevation (NAVD 1988): 15, 10, 5, 0

Well Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available

Survey Datum; Vertical - NAVD 1988

Hand Augered to 5' bgs

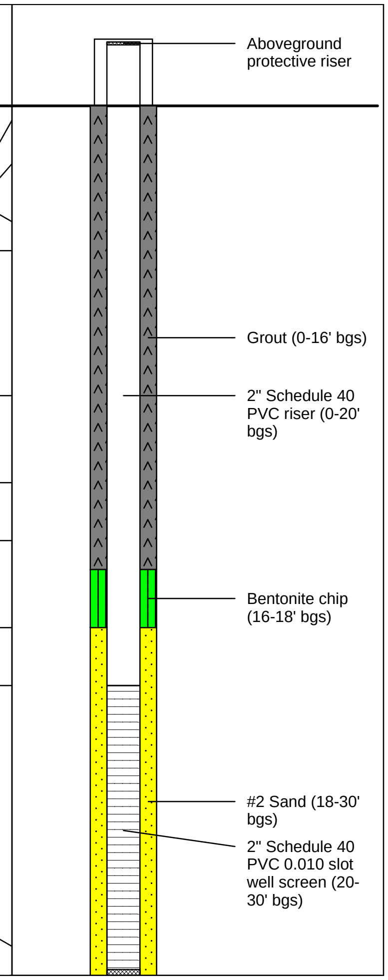
Project: B0085761.1201 Template:
Data File:

Date: 11/9/2012 Created/Edited by: K.Doll

Date Start/Finish: 10/10/12	**Northing:** 1788483.72	**Well ID:**	**MW-4**
Drilling Company: M & W Drillling	**Easting:** 265618.99	**Client:**	ExxonMobil Environmental Services
Driller's Name: Anthony Foster	**Casing Elevation:** 28.11	**Location:**	Mobile, Alabama
Drilling Method: HSA	**Surface Elevation:** 25.91		
Sampler Size: 2.25"	**Borehole Depth:** 30' bgs		
Auger Size: 4.25"	**Geologist:** Cole Pace		
Rig Type: Direct Push/Auger Combo			

Elevation (NAVD 1988)	Depth (ft. bgs)	Sample Run Number	Recovery (feet)	Sample/Int/Type	Field XRF Arsenic (As)	Field XRF Lead (Pb)	Geologic Column	USCS Code	Stratigraphic Description
25	0	1	5/5	0-0.5	7.6±1.2	39.3±1.7		ML	SILT, little fine sand and clay, dry, dark brown
				0.5-2	5.2±0.9	8.8±1.2			SILT, little fine sand and clay, moist, light brown
				2-4	4.0±1.8	126±3			SILT, little fine sand and clay, moist, dark brown
20				4-5	35.4±1.7	67±2.0			SILT, little fine sand and clay, moist, light brown to brown
	5	2	5/5	6-8	6.3±1.0	10.1±1.3		SC	clayey SAND, dry, reddish-brown, brittle
15				8-10	5.5±0.9	9.2±1.2			
	10	3	5/5	10-12	15.3±1.3	22.7±1.6			sandy CLAY, dry, brittle, yellow-brown to gray
				12-14	10.6±1.1	14.5±1.4		CL	CLAY, moist, plastic, pale red with gray
10	15	4	5/5	14-16	3.7±1.0	20.7±1.5			CLAY, plastic, yellowish-brown with gray
				16-18	3.1±1.0	16.4±1.4			
				18-20	<2.6	8.8±1.2		SC-CL	sandy CLAY, yellowish-brown, damp
5	20	5	5/5	20-22	8.1±1.0	6.6±1.3			sandy CLAY, yellowish brown, wet, saturated from 26-29' bgs
				22-24	3.6±0.9	4.5±1.1			
0	25	6	5/5	24-26	4.7±1.0	5.4±1.3			
				26-28	3.3±0.9	6.8±1.2			
	30			28-30	<2.9	13.3±1.4			sandy CLAY, grayish-brown, wet

Well Construction



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Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available

Survey Datum; Vertical - NAVD 1988

Hand Augered to 5' bgs

Project: B0085761.1201 Template:
Data File:

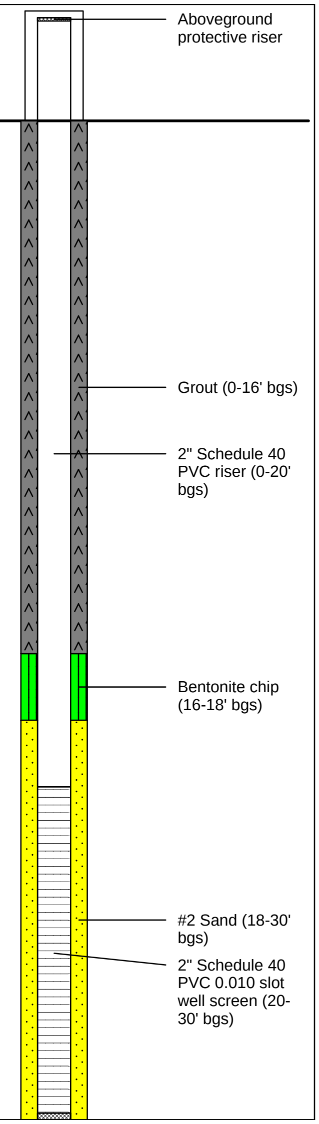
Date: 11/9/2012 Created/Edited by: K.Doll

Date Start/Finish: 10/16/2012	**Northing:** 1788204.44	**Well ID:** **MW-3**	
Drilling Company: M & W Drillling	**Easting:** 265820.58	**Client:** ExxonMobil Environmental Services	
Driller's Name: Anthony Foster	**Casing Elevation:** 33.36	**Location:** Mobile, Alabama	
Drilling Method: HSA	**Surface Elevation:** 30.24		
Sampler Size: 2.25"	**Borehole Depth:** 30' bgs		
Auger Size: 4.25"	**Geologist:** Cole Pace		
Rig Type: Direct Push/Auger Combo			

Elevation (NAVD 1988)	Depth (ft. bgs)	Sample Run Number	Recovery (feet)	Sample/Int/Type	Field XRF Arsenic (As)	Field XRF Lead (Pb)
30	0	1	5/5	0-0.5	<3.8	22.3±1.7
				0.5-2	<4.5	28±2
				2-4	<5.5	20±2
				4-5	19±4	332±4
25	5	2	5/5	6-8	10±2	39±3
				8-10	52±8	527±13
20	10	3	5/5	10-12	78±8	770±13
				12-14	10.8±1.4	215±7
15	15	4	5/5	14-16	11.1±1.9	16±2
				16-18	5.1±1.1	20.4±1.5
				18-20	<2.6	8.4±1.2
10	20	5	5/5	20-22	<5.9	<8.0
				22-24	<3.0	14.3±1.4
5	25	6	5/5	24-26	4.1±1.3	8.3±1.9
				26-28	2.9±0.8	<3.2
	30			28-30	NA	NA

USCS Code	Stratigraphic Description
ML	SILT, little fine sand and clay, brown, moist
ML	SILT, little fine to coarse sand, dark brown, moist
SC	sandy CLAY, black with some brown
GW	rock and gravel fragments, large
SC-CL	SAND and CLAY, yellowish-brown with black sandy material
SW	SAND, black sandy material
CL	CLAY, black to dark gray, soft, plastic
SC	sandy CLAY, yellowish-brown with magenta soils mixed in
CL	CLAY, yellowish-brown to pale red, moist, plastic
SW	SAND, some clay, clay decreasing with depth, color varies from yellowish-brown to gray to pale red, medium to fine-grain
SW	SAND, color varies from yellowish-brown to gray to pale red, fine to very fine-grained, saturated.
	No description

Well Construction



ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available

Survey Datum; Vertical - NAVD 1988

Hand Augered to 5' bgs

Project: B0085761.1201 Template:
Data File:
Date: 11/9/2012 Created/Edited by: K.Doll

Date Start/Finish:	10/11/12
Drilling Company:	M & W Drillling
Driller's Name:	Anthony Foster
Drilling Method:	HSA
Sampler Size:	2.25"
Auger Size:	4.25"
Rig Type:	Direct Push/Auger Combo
Northing:	1787892.53
Easting:	266142.11
Casing Elevation:	33.35
Surface Elevation:	30.63
Borehole Depth:	34' bgs
Geologist:	Cole Pace
Well ID:	**MW-2**
Client:	ExxonMobil Environmental Services
Location:	Mobile, Alabama

Elevation (NAVD 1988)	Depth (ft. bgs)	Sample Run Number	Recovery (feet)	Sample/Int/Type	Field XRF Arsenic (As)	Field XRF Lead (Pb)
30	0	1	5/5	0-0.5	4.3±1.2	19.2±1.6
				0.5-2	<3.4	32.0±1.6
				2-4	14.3±2	37±4
25	5			4-5	4.3±1.1	7.6±1.5
		2	5/5	6-8	6.4±1.7	12±2
20	10			8-10	9.3±1.3	6.9±1.8
		3	5/5	10-12	5.5±1.3	5.7±1.7
15	15			12-14	3.9±0.9	7.9±1.2
		4	5/5	14-16	4.6±1.5	7.7±1.9
				16-18	<4.4	12±2
10	20			18-20	<4.0	11.1±1.9
		5	5/5	20-22	<4.6	13±2
5	25			22-24	<5.3	19±2
		6	5/5	24-26	6.5±1.3	14.8±1.8
				26-28	<2.8	12.5±1.3
0	30			28-30	<4.3	14.5±2.1
		7	5/5	30-32	14.8±3.1	14.8±3.1
-5	35			32-34	<5.2	15.6±1.9

USCS Code	Stratigraphic Description
ML	SILT, little fine sand, brown, dry
	SILT, little fine sand and clay, brown, moist
	SILT, some fine sand, little clay, light brown to dark brown, moist
CL	CLAY, some silt, little fine sand, light brown, moist
SC	sandy CLAY, brownish-gray, dry
CL	CLAY, 6 inch layer or black sandy clay, then yellowish-brown and gray clay, plastic
SC	sandy CLAY, reddish-yellow, soft
SW	SAND, medium to fine-grained, yellowish-brown to gray
CL	silty CLAY, yellowish-brown to pale red, moist
	CLAY, yellowish-brown, plastic, moist
SC	clayey SAND, yellowish-brown, very damp
SW	SAND, medium to fine-grained, yellowish-brown, saturated

Well Construction

- Aboveground protective riser
- Grout (0-23' bgs)
- 2" Schedule 40 PVC riser (0-25' bgs)
- Bentonite chip (21-23' bgs)
- #2 Sand (23-35' bgs)
- 2" Schedule 40 PVC 0.010 slot well screen (25-35' bgs)

ARCADIS
Infrastructure, environment, buildings

Remarks: bgs = below ground surface; NA = Not Applicable/Available

Survey Datum; Vertical - NAVD 1988

Hand Augered to 5' bgs

Project: B0085761.1201 Template:
Data File:

Date: 11/9/2012 Created/Edited by: K.Doll

ARCADIS

Appendix D

Hydraulic Conductivity Analyses

ARCADIS U.S., Inc.
630 Plaza Drive
Suite 200
Highlands Ranch
Colorado 80129
Tel 720.344.3500
Fax 720.344.3535
www.arcadis-us.com

MEMO

To:
Bill Anckner

Copies:

From:
Josh Frizzell
Aaron Kempf

Date:
January 17, 2013

ARCADIS Project No.:
B0085761.1201

Subject:
Slug Test Analysis: Former VCC Mobile Site, Mobile Alabama

This technical memorandum summarizes the results of hydraulic conductivity values derived from slug test data using the parameter estimation program AQTESOLV™ (Version 4.50) at the Former VCC Mobile site in Mobile, AL. ARCADIS performed falling- and rising-head slug tests at monitoring wells MW-1, MW-2, MW-3, MW-4, MW-5, and MW-6 on October 17 and 18, 2012. Water levels were allowed to recover to static conditions after the slug was inserted and removed, and the recovery data were analyzed. The water levels were recorded using a pressure transducer In-situ Troll Model 700.

The six wells analyzed each had a screen length of ten feet. All wells had a casing diameter of two inches, and a borehole diameter of eight inches. The solid slug used for the test had a length of three feet with an outside diameter of approximately one inch.

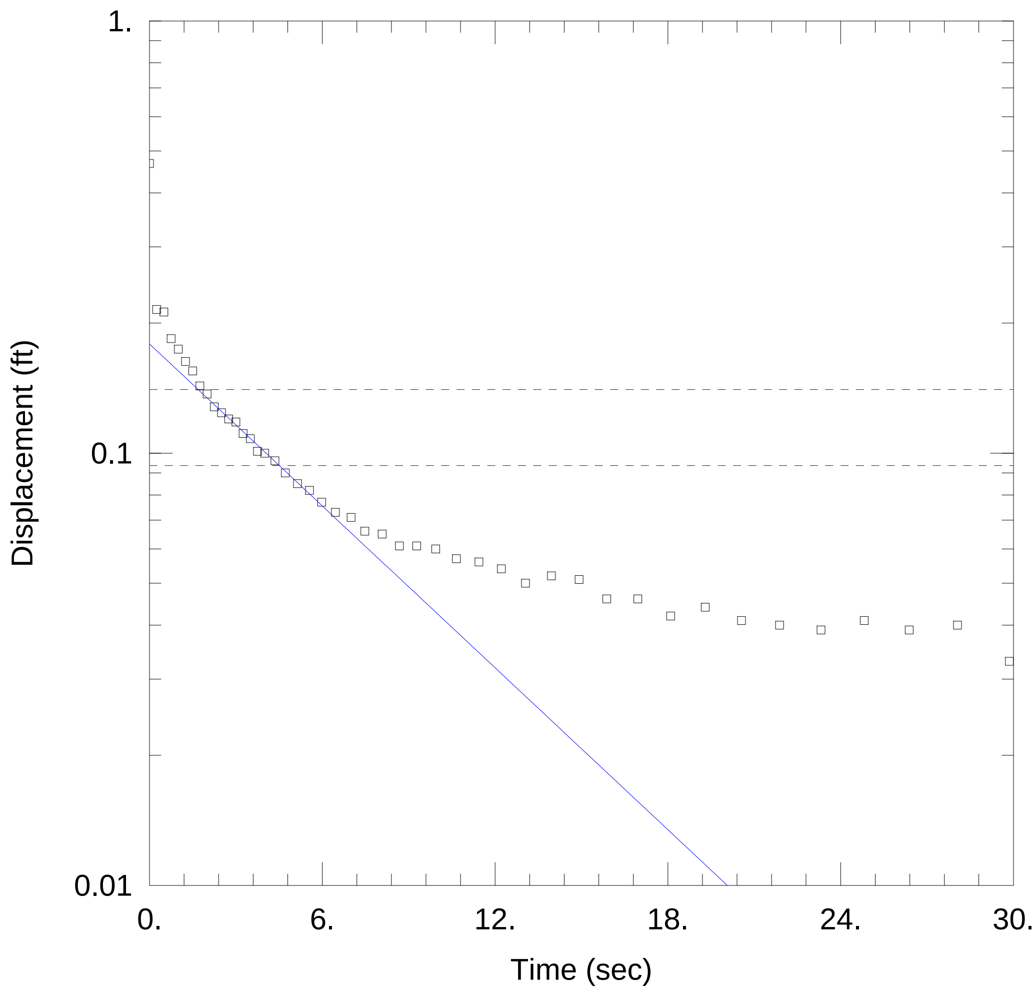
Model input parameters included well recovery results from the down-well pressure transducers and dataloggers, and well construction variables such as radius and screen depth. Using the Bouwer-Rice solution for unconfined aquifers, reasonable values for hydraulic conductivity were estimated for all wells analyzed. A correction was applied to the displacement values of falling head tests for MW-1, MW-3, and MW-6. This correction accounts for the difference between expected displacement values as the water level in the well approached static level and the observed displacement values. Sources of error may have included disturbance of the pressure transducer as the slug was initially inserted into the water column. Results are summarized on Table E-1, Appendix E. AQTESOLV™ output reports for each slug test are also included in Appendix E.

Hydraulic conductivity values were consistent at a given well for falling- and rising-head tests, as well as at different locations across the site. The hydraulic conductivity result for MW-4 was notably lower than the other five wells analyzed. However, lithology within the screened interval at MW-4 was characterized by higher clay content than in the other wells. The reduced hydraulic conductivity at MW-4 is consistent with the relatively high clay content at MW-4. The hydraulic conductivity results at each of the six wells analyzed are consistent with the expected hydraulic conductivity values based on lithology at each well (typically fine to medium sand with some very fine or coarse sand). Hydraulic conductivity ranged from 5.5 to 30.8 feet per day (ft/d).

Table E-1
Hydraulic Conductivity Analysis Results
Site Characterization Report and Removal Action Work Plan
Former VCC Mobile Site - Mobile, Alabama

Well ID	Date	TD (ft btoc)	DTW (ft btoc)	K (ft/d)
MW-1 (Slug In)	10/17/2012	31.09	26.03	14.0
MW-1 (Slug Out)	10/17/2012	31.09	26.00	30.8
MW-2 (Slug In)	10/18/2012	35.52	27.28	19.6
MW-2 (Slug Out)	10/18/2012	35.52	27.29	17.8
MW-3 (Slug In)	10/17/2012	31.08	26.51	24.8
MW-3 (Slug Out)	10/17/2012	31.08	26.53	15.0
MW-4 (Slug In)	10/18/2012	30.42	21.67	5.5
MW-4 (Slug Out)	10/18/2012	30.42	21.67	6.7
MW-5 (Slug In)	10/18/2012	18.04	10.13	19.4
MW-5 (Slug Out)	10/18/2012	18.04	10.14	26.5
MW-6 (Slug In)	10/18/2012	22.47	17.97	18.0
MW-6 (Slug Out)	10/18/2012	22.47	17.96	25.8

Notes:
TD = Total well depth measured from top of well casing
DTW = Depth to water measure from top of well casing
ft btoc = feet below top of casing
K (ft/d) = Hydraulic Conductivity in feet per day



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-1 (Slug In)
Test Date: 10/17/2012

AQUIFER DATA

Saturated Thickness: 5.06 ft
Anisotropy Ratio (Kz/Kr): 1.

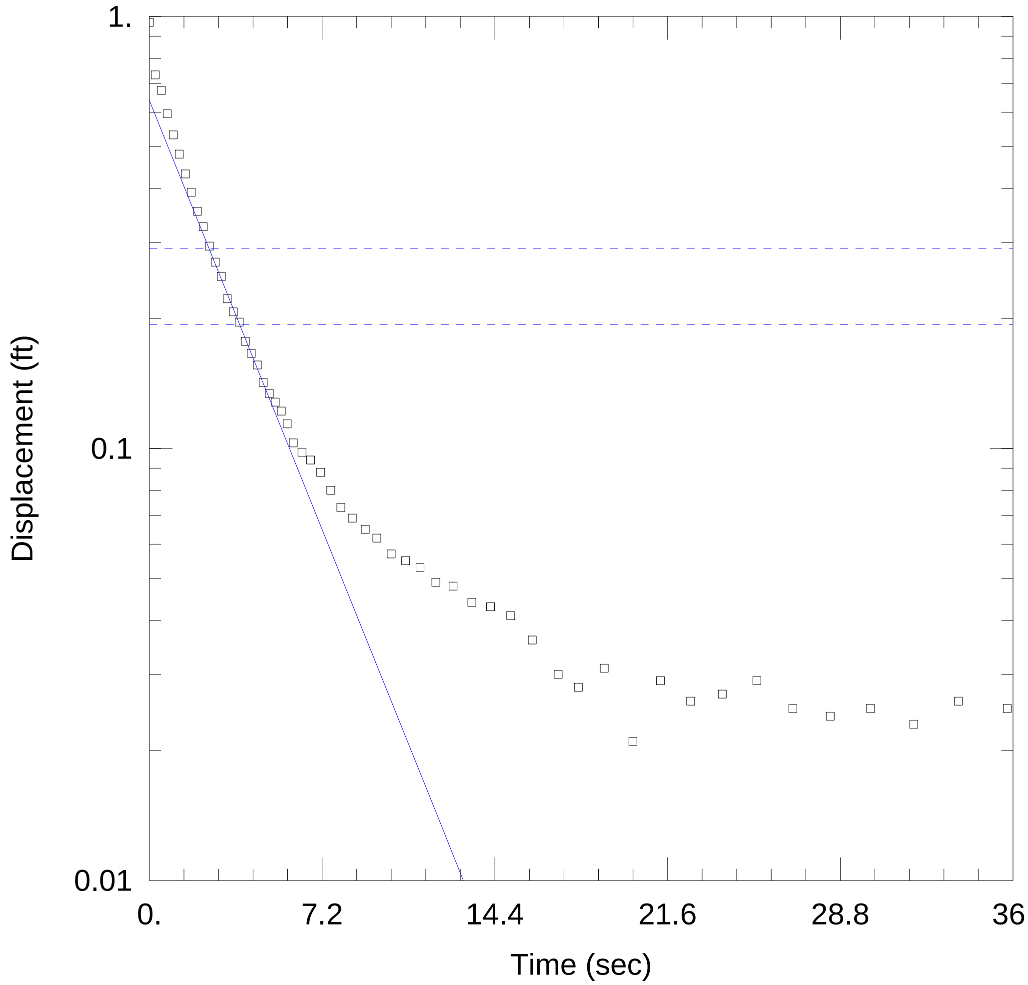
WELL DATA (MW-1 (Slug In))

Initial Displacement: 0.468 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08 ft
Static Water Column Height: 5.06 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 14. ft/day
y0 = 0.1789 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-1 (Slug Out)
Test Date: 10/17/2012

AQUIFER DATA

Saturated Thickness: 5.09 ft
Anisotropy Ratio (Kz/Kr): 1.

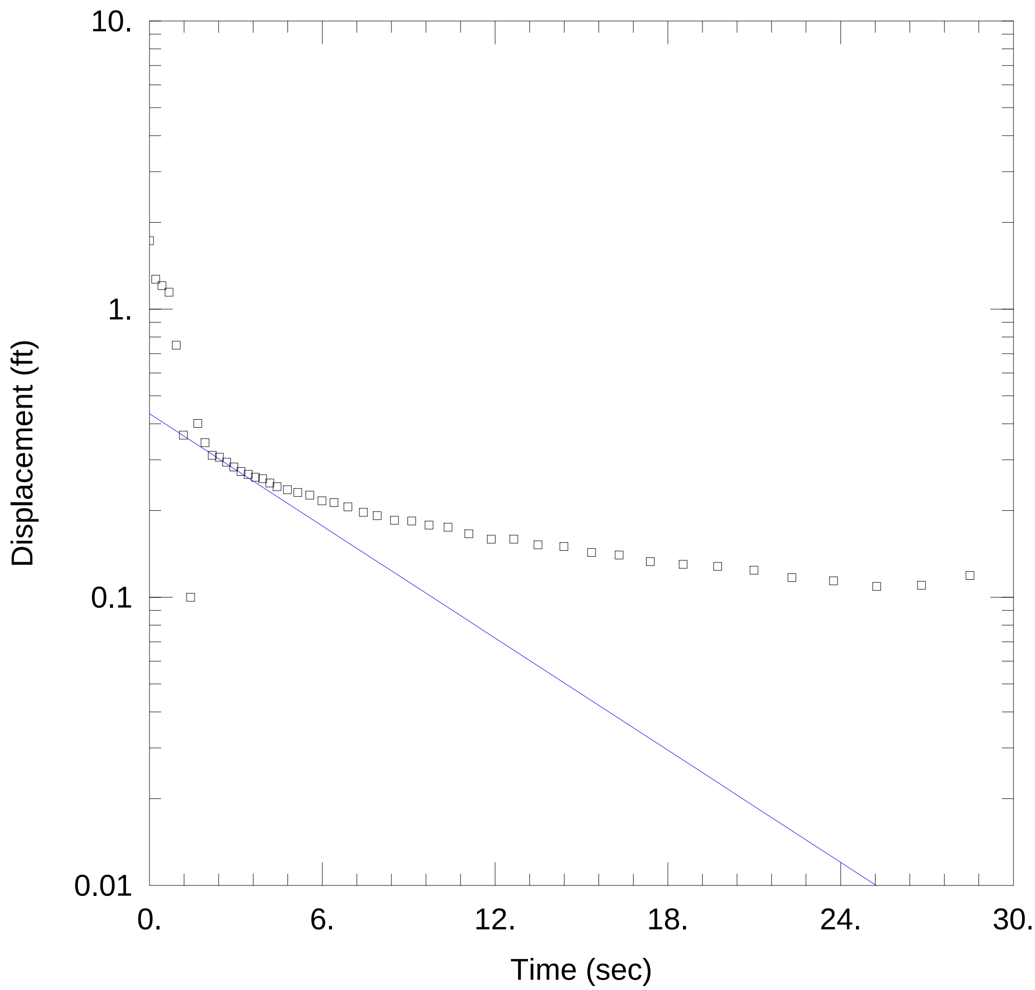
WELL DATA (MW-1 (Slug Out))

Initial Displacement: 0.969 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.08 ft
Static Water Column Height: 5.09 ft
Screen Length: 10. ft
Well Radius: 0.33 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 30.75 ft/day
y0 = 0.6387 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-2 (Slug In)
Test Date: 10/18/2012

AQUIFER DATA

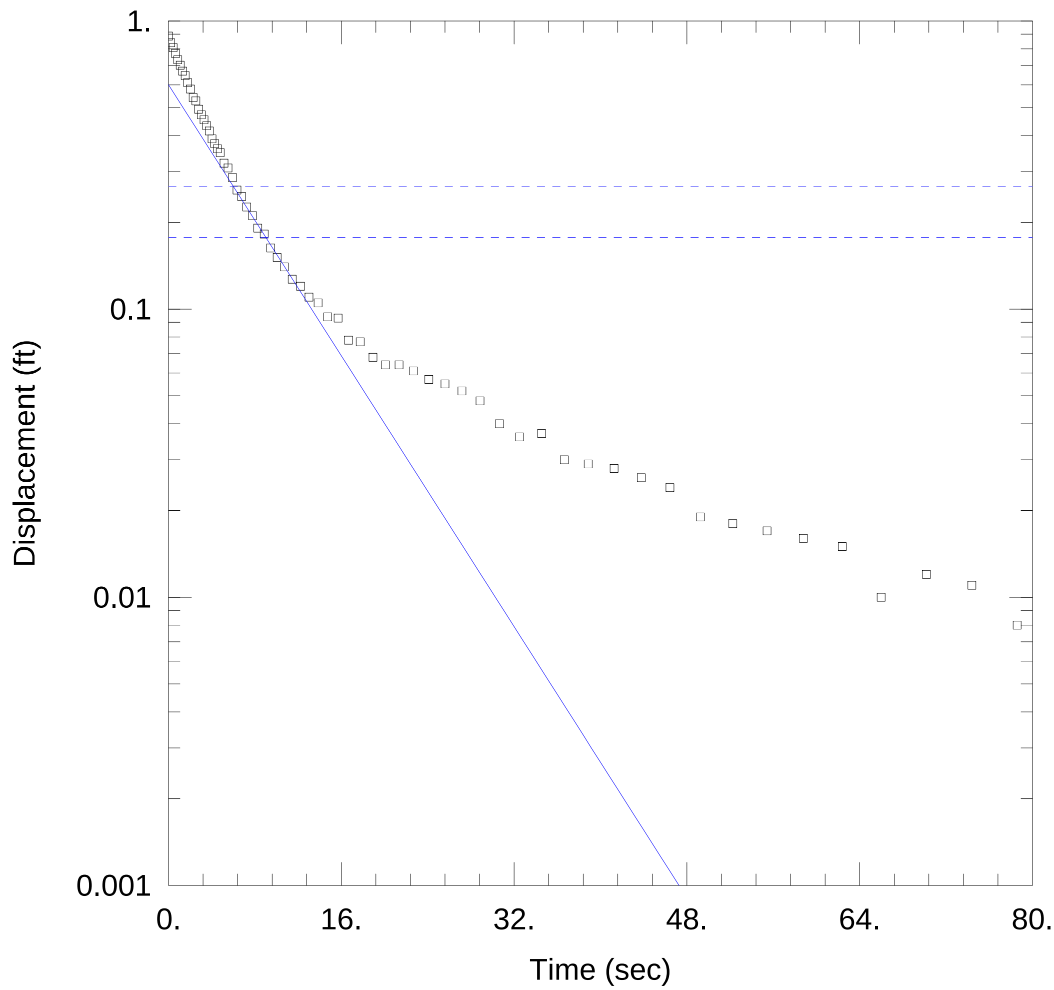
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2 (Slug In))

Initial Displacement: 1.728 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.08 ft
Static Water Column Height: 8.24 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 19.6 ft/day
y0 = 0.4333 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-2 (Slug Out)
Test Date: 10/18/2012

AQUIFER DATA

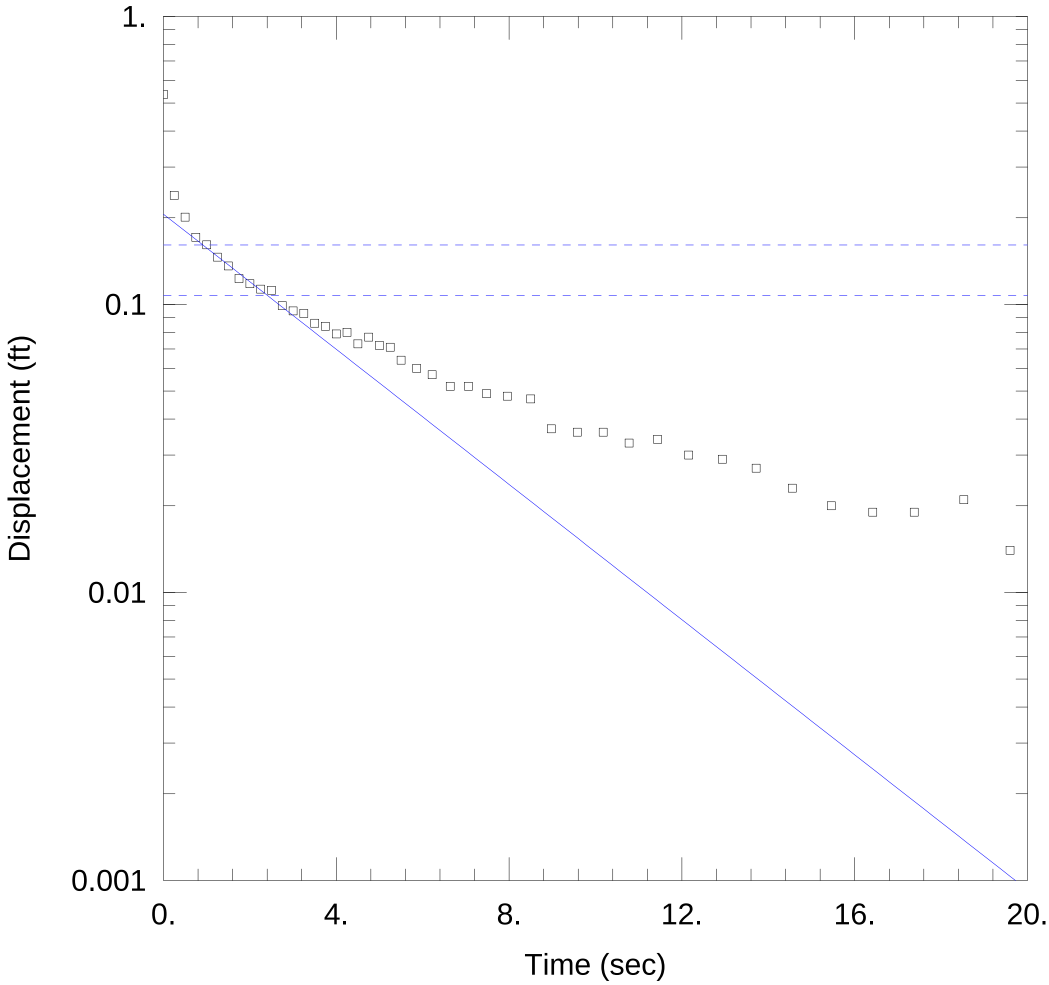
Saturated Thickness: 7. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-2 Slug Out)

Initial Displacement: 0.886 ft
Total Well Penetration Depth: 35. ft
Casing Radius: 0.08 ft
Static Water Column Height: 8.23 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 17.75 ft/day
y0 = 0.6003 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-3 (Slug In)
Test Date: 10/17/2012

AQUIFER DATA

Saturated Thickness: 10. ft

Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-3 (Slug In))

Initial Displacement: 0.536 ft
Total Well Penetration Depth: 30. ft
Casing Radius: 0.08 ft

Static Water Column Height: 4.57 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

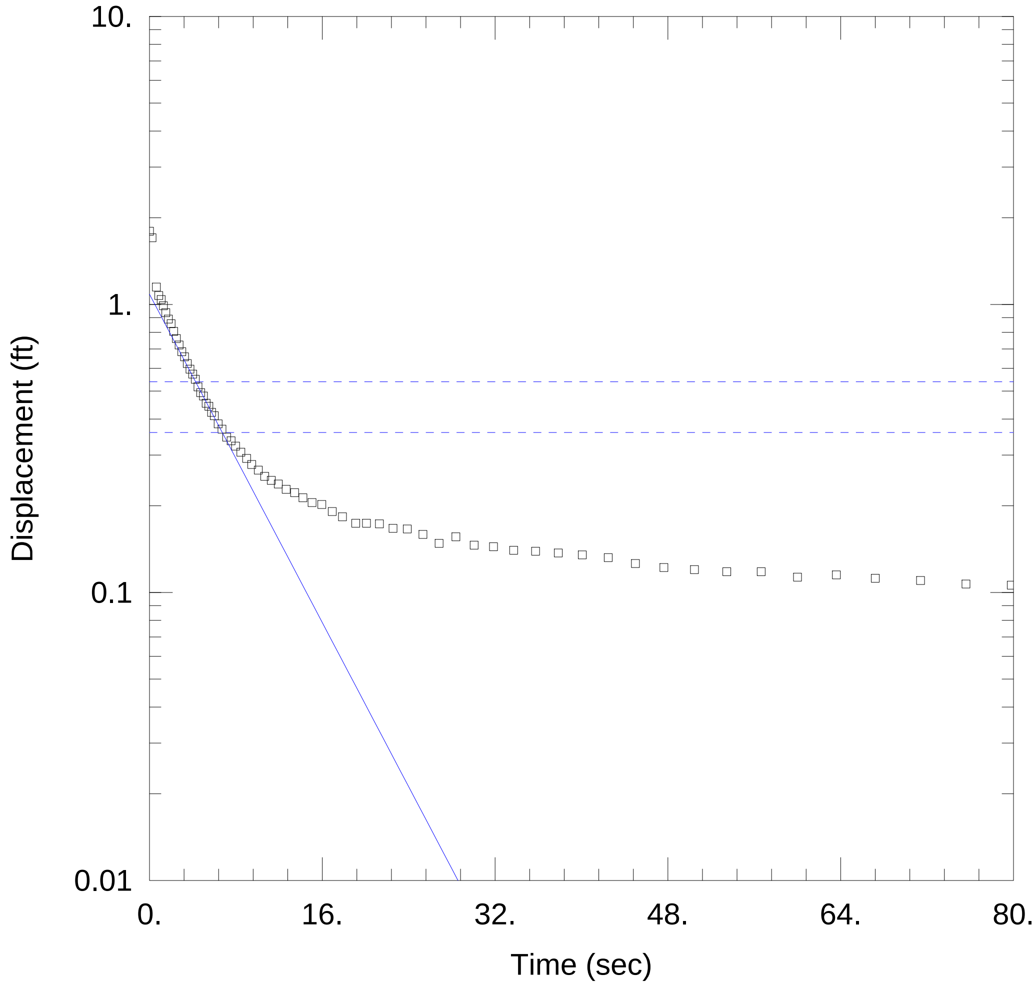
SOLUTION

Aquifer Model: Unconfined

Solution Method: Bouwer-Rice

K = 24.76 ft/day

y0 = 0.2057 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-3 (Slug Out)
Test Date: 10/17/2012

AQUIFER DATA

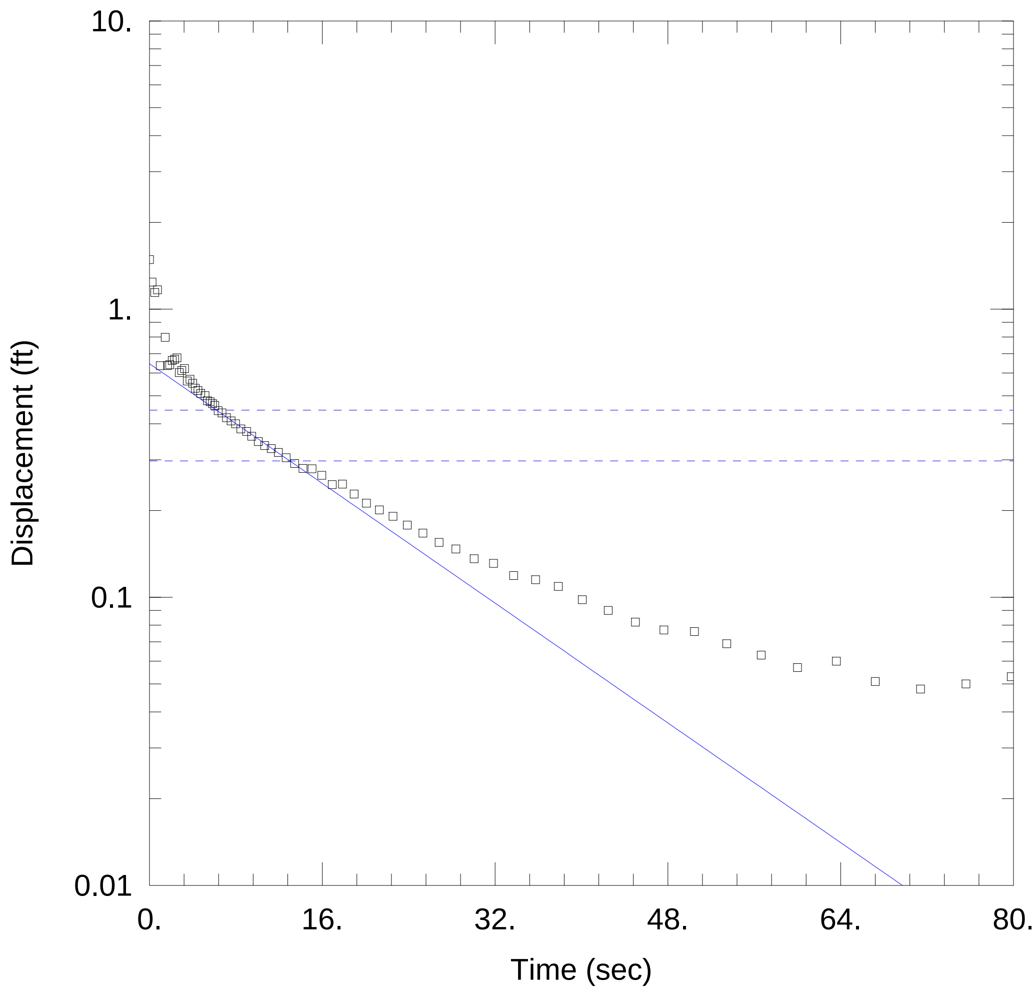
Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-3 (Slug Out))

Initial Displacement: 1.795 ft
Static Water Column Height: 4.55 ft
Total Well Penetration Depth: 30. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 15.04 ft/day
y0 = 1.085 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-4 (Slug In)
Test Date: 10/18/2012

AQUIFER DATA

Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

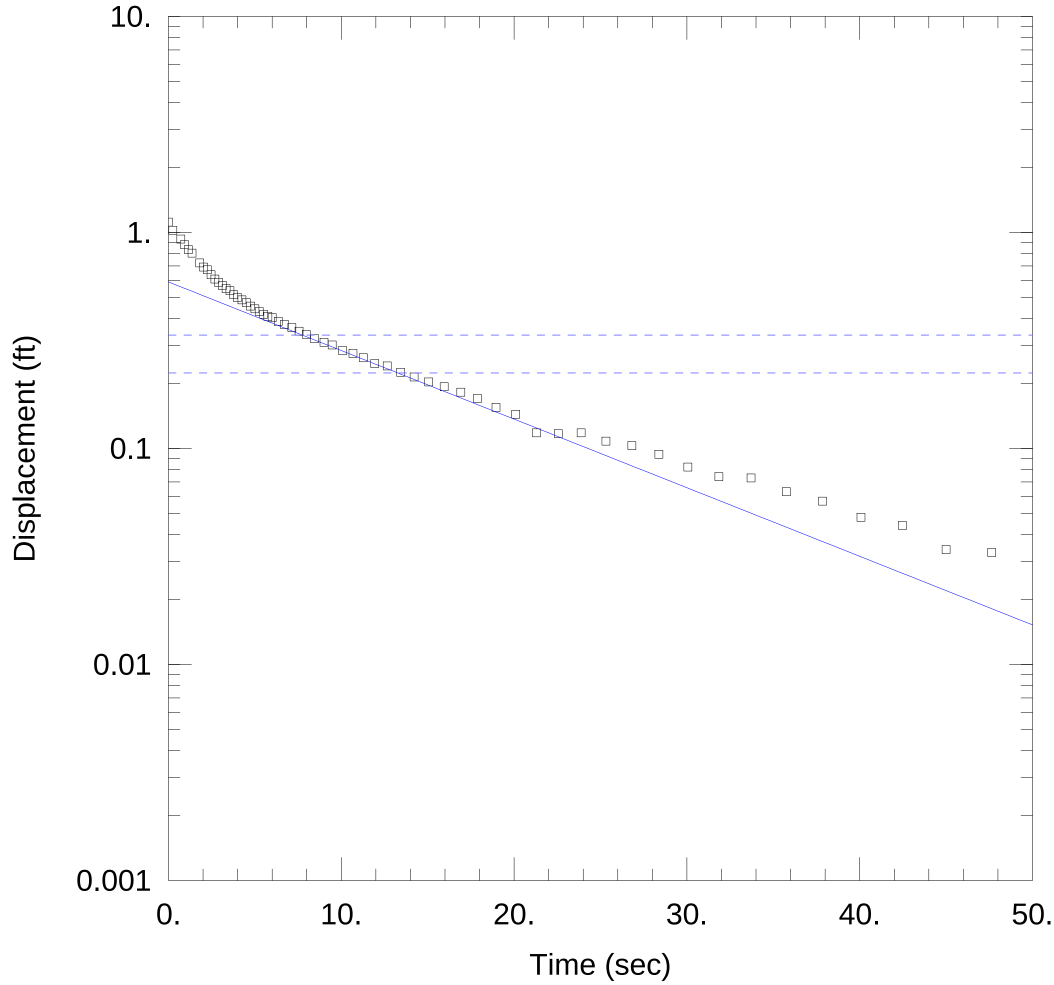
WELL DATA (MW-4 (Slug In))

Initial Displacement: 1.486 ft
Total Well Penetration Depth: 30. ft
Casing Radius: 0.08 ft
Static Water Column Height: 8.75 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 5.481 ft/day
y0 = 0.6463 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-4 (Slug Out)
Test Date: 10/18/2012

AQUIFER DATA

Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

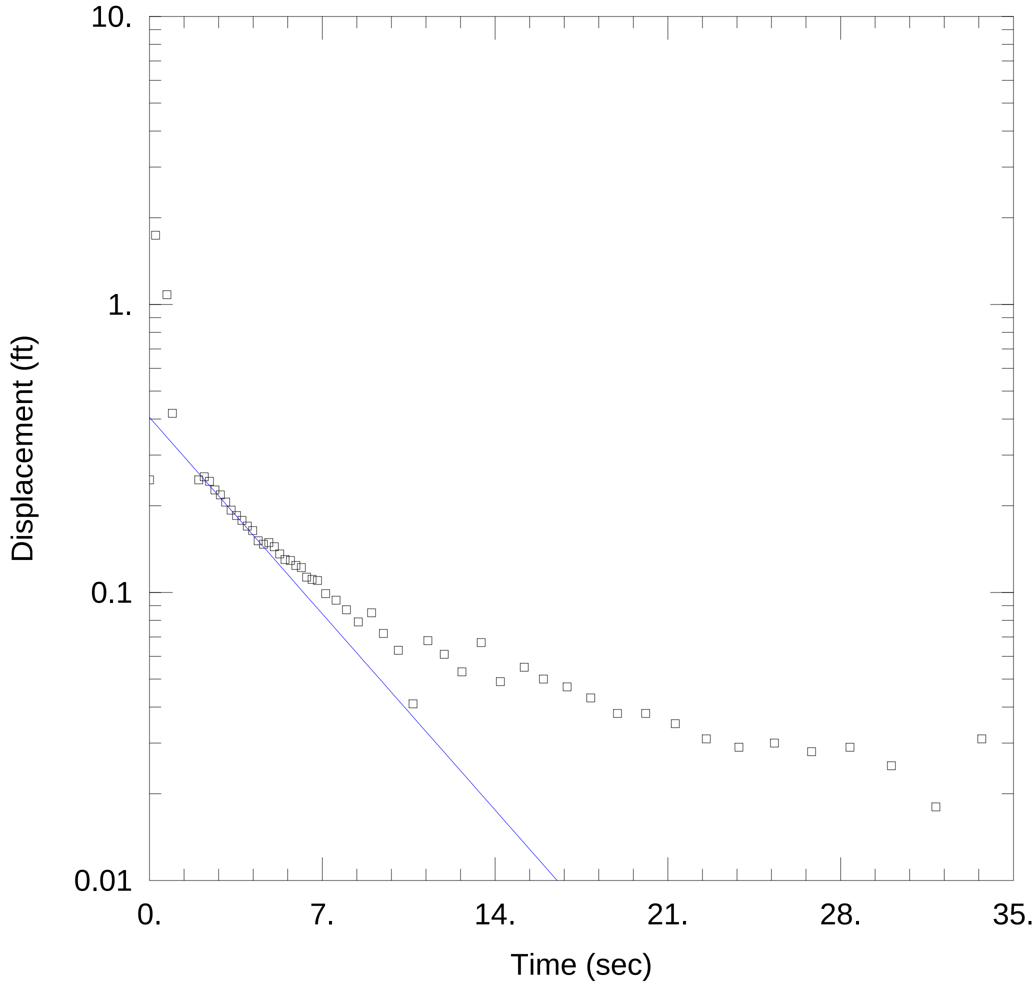
WELL DATA (MW-4 (Slug Out))

Initial Displacement: 1.117 ft
Total Well Penetration Depth: 30. ft
Casing Radius: 0.08 ft
Static Water Column Height: 8.75 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 6.702 ft/day
y0 = 0.5896 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-5 (Slug In)
Test Date: 10/18/2012

AQUIFER DATA

Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

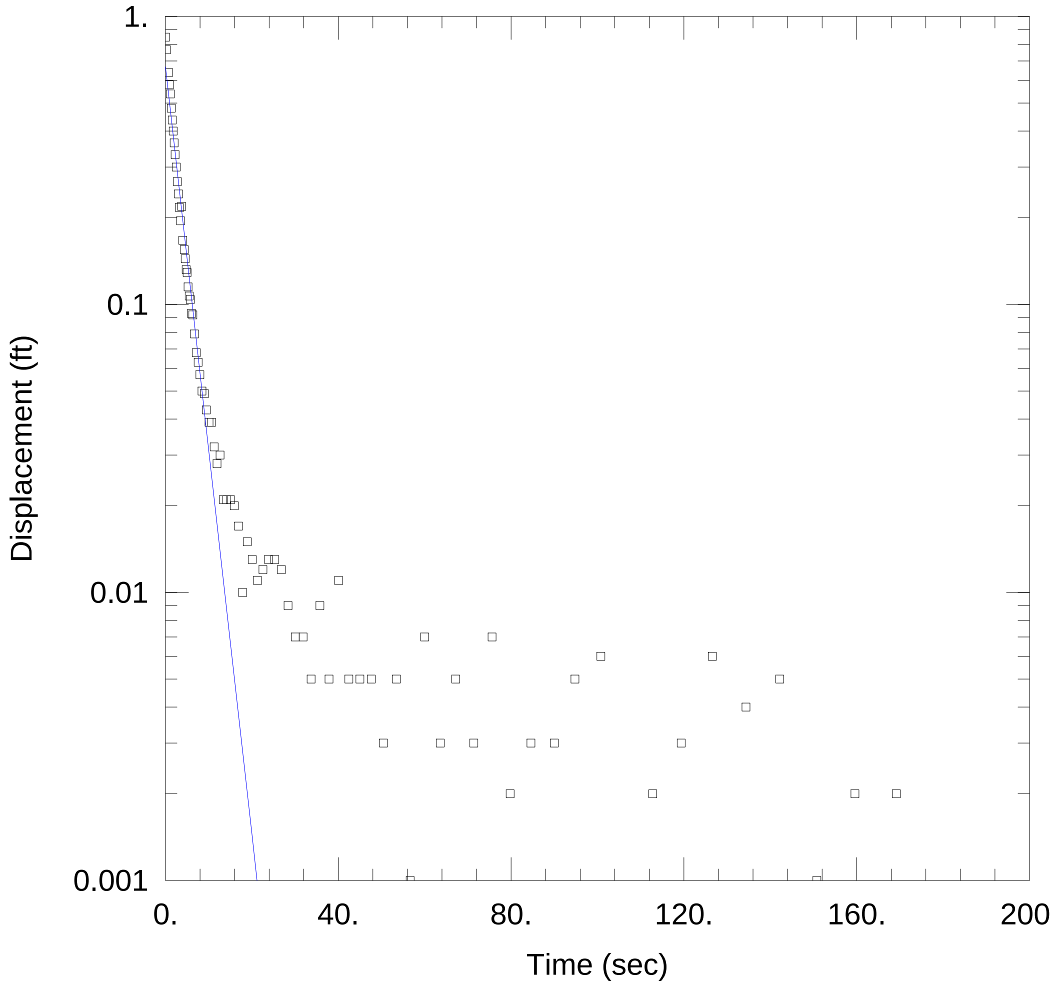
WELL DATA (MW-5 (Slug In))

Initial Displacement: 0.246 ft
Total Well Penetration Depth: 20. ft
Casing Radius: 0.08 ft
Static Water Column Height: 1. ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 19.37 ft/day
y0 = 0.405 ft



WELL TEST ANALYSIS

Data Set: G:\...\MW-5 Slug Out.aqt
Date: 01/15/13
Time: 15:48:21

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-5 (Slug Out)
Test Date: 10/18/2012

AQUIFER DATA

Saturated Thickness: 10. ft
Anisotropy Ratio (Kz/Kr): 1.

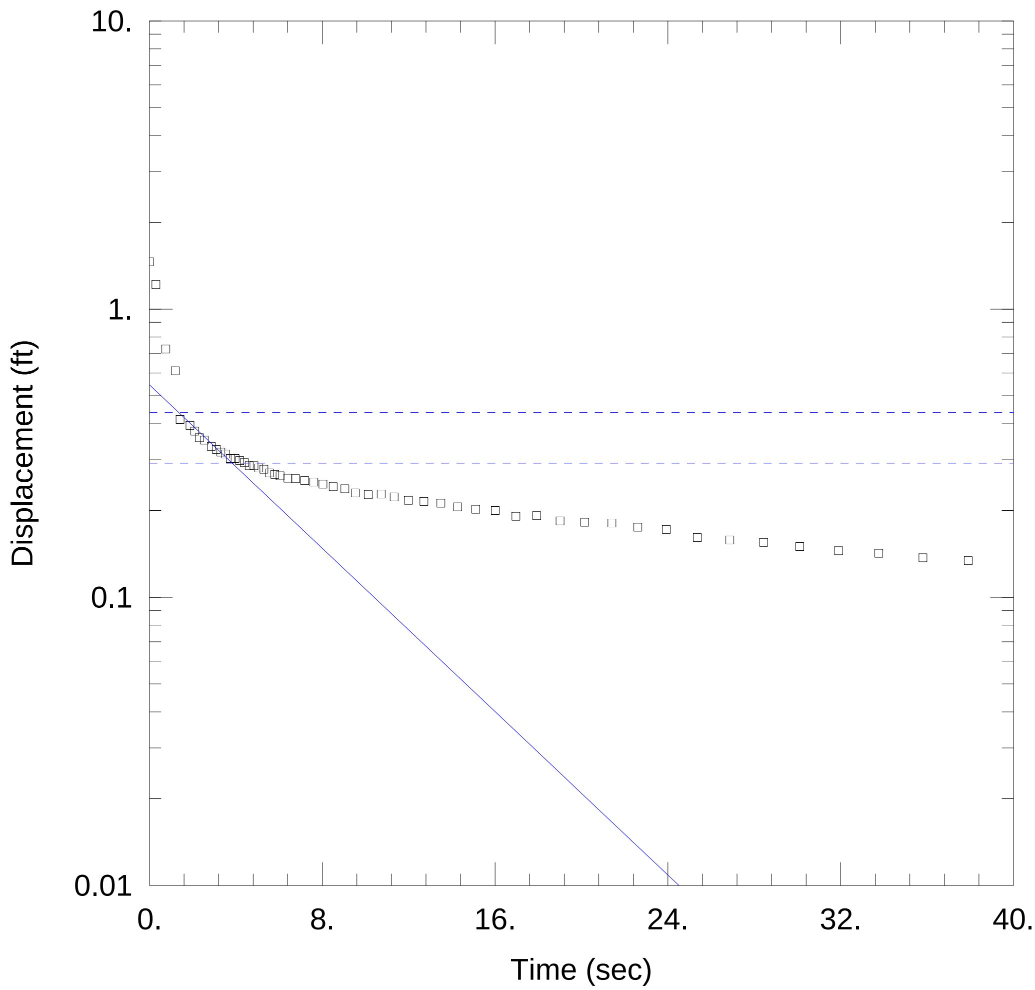
WELL DATA (MW-5 (Slug Out))

Initial Displacement: 0.847 ft
Static Water Column Height: 7.9 ft
Total Well Penetration Depth: 20. ft
Screen Length: 10. ft
Casing Radius: 0.08 ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 26.5 ft/day
y0 = 0.6678 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-6 (Slug In)
Test Date: 10/18/2012

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

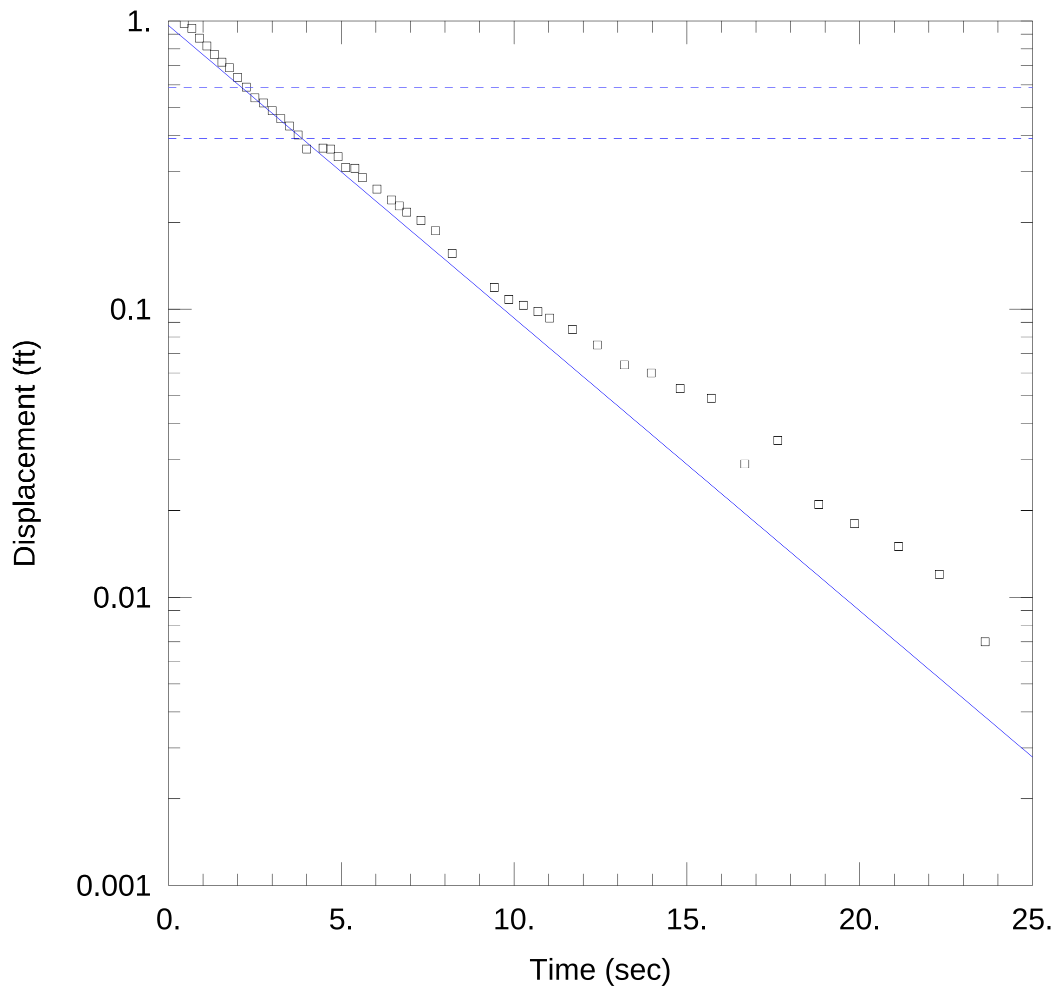
WELL DATA (MW-6 (Slug In))

Initial Displacement: 1.459 ft
Total Well Penetration Depth: 25. ft
Casing Radius: 0.08 ft
Static Water Column Height: 4.5 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 18.01 ft/day
y0 = 0.5454 ft



WELL TEST ANALYSIS

PROJECT INFORMATION

Company: ARCADIS
Client: VCC
Project: B0085761.1201
Location: Mobile, AL
Test Well: MW-6 (Slug Out)
Test Date: 10/18/2012

AQUIFER DATA

Saturated Thickness: 8. ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-6 (Slug Out))

Initial Displacement: 1.956 ft
Total Well Penetration Depth: 25. ft
Casing Radius: 0.08 ft
Static Water Column Height: 4.51 ft
Screen Length: 10. ft
Well Radius: 0.08 ft

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

K = 25.82 ft/day
y0 = 0.9643 ft

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Appendix E

Waste Manifests

HAZ~MAT

ENVIRONMENTAL SERVICES
P.O. BOX 37392 • CHARLOTTE, N.C. 28237
(704) 332-5600
FAX (704) 375-7183

Manifest No. 58829

P.O. No.

Job No.

NON-HAZARDOUS SPECIAL WASTE

Section I. GENERATOR (Generator complete all of Section I)

GENERATOR LOCATION

NAME EXXONMOBIL OIL CORP
ORIGINATING ADDRESS 901 N. KATE STREET
MAILING ADDRESS
CITY PRITCHARD STATE AL ZIP
PHONE NO. 703-846-3804 / 919-415-2255
CONTACT NAME LAUREN GORDON / BILL ANCKNER
DES. OF WASTE NON-DOT REGULATED MATERIAL

WORK CONTRACTED BY
Bill To (If different from information at left)

NAME ARCADIS
ADDRESS 801 CORPORATE CENTER DRIVE STE 300
CITY RALEIGH STATE NC ZIP 27607
PHONE NO. 919-415-2255
CONTACT NAME BILL ANCKNER

No.	Type	Units	Quantity
01	TT	D	0025

Section II. INVOICE INFORMATION GALLONS DRUMS

DESCRIPTION		QUANTITY		LINE TOTAL	
1. PETROLEUM CONTACT WATER PUMPED FROM TANKS, DRUMS OR AFVR					
2. OFF-SPEC LIGHT OIL, DIESEL OR GAS PUMPED FROM TANKS OR DRUMS					
3. SOLUBLE OILS OR COOLANTS PUMPED FROM STORAGE					
4. SEDIMENT OR SOLIDS VACUUMED FROM CONTAINMENT AREA					
5. 55-GALLON DRUM REMOVED - SOLID OR EMPTY	SOIL CUTTINGS/PPE		15		
6. 55-GALLON DRUM REMOVED - LIQUID	DECON WATER		2		
7.	PURGE WATER		6		
8.					
9.					
10. ARRIVAL TIME: 2:40 PM	DEPARTURE TIME: 3:10 PM				

GENERATOR'S CERTIFICATION: I hereby certify that the above named material is not a hazardous waste as defined by 40 CFR Part 261 or any applicable state law, has been properly described, classified and packaged, and is in proper condition for transportation according to applicable regulations; AND, if the waste is a treatment residue of a previously restricted hazardous waste subject to the Land Disposal Restrictions, I certify and warrant that the waste has been treated in accordance with the requirements of 40 CFR Part 268 and is no longer a hazardous waste as defined by 40 CFR Part 261.

Jon B. Sawyer On Behalf of ExxonMobil [illegible] — Generator Authorized Agent Name

Signature

Shipment Date 1 2 1 2 1 2

Section III. TRANSPORTER TRANSPORTER (Generator complete a-d; Transporter I complete e-g; Transporter II complete h-n)

HAZ~MAT
ENVIRONMENTAL SERVICES
P.O. BOX 37392 • CHARLOTTE, N.C. 28237

a. Driver Name/Title Dustin Cheston
b. Phone No. 704 332 5600 c. Truck No. 21-11 / BT-17

Hazardous Waste Transporter Permits
EPA NCR 000003186
EPA NCD048461370

d. Driver Signature — Shipment Date 1 2 1 2 1 2

TRANSPORTER II

e. Name
f. Address
g. Driver Name/Title
h. Phone No. i. Truck No.
j. Transporter II Permit Nos.

Driver Signature — Shipment Date

Section IV. FACILITY INFORMATION AND CERTIFICATE OF DISPOSAL

Site Name: Haz-Mat Environmental Services
Physical Address: 210 Dalton Avenue, Charlotte, N.C. 28206

a. Phone No. 704-332-5600
b. Mailing Address: P.O. Box 37392, Charlotte, N.C. 28237

e: Discrepancy Indication Space

This is to certify that all non-hazardous material removed from above location has been received and will be disposed of in accordance with applicable local, state and federal regulations in the following manner: (1) Petroleum products are blended into a beneficial reusable fuel for use in large industrial burners. (2) Waste waters are to be treated with polymers, pH adjusters, and a flocculant, then flows through a dissolved air flotation system for pretreatment separation, then into the CMUD sanitation sewer system under permit IUP#5012. (3) Sludges from treatment systems are hauled to E.P.A. approved facilities for proper disposal. Manifest and certificate of disposal are on file. (4) Our treatment system operates on a first in, first out basis and product should be processed within seven days.

SIGNATURE OF FACILITY AGENT	DATE	MONTH	DAY	YEAR

ORIGINAL - FINAL T.S.D. • YELLOW - DISPOSER • PINK - 1ST T.S.D. • GOLD - GENERATOR

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Appendix F

Calculations of ADEM Site-specific Remediation Endpoints

ARCADIS U.S., Inc.
801 Corporate Center Drive
Suite 300
Raleigh
North Carolina 27607
Tel 919 854 1282
Fax 919 854 5448

MEMO

To:
Bill Anckner

Copies:
Geoff Germann

From:
Jeanine Smith
Shawn Sager

Date:
April 23, 2013

ARCADIS Project No.:
B0085761.1301.00008

Subject:
Calculation of ADEM Site-specific Remediation Endpoints,
Former Virginia-Carolina Chemical Corporation (VCC) Site, Mobile, Alabama

Introduction

The purpose of this memo is to present supporting documentation for the development of site-specific health based remedial goals for arsenic and lead in soils at the former Virginia-Carolina Chemical Corporation (VCC) site (the Site) in Mobile, Alabama. This memo presents a derivation of site-specific, risk-based target levels (RBTLs) based on the Alabama Department of Environmental Management (ADEM) Risk-Based Corrective Action (ARBCA) guidance (ADEM 2008).

The ARBCA process is a tiered approach designed to identify remedial goals for sites with varying degrees of site specificity moving through the tiered process. The initial step in the process is to compare the maximum detected constituent concentration to the preliminary screening value (PSV). In the case of arsenic, the PSV for residential soil is 0.4 milligrams per kilogram (mg/kg) and the PSV for commercial soil is 1.6 mg/kg (ADEM 2008). The maximum arsenic concentration detected at the Site was 808 mg/kg located in sample MB-SB-57, 2 to 4 feet below ground surface (bgs). The lead PSV for residential soil is 400 mg/kg and the PSV for commercial soil is 800 mg/kg, and the maximum lead concentration detected at the Site was 18,800 mg/kg also located in sample MB-SB-57, 2 to 4 feet bgs. Therefore, a preliminary screening level (PSL) evaluation would not be sufficient to obtain closure for the Site. Subsequent to a PSL evaluation would either be a risk management (RM) 1 (RM-1) evaluation or an RM-2 evaluation. The difference is in the site-specific nature of the exposure assumptions.

The former fertilizer plant structures are no longer present and the Site currently includes vacant properties and the Interstate 165 (I−165) corridor. The vacant properties are undeveloped and overgrown with vegetation (i.e., shrubs, small trees and tall grasses). Notable features include a drainage ditch that extends from Lilly Street to New Bay Bridge Road, and long brush and rubble piles that transverse the undeveloped parcels. Fencing is present around portions of both parcels.

The I−165 corridor consists of an elevated six-lane freeway deck with frontage roads (e.g., Hall Street) on both the northeast and southwest sides of I−165 and an interchange with New Bay Bridge Road. Most of the former facility structures were located within the current I−165 corridor and no longer exist. The ground surface topography slopes inward toward the centerline of the freeway toward a drainage feature. This drainage feature runs parallel with the freeway.

An RM-2 (or site-specific) evaluation was performed to evaluate potential risk and derive RBTLs consistent with the ADEM ARBCA program. The current commercial PSV for arsenic of 1.6 mg/kg is based on a target excess lifetime cancer risk (ELCR) of 1×10^{-6}. Using a ratio approach, the ELCR for a hypothetical commercial worker at the site was calculated to be 5×10^{-4} (ELCR = [1×10^{-6} × 808 mg/kg]/1.6 mg/kg). Based on the results of this risk calculation, site-specific RBTLs were calculated.

Exposure to lead is evaluated differently than other constituents because the benchmark is based on a predicted blood lead level. If the maximum lead concentration is used in the USEPA's Adult Lead Model (ALM; USEPA 2003a), then the predicted blood lead level from a site worker exposed to lead in soil at 18,800 mg/kg would be 28 micrograms per deciliter (µg/dL) for the site worker which is well above the benchmark of 10 µg/dL. Therefore, the ALM was used to develop RBTLs for non-residential scenarios (ADEM 2008).

The remainder of this memo outlines the approach to develop the RBTLs for arsenic and lead based on site-specific information developed as part of the remedial action plan for the site. Included in the subsequent sections are an exposure assessment, toxicity assessment, and the derivation of the RBTLs.

Exposure Assessment

The purpose of the exposure assessment is to estimate the ways a population may potentially be exposed to constituents at the Site. The exposure assessment includes characterization of the physical environment, identification of exposure pathways (including migration pathways, exposure points, and exposure routes), and identification of potentially exposed individuals and populations. The exposure assessment typically involves projecting concentrations along potential pathways between sources and receptors. The projection usually is accomplished using site-specific data and, when necessary, mathematical modeling. Exposure can occur only when the potential exists for a receptor to directly contact released constituents or when there is a mechanism for released constituents to be transported to a receptor.

The following sections detail the potential receptors, exposure pathways and assumptions, and the parameters used to estimate constituent intakes.

Potential Human Receptors

Several possible receptors have been identified for the Site. Potentially exposed receptors must be considered in light of current and likely future use of the Site and the nearby area, as well as access to the Site and impacted soil. Based on the available information and site description, the most likely future receptors are adolescent trespassers, site workers, and construction workers or utility workers. In the absence of land use controls, exposure of child and adult residents is considered as well.

Receptor Exposure Pathways and Exposure Assumptions

Exposure pathways are identified in this section based on the site characterization information and the fate and transport properties of the constituents of potential concern (COPCs) to identify likely scenarios where human receptors might come in contact with constituents from affected media under current or potential future conditions at the Site. The principal pathways by which exposure could occur for human receptors are identified in each of the relevant exposure scenarios.

An exposure pathway is defined by the following four elements:

1. A source and mechanism of constituent release to the environment.

2. An environmental transport medium for the released constituent.

3. A point of potential contact by the receptor with the medium containing the constituent (the exposure point).

4. A route of exposure to the receptor at the exposure point (i.e., ingestion, inhalation, or dermal contact).

The exposure assessment for all receptors was based exclusively on exposure to soil. The receptors are assumed to be exposed to the surface or subsurface soil through incidental ingestion of, and dermal contact with the soil and inhalation of particulates adhered to dust released from the soil. The calculation of the RBTLs for site worker exposure to soil was based on the *United States Environmental Protection Agency (USEPA) Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA 2002). Available data for the Site do not show migration of arsenic from the surficial soil to groundwater. Therefore, the calculation of RBTLs based on the protection of groundwater is not included in this evaluation.

Exposure parameters are receptor- and scenario-specific values that are used in estimating the RBTLs. They include, for example, such receptor-specific characteristics as body weight and ingestion rates and such scenario-specific items as the total period a receptor is exposed to constituents of interest and the frequency with which exposure occurs (**Table 1**). Receptor-specific exposure assumptions were obtained from the USEPA guidance (USEPA 1989, 1997, 2002, 2004, 2009a). Receptor exposure assumptions were selected so that RBTLs are based on a reasonable maximum exposure (RME) scenario.

In general, it is assumed that all of a constituent ingested at a site is bioavailable, or that the relative bioavailability for constituents in soil is equal to 100 percent. However, recent research suggests that the relative bioavailability of arsenic in soil is less than 100 percent. The USEPA Technical Review Workgroup (TRW) Bioavailability Committee reviewed estimates of arsenic relative bioavailability data to determine an appropriate recommendation. USEPA (2012a, b) recommended a relative bioavailability factor (RAF) of 0.6 (or 60 percent) in the absence of site-specific data. Therefore, this RAF was used in the derivation of RBTLs.

A summary of receptor-specific exposure parameters is provided below.

Hypothetical Adolescent Trespasser

An older youth, ages 6 to 16 years, could trespass onto the Site since it is not 100 percent fenced and access is not completely restricted. This individual could contact soil while trespassing. It was assumed that this individual could access the Site on an occasional basis through an exposure period of 10 years. The exposure frequency was assumed to be 52 days per year (days/year), assuming the individual accesses the site once a week for the entire year. The adolescent trespasser was assumed to contact the soil through incidental ingestion, dermal contact and inhalation of dust. The equations used to evaluate this exposure scenario are presented in **Table 2**. The exposure assumptions for the adolescent trespasser are included in **Table 1** and are summarized as follows:

- Averaging time of 25,550 days (70 years × 365 days per year) for cancer effects, and averaging time of 3,650 days (10 years × 365 days per year) for non-cancer effects (USEPA 1991)
- Adolescent body weight of 44 kilograms (kg) (USEPA 2011)
- Exposure duration of 10 years (professional judgment based on the assumption that older children are more likely to be unsupervised than very young children)
- Exposure frequency of 52 days per year, assuming 1 visit per week for the entire year (professional judgment)

- Exposure time of 1 hour per day (hr/day) (professional judgment based on a conservative assumption that the individual might loiter on the properties for an hour)
- Incidental soil ingestion rate of 50 mg per day (mg/day) (USEPA 2011)
- Exposed skin surface area of 4,400 square centimeters (cm^2), which is the age averaged value for hands, forearms, legs, and face (USEPA 1997)
- Soil adherence rate of 0.2 milligrams per square centimeter (mg/cm^2) (USEPA 2004)

Hypothetical Future Site Worker

The *Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites* (USEPA 2002) recommends evaluation of outdoor and indoor workers separately since these two groups should experience difference levels of exposure to the soil constituents. Outdoor site workers are the most likely receptor at the Site and were conservatively evaluated in this report since their exposure will represent a more conservative evaluation. Outdoor site workers are assumed to be exposed to the surface soil through incidental ingestion of, and dermal contact with the soil and inhalation of particulates adhered to dust released from the soil; whereas, indoor site workers are assumed only to be exposed to the surface soil only through incidental ingestion of indoor dust originating from the surface soil (USEPA 2002). The equations used to evaluate site worker exposure to soil are presented in **Table 2** (USEPA 2002). The exposure assumptions for the site worker are included in **Table 1** and are summarized as follows:

- Averaging time of 25,550 days (70 years × 365 days per year) for cancer effects; and averaging time of 9,215 days (25 years × 365 days per year) for non-cancer effects (USEPA 1991)
- Adult body weight of 70 kg (USEPA 1991)
- Exposure duration of 25 years (USEPA 2002)
- Exposure frequency of 225 days/year (outdoor site worker) (USEPA 2002)
- Exposure time of 10 hr/day (ADEM 2008)
- Incidental soil ingestion rate of 100 mg/day (outdoor site worker) and 50 mg/day (indoor site worker) (USEPA 2002)
- Exposed skin surface area of 3,300 cm^2, which is the sum of the mean values for hands, forearms, and face for an adult (USEPA 2002)

- Soil adherence rate of 0.2 mg/cm^2 (USEPA 2002)

Hypothetical Construction Worker

Hypothetical construction workers or utility workers at the Site could be exposed to soil through incidental ingestion of, and dermal contact with the soil and inhalation of particulates. Construction workers could use personal protective equipment (PPE) to minimize their exposure to site-related constituents in soil. While it is likely that construction workers would use PPE, the risk assessment was conducted conservatively assuming that PPE would not be used. The equations used to evaluate this potential exposure scenario are the same as a gardener, assuming that more dust generated during construction activities at the site. The equations used to evaluate exposure to soil by a construction worker are found in **Table 3,** and the PEF used to evaluate potential exposure is presented in **Table 4**. The exposure assumptions for the construction worker are included in **Table 1** and are summarized as follows:

- Averaging time of 25,550 days (70 years × 365 days per year) for cancer effects; and averaging time of 182 days (26 weeks × 7 days per week) for non-cancer effects (USEPA 1991)
- Adult body weight of 70 kg (USEPA 1991)
- Exposure duration of 1 year (USEPA 2002)
- Exposure frequency of 130 days/year (5 workdays per week for 26 weeks) (USEPA 2002)
- Exposure time of 10 hr/day (ADEM 2008)
- Incidental soil ingestion rate of 330 mg/day (USEPA 2002)
- Exposed skin surface area of 3,300 cm^2, which is the sum of the mean values for hands, forearms, and face for an adult (USEPA 2002)
- Soil adherence rate of 0.3 mg/cm^2 (USEPA 2002)

Toxicity Assessment

There are two general categories of toxic effects (non-carcinogenic and carcinogenic) and constituent-specific toxicity values used to calculate potential risks for these two types of toxic effects. Toxicity values for potential non-carcinogenic and carcinogenic effects are available for arsenic from the United States Environmental Protection Agency (USEPA) Integrated Risk Information System (IRIS) (USEPA 2013). Additionally, an inhalation reference concentration for arsenic used to evaluate non-cancer inhalation exposures is available from the California Environmental Protection Agency (CalEPA 2013), since one is not available on IRIS.

Dermal Toxicity Values and Dermal Absorption

Whenever possible, route-specific toxicity values have been used; however, the USEPA has not yet developed toxicity values for dermal exposures. For this reason, adjusted toxicity values (RfD_a and CSF_a) (adjusted to the absorbed dose) are derived from the oral toxicity values (RfD_o and CSF_o) and the oral (gastrointestinal) absorption efficiency (ABS_{GI}) for assessing dermal exposure (USEPA 1989):

$$RfD_a = RfD_o \times \text{Oral Absorption Efficiency}$$

$$CSF_a = CSF_o \,/\, \text{Oral Absorption Efficiency}$$

The adjusted toxicity values presented in Table 5 represent the theoretical toxicity of the orally absorbed dose of the constituent. An oral absorption efficiency factor (or relative absorption factor) describes the ratio of the absorbed fraction of a constituent from a particular exposure medium to the fraction absorbed from the dosing vehicle used in the toxicity study for that constituent. Oral absorption efficiency values are used in the derivations of the risk-based soil constituent concentrations to account for differences in the proportion of absorbed constituent in the soil compared to the proportion absorbed in the toxicity studies forming the bases of the toxicity reference values. Oral absorption efficiencies are constituent-specific because they depend on unique properties of each constituent. USEPA (2004) does not recommend adjusting the oral absorption efficiency and thus the default value of 1 was used.

All toxicity values, including the dermal toxicity values, are presented in **Table 5**.

Development of Risk-Based Target Levels

The derivation of RBTLs is discussed in this section by combining exposure assumptions and toxicity values. RBTLs are derived by not only by combining exposure assumptions and toxicity values, but also by considering cancer and noncancer endpoints. A distinction is made between non-carcinogenic and carcinogenic endpoints, and two general criteria are used to describe the hazard quotient (HQ) for non-carcinogenic effects and excess lifetime cancer risk (ELCR) for constituents evaluated as human carcinogens.

Hazard Quotient for Non-Cancer Hazard

Exposure doses are averaged over the expected exposure period to evaluate non-carcinogenic effects. The HQ is the ratio of the estimated exposure dose and the RfD or RfC. Thus, an HQ greater than 1 indicates that the estimated exposure level for that constituent exceeds the RfD or RfC. This ratio does not provide the probability of an adverse effect. Although an HQ less than 1 indicates that health effects should not occur, an HQ that exceeds 1 does not imply that health effects will occur, but that health effects are possible. The USEPA and ADEM consider HQs at or below 1 as potentially acceptable noncancer risks (USEPA 1996; ADEM 2008).

Excess Lifetime Cancer Risk

The ELCR is an estimate of the potential increased risk of cancer that results from lifetime exposure, at specified average daily dosages, to constituents detected in media at the site. Estimated doses or intakes for each constituent are averaged over the hypothesized lifetime of 70 years. It is assumed that a large dose received over a short period is equivalent to a smaller dose received over a longer period, as long as the total doses are equal. The ELCR is calculated as the product of the exposure dose and the CSF or Inhalation Unit Risk (IUR). When evaluating potential individual cancer risks, USEPA has established an acceptable risk range of 1 in 1,000,000 (1×10^{-6}) to 1 in 10,000 (1×10^{-4}) (USEPA 2000). In establishing this range, USEPA accepted the policy that a risk range, rather than a single risk value, adequately protects public health (USEPA 2000). RBTLs calculated under the RM- 2 method can meet a cumulative ELCR of 1 in 100,000 (1×10^{-5}) (ADEM 2008). Since there is only one constituent, the target ELCR of 1×10^{-5} was used in this evaluation.

Arsenic Risk-Based Target Levels

The RBTLs for arsenic were calculated using site-specific exposure information for the exposure scenarios identified at the Site by combining the appropriate receptor exposure parameters with the toxicity values for each pathway. The results are presented in **Table 6** through **Table 8** and summarized in **Table 9**.

The equations used to evaluate potential exposures of the site worker, and adolescent trespasser to arsenic in soil are presented in **Table 2**, and those used to evaluate potential exposures of construction workers to arsenic in soil are presented in **Table 3**. With the exception of a construction worker, the cancer RBTL based on a target ELCR of 1×10^{-5} was less than the noncancer RBTL; therefore, the RBTL derived based on cancer endpoints was selected as the RBTL for site workers and trespassers. The RBTL results are summarized below by receptor. The equations used in this evaluation are similar to those included in Appendix B of the ADEM RBCA Guidance (ADEM 2008); however, ADEM presents one combined equation for incidental ingestion, dermal contact and inhalation, whereas ARCADIS used separate equations for each of the three exposure routes, then combines the route-specific RBTLs into one final RBTL. Because ADEM uses a combined equation, the use of an inhalation RfD and CSF is required rather than the RfC and IUR. The specific details of the differences are:

- The averaging time in **Table 1** is presented in days while the ADEM averaging time is presented in years and converted to days using 365 days/year.

- The conversion factor of 1,000,000 mg/kg is in the numerator in **Tables 2 and 3** and thus is presented as 10^6 mg/kg, while in the ADEM tables it is in the denominator and is presented as 10^6 kg/mg in the guidance.

- Relative absorption factors (RAFs) are used in the ADEM equations for the oral and dermal routes. For arsenic, the USEPA has recently recommended a default bioavailability factor of 0.6 for the oral route if site-specific data are not available. This value was used as the RAF for the oral route in place of the ADEM default value of 1. For the dermal route, the USEPA's dermal absorption factor (ABSd) of 0.03 was used. These factors are shown in the equations in **Tables 2 and 3**.

- The use of the inhalation RfD and CSF by ADEM require the use of a body weight and inhalation rate for the inhalation exposure pathway to get the units to work out correctly. The equations in **Tables 2 and 3** utilize the inhalation toxicity values that do not have body weight included and thus the need for body weight is not required. An exposure time is included in **Tables 2 and 3** together with a conversion factor to allow the units to work out correctly. The IUR and RfC are provided in **Table 5**.

Adolescent Trespasser

The minimum calculated RBTL for arsenic for an adolescent trespasser was 367 mg/kg (**Table 6**). The maximum soil value of 808 mg/kg was greater than the RBTL (**Table 9**).

Hypothetical Future Site Worker

The minimum calculated RBTL for an outdoor site worker was 27 mg/kg (**Table 7**). The maximum soil value of 808 mg/kg for the site worker was greater than the calculated RBTL (**Table 9**).

Hypothetical Future Construction Worker

The minimum calculated RBTL for a construction worker was 97 mg/kg (**Table 8**). The maximum soil value of 808 mg/kg for the site worker was greater than the calculated RBTL (**Table 9**).

Lead Risk-Based Target Levels

The ALM (USEPA 2003) was used to calculate soil RBTLs for lead. The USEPA default parameters were used in the ALM as follows.

- Baseline blood lead level of 1.0 micrograms per deciliter (µg/dL) (USEPA 2009b)

- Geometric standard deviation of the blood lead level, 1.8 (unitless) (USEPA 2009b)

- Biokinetic slope factor of 0.4 micrograms lead per deciliter blood per micrograms per day soil (µg/dL per µg/day) (USEPA 2003)
- Absorption fraction of 0.12 (unitless) (USEPA 2003)
- Fetal to maternal blood lead level ratio of 0.9 (unitless) (USEPA 2009)

The soil ingestion rates, exposure frequencies, and averaging times were receptor-specific. The exposure frequencies were consistent with the values used in the calculation of the arsenic RBTLs. The soil ingestion rate for trespassers and outdoor site workers were set at 50 mg/day, consistent with the ALM default values. For construction workers, the soil ingestion rate was set at 100 mg/day. The averaging times were set to 1 year for trespassers and outdoor workers and 6 months for construction workers.

Adolescent Trespasser

The calculated RBTL for lead for an adolescent trespasser was 9,432 mg/kg (**Table 10**). The maximum soil value of 18,800 mg/kg was greater than the RBTL.

Hypothetical Future Site Worker

The calculated RBTL for an outdoor site worker was 2,180 mg/kg (**Table 10**). The maximum soil value of 18,800 mg/kg for the site worker was greater than the calculated RBTL.

Hypothetical Future Construction Worker

The calculated RBTL for a construction worker was 941 mg/kg (**Table 10**). The maximum soil value of 18,800 mg/kg for the site worker was greater than the calculated RBTL.

Summary of RBTLs

Arsenic and lead are constituents of concern for the former VCC Site in Mobile, Alabama. Potential exposures of a wide range of hypothetical future receptors were evaluated in this memo. The intention is to implement institutional controls at the Site to limit future land use to nonresidential uses. The table below presents the recommended RBTLs by receptor.

Potential Receptor	*Arsenic Risk-Based Target Levels*	*Lead Risk-Based Target Levels*
Adolescent Trespasser	367 mg/kg	9,432 mg/kg

Hypothetical Future Site Worker	27 mg/kg	2,180 mg/kg
Hypothetical Future Construction Worker	97 mg/kg	941 mg/kg

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