# VOLUNTARY COMPLIANCE STATUS REPORT
# FORMER VULCAN PERFORMANCE CHEMICALS
# DALTON PLANT

**by**

**Haley & Aldrich, Inc.**
**Greenville, South Carolina**

**for**

**Legacy Vulcan Corp.**
**Birmingham, Alabama**

**File No. 37848-007**
**15 August 2014**

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15 August 2014
File No. 37848-007

Georgia Environmental Protection Division
Response & Remediation Program
2 Martin Luther King Jr. Drive, SE
Suite 1054
Atlanta, Georgia 30334

Attention: Mr. Kevin Collins, Geologist

Subject: Voluntary Compliance Status Report
Former Vulcan Performance Chemicals Dalton Plant
HSI Site No. 10770

Dear Mr. Collins:

On behalf of Legacy Vulcan Corp. (LVC), Haley & Aldrich, Inc. is submitting this letter and accompanying report for the former Vulcan Performance Chemicals Dalton Plant (Hazardous Site Inventory No. 10770). Enclosed are an original and two (2) CD-ROM copies of the Voluntary Remediation Program Compliance Status Report (CSR). This CSR summarizes the existing groundwater conditions on the subject property and is submitted in lieu of the Third Annual Progress Report and completes the Voluntary Remediation Program corrective action process per the application approved on July 31, 2012.

As stated in the VRP Application, submitted to EPD on 27 January 2012, delineation and remediation at the property is complete. There are no chemicals of concern in soil and the one chemical of concern identified in groundwater (lead) is now below the maximum contaminant level. In general, lead concentrations in groundwater steadily declined following remedial activities in 2008, and, beginning in 2011, lead was reported below the MCL in samples collected from all wells, except MW-21. For the two most recent sampling events, analytical reports of samples collected from MW-21 have included results below the MCL of 0.015 mg/l. As discussed in the meeting with EPD on March 18, 2014, the duplicate sample collected from MW-21 in April 2013, had a reported concentration of lead below the MCL. In April 2014, the annual monitoring was conducted and the analytical report of the sample collected from MW-21 confirmed lead is no longer present in groundwater above the MCL. (Table IV of the attached report)

On behalf of LVC, Haley & Aldrich respectfully requests the EPD delist this site from the Hazardous Site Inventory. If you have any questions regarding this CSR, please contact Carleton Degges/LVC at (205) 298-3063 or myself at (864) 214-8754.

Sincerely yours,
HALEY & ALDRICH, INC.

Daniel E. McDonnell, P.G.
Senior Project Manager

Enclosures

c: Douglas E. Cloud – Kazmarek Mowrey Cloud Laseter LLP
Carleton Degges – LVC

# COMPLIANCE STATUS CERTIFICATION

I certify under penalty of law that this report and all attachments were prepared under my direction in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, 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.

Based on my review of the findings of this report with respect to the risk reduction standards of the Rules for Hazardous Site Response, Rule 391-3-19-.07, I have determined that this site/property is in compliance with Type 1 risk reduction standards.

[NAME]

8/14/14
Date

Senior Vice President
[TITLE]

# PROFESSIONAL GEOLOGIST CERTIFICATION

I certify that I am a qualified groundwater scientist who has received a post-graduate degree in the natural sciences, and have sufficient training and experience in groundwater hydrology and related fields, as demonstrated by state registration and completion of accredited university courses that enable me to make sound professional judgments regarding groundwater monitoring and contaminant fate and transport. I further certify that this Compliance Status Report prepared for Legacy Vulcan Corp. for the former Vulcan Performance Chemicals site, located in Dalton, Georgia, was prepared by myself and appropriate qualified subordinates working under my direction.

8/15/14

Daniel E. McDonnell, P.G. Date
Georgia Professional Geologist Registration No. 002083

DANIEL E. McDONNELL
No.PG002083

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# 1. INTRODUCTION

This Voluntary Compliance Status Report (CSR) for the former Vulcan Performance Chemicals Dalton Plant (Hazardous Site Inventory #10770, the Site) is submitted by Haley & Aldrich, Inc. (Haley & Aldrich) on behalf of Legacy Vulcan Corp. (LVC). The Georgia Environmental Protection Division (EPD) formally accepted LVC as a participant in the Georgia Voluntary Remediation Program (VRP) for this qualifying property in the letter dated 31 July 2012.

## 1.1 Objective

The objective of this CSR is to confirm and document consistency of corrective actions with the provisions, purposes, standards, and policies of the VRP, and to certify compliance of the property with the applicable cleanup standards. The CSR summarizes data obtained from investigations that have been completed since the CSR Addendum was submitted by CH2MHill in November 2008.

## 1.2 CSR Format

Consistent with EPD Guidance, the format and content of this CSR is as follows:

1. **Introduction** – General introduction to the report and statement of the objective.

2. **Facility History and Previous Investigation** - Description of the Site and facility ownership including a summary of previous investigations, hydrogeologic setting, source description, and extent of lead in groundwater.

3. **Hydrogeologic Framework** – Summary of fate and transport of lead in groundwater, including the results of geochemical modeling.

4. **Identification of Potential Receptors** – Discussion of potential receptors and exposure pathways, including point of exposure and point of demonstration.

5. **Risk Reduction Standards (RRS)** – Comparison of the Type I RRS to current conditions, including certification of compliance with the RRS.

6. **Summary** – Summary of documented findings.

# 2. FACILITY HISTORY AND PREVIOUS INVESTIGATIONS

The facility was initially developed and owned by Mayo Chemical Company and operated under the name Farm and Industrial Chemical Company. Mayo sold the facility to a business unit of LVC in 1996. In 2003, Lynx Chemical Group purchased the facility and in July 2007, the facility was sold to Harcros Chemicals Inc. (Harcros). The Site continues to be used as a chemical manufacturing facility operated by Harcros.

Harcros' address is as follows:

Harcros Chemicals Inc.
134 Phelps Rd. SE
Dalton, GA 30720

The Site is comprised of approximately 27-acres and is located at 134 Phelps Road in the City of Dalton, Whitfield County, Georgia (Figure 1). The Site is bordered to the north by Corporate Drive, to the east by railroad tracks, to the south by undeveloped land, and to the west by South Dixie Road. The Site is zoned for heavy manufacturing and is surrounded by properties that are zoned for either heavy manufacturing or general commercial.

The active manufacturing area of the on-Site facility is located in the northeastern portion of the property and consists of an office building, a maintenance building, warehouses, manufacturing buildings, aboveground tank farms, and two pretreatment lagoons. The developed portion of the property is fenced and access is restricted.

## 2.1 Previous Investigations

The Site underwent a Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) Preliminary Assessment in 1987. Beginning in 1996, environmental assessments associated with property transactions were conducted. Details of the environmental assessments were described in the 2008 CSR Addendum.

Lead was detected at a concentration of 0.044 milligrams per liter (mg/L), which was greater than the Hazardous Site Response Act (HSRA) notification concentration of 0.015 mg/L. A Release Notification was submitted to EPD in June 2003 for lead in groundwater. Based on the Release Notification, the Site was listed on the Hazardous Site Inventory (HSI) in September 2003. EPD notified Lynx Chemical Group LLC of the listing and cited the presence of lead, nickel, and beryllium in groundwater at concentrations above the HSRA notification levels. However, the groundwater pathway score that resulted in the Site being listed was based on the evaluation of lead.

Additional soil and groundwater investigations were conducted in 2006 to support development of a HSRA Corrective Action Plan. In 2006, 14 soil samples were collected at eight boring locations and three new (temporary) monitoring wells were installed and sampled along with four existing monitoring wells. The results of this work were summarized in a report submitted to EPD on 7 September 2006. The summary tables from the September 2006 submittal are included in Appendix A. These summary tables provide a comprehensive overview of metals concentrations in soil and groundwater samples collected onsite from 1996 through 2006. The corresponding data point location map for these samples, also from the September 2006 report, is included in Appendix A.

A HSRA CSR was submitted to EPD on 31 July 2007. An interim corrective action/excavation was completed in July 2008 (information is provided in Section 2.3 of this CSR). Monitoring wells that were abandoned during excavation activities were replaced with MW-17, MW-18, MW-19, and MW-20 in 2008. A CSR Addendum, which included a summary of the interim corrective action, was submitted to EPD on 11 November 2008. That submittal concluded that the Site was in compliance with applicable RRSs for soil but not in compliance with the applicable RRS for lead in groundwater.

Routine groundwater monitoring has been ongoing since 2008. Two monitoring wells were installed in August 2011 to replace destroyed/abandoned wells MW-12 and MW-3D. The replacement wells were designated MW-22D and MW-23 and were installed at the locations shown on Figure 2 to monitor the extent of lead in groundwater. Monitoring well MW-22D was installed adjacent to MW-21 (the only well at the time where lead was detected above RRS) to a depth of approximately 37 feet below ground surface (bgs), 19 feet below auger refusal, to provide vertical delineation data.

Groundwater monitoring results were documented in Annual Reports submitted on 29 October 2009, 29 November 2010, and 30 November 2011. An application requesting that the Site be entered into the VRP was submitted to the EPD on 27 January 2012. EPD reviewed the applications and in a letter dated 31 July 2012 formally approved the application and accepted the Site into the VRP. The approval letter provided a schedule for semi-annual sampling and progress reporting. In January 2013, EPD agreed to reduce the monitoring and reporting frequency from semi-annual to annual.

The first Annual Progress Report was submitted in January 2013 and included a discussion of the analytical results from samples collected in April 2012. A second Annual Progress Report was submitted in January 2014, focusing on the April 2013 sampling event. In accordance with the approved VRP application, the April 2013 groundwater monitoring event included sample collection at monitoring wells MW-19, MW-21, and MW-23, with laboratory analysis for lead.

Groundwater samples were most recently collected in April 2014 and the results are included in this CSR. As in other events, samples were collected using low-flow methods. Prior to sample collection, water levels and field parameters, including pH, temperature, conductivity, turbidity, dissolved oxygen, and oxidation-reduction potential (ORP), were measured and recorded on purge logs (provided in Appendix B). Groundwater samples were submitted to Analytical Environmental Services, Inc. and analyzed for lead by EPA Method 6010C. The analytical results are discussed in Section 2.4 and the laboratory analytical reports are provided in Appendix C.

## 2.2 Hydrogeologic Setting

The Site is situated in a valley within the Valley and Ridge Physiographic Province. The predominant rocks in the area of the Site are shale and limestone/dolomite of the Conasauga Group (Cambrian). The residual soils present in this area were formed by normal chemical and physical weathering of the parent rock types and are referred to as saprolite. The typical saprolite soil profile consists of clayey soils near the ground surface, transitioning to sandy silts and silty sands that typically contain increasing amounts of rock fragments (shale and limestone) with depth. Depth to the top of rock varies at the Site but generally occurs between 10 and 20 feet. Zones of gravel-sized, partially weathered rock have been observed distributed throughout the otherwise predominantly silty material.

Groundwater occurs under unconfined conditions in the overburden. Although appreciable amounts of groundwater may occur in the limestone/dolomite bedrock units, there is generally minimal flow. Within the water table aquifer, the direction of groundwater flow is controlled by the local topography:

recharge occurs in upland areas with discharge to surface water. Flow within the bedrock (especially the limestone/dolomite units) is controlled to a large degree by fracture systems with recharge of the bedrock units originating from the overlying saprolite.

The developed portion of the Site is relatively flat, with a slight topographic gradient to the south and west. Site surface water includes a stream in the northwest corner of the Site. The stream flows off-Site along the southern boundary of the property.

Groundwater monitoring has been performed at the Site since 1996 with regularly scheduled routine groundwater monitoring events occurring since 2008. A potentiometric surface map based on water level data from the most recent sampling event (April 2014) is included as Figure 3. A summary of April 2014 water level elevations is provided in Table I. Based on these water level data, groundwater flow at the Site is interpreted to be to the south and west.

Hydrogeologic cross sections depicting subsurface hydrogeologic conditions are shown in Figure 4. Cross-section A-A’, in Figure 4, is oriented along the groundwater flow path through the area excavated in July 2008. Cross section B-B’, in Figure 4, is oriented perpendicular to the flow path, also through the excavated area.

The hydraulic conductivity of the shallow aquifer has been estimated from slug tests conducted at several monitoring wells. The results indicate that the hydraulic conductivity of the shallow aquifer ranges from approximately $1.5 \times 10^{-4}$ centimeters per second (cm/sec) in silty material to approximately $2.2 \times 10^{-2}$ cm/sec at wells where gravel zones were encountered. Hydraulic conductivity in bedrock is approximately $1.2 \times 10^{-2}$ cm/sec. Based on these measurements, estimated values of groundwater flow velocity at the Site range from 11 feet per year (ft/yr) in saprolite to 800 ft/yr in bedrock and more than 1,000 ft/yr in saprolite where zones of gravel are present.

## 2.3 Source Description

Concentrations of lead in groundwater above the Type 1 RRS were documented at the Site; however, there are no known releases of lead or lead-containing substances. Personnel of a previous Site owner recalled a release of sodium hydroxide, many years ago, that caused a localized, elevated pH in groundwater. The resulting change in geochemical conditions likely induced mobilization of naturally-occurring lead from native soil to groundwater.

The conclusion that lead in groundwater originated from naturally-occurring lead in soil is supported by multiple lines of evidence including analytical results obtained from soil samples taken from borings across the Site, where the average concentration of lead was 12.3 milligrams per kilogram (mg/kg). This average value is consistent with regional studies for Georgia, which reports an average background soil range of lead from 10.3 to 18.7 mg/kg (USGS, 2001[1]). In addition, lead was present in groundwater samples collected during the early phases of the investigation at levels above the RRS in a localized area, defined by monitoring wells MW-1, TMW-12, TMW-13, and TMW-14 (these wells have since been abandoned but their locations are shown on the map included in Appendix A).

Following discovery of the elevated groundwater pH, personnel of a previous Site owner reportedly introduced sodium bicarbonate to the subsurface as a buffering agent to neutralize the pH. The

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[1] USGS, 2001. Geochemical Landscapes of the Conterminous United States - New Map Presentations for 22 Elements. N. Gustavsson, B. Bølviken, D.B. Smith, and R.C. Severson. U.S. Geological Survey Professional Paper 1648. U.S. Department of the Interior, U.S. Geological Survey. November, 2001.

application of sodium bicarbonate was successful in neutralizing the pH; however, it did not correct all of the geochemical conditions responsible for lead concentrations above the Type 1 RRS in groundwater. Previous soil sampling conducted in this area did not identify a source of lead or exceedances of soil cleanup standards. This appears to verify the report of a sodium hydroxide release as described above, and not of a chemical release containing lead.

To eliminate concerns regarding an ongoing release or a buried source of lead, an interim corrective action was completed in 2008 in the area of the sodium hydroxide release. The interim corrective action consisted of an excavation to a depth of 15 feet bgs at which point bedrock was encountered. Excavated soil was transported directly from the excavation to dump trucks and then transported to the Old Dixie Sanitary Landfill in Whitfield County. In an effort to enhance attenuation of lead in groundwater, a soil amendment (Enviroblend®) was added between layers of backfill up to the approximate depth of the water table.

Groundwater sampling conducted later in 2008, indicated lead was present in groundwater above the Type 1 RRS within the excavation area, but only at MW-19. Samples from a downgradient monitoring well installed later in 2008 (MW-21, located approximately 200 feet downgradient from the excavated area) also exceeded the Type 1 RRS for lead.

## 2.4 Extent of Lead in Groundwater

Analytical results for samples collected in April 2014 are summarized in Table II. Lead was not present above the laboratory detection limit (0.010 mg/L) in any of the samples. The historical concentrations of lead in groundwater samples collected at the Site are summarized in Tables III and IV Lead concentrations are also included on both the potentiometric surface map (Figure 3) and the hydrogeological cross-sections (Figure 4).

The observations and trends in lead concentrations support the conclusion that lead in groundwater, above the MCL, was caused by a change in geochemical conditions following the subsurface introduction of sodium compounds that resulted in an ion exchange of naturally occurring lead from soil, at an elevated pH (a detailed discussion is provided in the following sections). The data support that lead concentrations have attenuated due to natural subsurface geochemical conditions that were enhanced by the application of a soil amendment during the interim corrective action, conducted in 2008. As a result of these processes, analytical results of collected groundwater samples no longer report detections of lead above the Type I RRS.

# 3. HYDROGEOLOGIC FRAMEWORK

As presented in the VRP Application, a Conceptual Site Model (CSM) developed for the Site portrays the environmental system, including the physical, chemical, and biological processes that affect the source, transport, and fate of lead through the subsurface to potential environmental receptors via potential exposure pathways. The CSM was developed to depict Site geology, hydrogeology, and subsurface geochemical conditions and used to evaluate how these factors affect the environmental fate and transport of lead compounds in groundwater. The CSM illustrates how, over a period of time, lead was mobilized from soil due to the presence of sodium hydroxide. The CSM further depicts lead re-adsorbing to soil following the buffering of impacted groundwater. A graphical representation of the CSM was included in the VRP application and was updated in previous Annual Progress Reports. The CSM graphic is not included in this CSR as there are no longer any exceedances of the lead RRS.

## 3.1 Geochemistry

In addition to the metals analyses, samples collected from monitoring wells MW-19, MW-21, and MW-23 during the April 2012 event were analyzed for select indicator parameters (total alkalinity, carbonate/bicarbonate alkalinity, chloride, and sulfate). The results of indicator parameter testing were used in the evaluation of geochemical interactions in Site groundwater that influence or otherwise control the environmental fate and transport of lead. The evaluation included a review of Site-specific data as well as available literature, and the use of geochemical computer modeling software (Geochemist's Workbench Essentials, Version 4.0, Rockware, Inc.) to evaluate the potential for lead compounds to migrate within groundwater. The model output was then used to assess monitored natural attenuation as an appropriate remedial option.

The mobility of lead from soil to groundwater depends on solubility and geochemical form, which is a function of site-specific soil chemistry. Many complex factors affect migration of lead in soils and the key documented factor in determining mobility is the chemical form (speciation). Speciation is affected by a host of site-specific variables including soil acidity (pH), redox potential (Eh), complexation and/or precipitation with natural electrolytes (e.g. sulfate/sulfide, carbonate), co-precipitation with abundantly occurring metal oxides (e.g. Al, Fe, Mn), and the type and amount of organic matter contained in the soil. Soil conditions can vary greatly from location to location, but the primary factor governing the mobility of lead in soil and groundwater (assuming pH ranges typical of natural systems) is its relatively low solubility.

Two non-related evaluation methods were used to investigate mobility of lead at the Site. First, a simple soil adsorption capacity solution was derived, followed by a more sophisticated geochemical model. Both are described below.

### 3.1.1 Cation Exchange Capacity

The adsorption capacity of a soil, estimated by the number and types of binding sites available, is measured as the "cation exchange capacity" (CEC). The CEC is the capacity of soil to exchange cations between soil and groundwater (soil porewater). CEC is often used as a measure of soil fertility and nutrient retention capacity; however, in environmental chemistry, CEC provides a basic measure of the capacity of the soil to bind cations such as lead.

Researchers have studied many soils and used multivariate regression models in an attempt to predict the ability of soils to bind lead via CEC[2]. A simplified version of the referenced multiple linear regression equation, using pH and CEC, is as follows:

$$\text{Soil Pb Adsorption Maximum (umol/gram)} = 2.81 \times \text{CEC (meq/100g)} + 10.7 \times \text{pH} - 49.3$$

Based on data obtained from the Whitfield County U.S. Department of Agriculture Natural Resources Conservation Service (http://websoilsurvey.nrcs.usda.gov), the soils at the Site are classified as silty loams, with a reported CEC that ranges between 6.9 and 13.1 meq/100 grams. Inserting these values into the above equation, and assuming the soil pH reflects the pH of the groundwater (mean = 6.91 s.u., based on September 2011 groundwater sampling), results in a maximum soil lead absorption capacity ranging from 44 to 61 umol/gram of soil. This absorption capacity equates to a lead concentration in soil of between 9,100 to 12,700 mg/kg. The natural background concentration of lead in soil at the Site is approximately 20 mg/kg and the calculated lead adsorption indicates excess capacity for the soil to adsorb lead from groundwater following pH equilibration. Excess soil binding capacity, calculated as CEC, effectively prevents lead compounds from migrating beyond the Site boundary via groundwater.

### 3.1.2 Geochemical Modeling

To further evaluate lead mobility, geochemical modeling was performed. Model inputs utilized both the concentration of lead reported from samples collected in September 2011 and the geochemical 'activities' of various groundwater parameters that are known to affect the solubility of lead in aqueous systems. Laboratory data were obtained from wells MW-4, MW-5, MW-18, MW-21, and MW-23 for input into the geochemical model. Analytical results used as input into the model included dissolved lead, alkalinity (total and bicarbonate), chloride, silica, sulfate, and sulfide. Field parameters from the September 2011 sampling event were also used, including temperature, specific conductivity, pH, dissolved oxygen, ORP, and turbidity.

Groundwater pH measured across the Site indicates the geochemistry of the vadose zone soils is within a normal range (6.27 to 7.13 s.u.). Typical for the region, where the parent rocks are shale and limestone/dolomite, the reported bicarbonate alkalinity ($HCO_3^-$) was essentially equivalent to total alkalinity (as calcium carbonate equivalents). Dissolved (or 'free') lead in groundwater (as $Pb^{2+}$) is not expected due to the likelihood of ionic bonding resulting in lead carbonate ($PbCO_3$). Adjusting for actual concentrations of chloride, carbonate, and sulfate, the geochemical species of lead predicted to be the most stable is $PbCO_3$. (Figure 5) Lead carbonate is sparingly soluble at pH conditions above 6.5 s.u. (mean for the Site is 6.9 s.u.) and alkalinity is greater than 30 mg/L (mean for the Site is 278 mg/L). This confirms the finding that excess lead (dissolved $Pb^{2+}$) adsorbs to soil as groundwater migrates.

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[2] Hassett, J.J., 1974. Capacity of selected Illinois soils to remove lead from aqueous solutions. Commun. Soil Sci. Plant Anal., 5, 499-505.; Zimdahl, R.L. and Skogerboe, R.K., 1977. Behavior of lead in soil. Environ. Sci. Technol. 11, 1202-1207.

## 3.2 Lead Fate and Transport

Considering the available information, the geochemical processes that resulted in detections of lead in well MW-21 are likely the result of:

1. A historic subsurface release of sodium hydroxide that created a high groundwater pH in a localized area. The alkaline conditions caused desorption of naturally-occurring lead in soil via cation exchange with sodium. This desorption resulted in an imbalance of lead ions in groundwater and the subsequent formation of lead carbonate and/or lead hydroxide as suggested by the geochemical modeling. Lead hydroxide and lead carbonate are slightly soluble under the existing (normal) pH/Eh conditions at the Site.

2. The high pH groundwater was discovered years later and groundwater in the immediate area was then buffered with sodium bicarbonate. Although the pH was neutralized, the additional sodium may have caused supplemental dissolution of more lead, again via cation exchange. Additional lead carbonate likely formed when the lead hydroxide reacted with the sodium bicarbonate.

3. The contribution of sodium from both the sodium hydroxide (NaOH) and the sodium bicarbonate ($NaHCO_3^-$), as well as the presence of lead bound to solubilized (dissolved) organic carbon, held lead in solution as a colloid (USEPA, 2007[3]).

4. As the lead (inorganic and organically bound colloidal) migrated in groundwater, the neutral groundwater pH, combined with the subsurface forces of advection/dispersion, was sufficient to allow the normal cation exchange capacity of the downgradient soils to re-adsorb the lead. This condition is supported by the steady decrease in lead concentration observed at MW-19 and at MW-21.

The geochemical modeling predicted a minimally-soluble form of lead ($PbCO_3$) in Site groundwater. Geochemical conditions at the Site, combined with a generally low hydraulic conductivity and an abundance of silts and clays with high cation binding capacity in the overburden, support the conclusion that Site soils have re-adsorbed lead thereby restricting movement of dissolved lead in groundwater. As predicted by the model, groundwater with higher than background lead concentrations re-adsorbs to soil, without active remediation. The model accuracy was confirmed at well MW-21 where the detected lead concentration decreased below the RRS without additional remedial activities.

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[3] USEPA, 2007. Monitored Natural Attenuation of Inorganic Contaminants in Ground Water. Volume 2: Assessment for Non-Radionuclides Including Arsenic, Cadmium, Chromium, Copper, Lead, Nickel, Nitrate, Perchlorate, and Selenium. US Environmental Protection Agency, National Risk Management Research Laboratory, Office of Research and Development, Cincinnati, OH. EPA/600/R-07/140. October 2007.

# 4. IDENTIFICATION OF POTENTIAL RECEPTORS

## 4.1 Potential Receptors and Exposure Pathways

Land use at the Site and contiguous parcels is classified as industrial and commercial. Dalton Utilities supplies potable water to all developed properties in the area, including the Site. The possible exposure pathways to Site groundwater were evaluated for environmental media, and human and ecological receptors. The results of the evaluation are discussed below.

### 4.1.1 Environmental Media

- Lead is not present in Site soils above the RRS.

- Soil gas is not a medium of concern for exposure to lead.

- Groundwater is present under unconfined conditions and is controlled by topography. Analytical results from the most recent round of sampling (April 2014) indicate lead is not present above the laboratory reporting limit. Previously, lead concentrations above the RRS were determined to be limited to the uppermost portion of the surficial aquifer and did not migrate downward vertically into the deeper portion of the surficial aquifer.

- Surface water on the Site includes an unnamed small creek that flows northwest to southeast through the undeveloped portion of the property and offsite. The developed portion of the site is primarily paved and stormwater runoff from the production and chemical storage areas is directed into drains that discharge to the facility's pretreatment lagoons and ultimately to the Dalton Utilities sanitary sewer.

### 4.1.2 Exposure Pathways and Potential Human Receptors

- Dalton Utilities provides water service to the facility. Potable use of groundwater is an incomplete exposure pathway as there is no use of groundwater onsite.

- The nearest groundwater extraction well is more than 3,000 feet, and not downgradient, from the previous lead detections in groundwater. Lead is no longer present in groundwater at concentrations above the RRS. Therefore, migration of lead in groundwater to downgradient receptors is considered an incomplete exposure pathway.

- The water table varies from 4 to 16 feet bgs at the Site. In the localized area where lead has previously been detected in groundwater above the RRS, the depth to water is approximately 10 feet bgs. A future construction worker could be potentially exposed to groundwater through incidental contact (ingestion or dermal contact) should development include the excavation of soil to depths beneath the water table, water is accumulated into the excavation, and construction workers have contact with the accumulated water; however, it is unlikely an excavation in this area would intersect the water table. Regardless, lead is no longer detected in groundwater at concentrations above the RRS. Therefore exposure to future construction workers is considered an incomplete pathway.

- At the Site, there is no complete exposure pathway of groundwater, exhibiting concentrations of lead above the RRS, to surface water. The nearest surface water is approximately 650 feet downgradient from MW-21. Based on groundwater measurements and Site-specific geochemical modeling, dissolved lead has attenuated prior to reaching surface water. Additionally, the onsite creek is located in an undeveloped portion of the site where there is limited possibility of human contact with surface water or sediment.

### 4.1.3 Exposure Pathways and Potential Ecological Receptors

- Other than native soil, there are no known or documented sources of lead at the Site. Habitat conditions at the Site are, in general, not suitable for the threatened and endangered species for Whitfield County identified by the USFWS. Based on visual assessment of the creek, the quality of the aquatic habitat is moderate. As indicated previously, no complete exposure pathway from groundwater, exhibiting concentrations of lead above the RRS, to surface water occurs at the Site because lead has attenuated prior to reaching the creek, approximately 650 feet down-gradient from MW-21. Therefore, the potential for exposure to lead in groundwater, surface water, and sediments is expected to be minimal because no complete exposure pathway exists.

## 4.2 Point of Exposure and Point of Demonstration Well

EPD requested a *point of exposure* be identified that is the nearest of the following locations:

(A) The closest existing downgradient drinking water supply well;
(B) The likely nearest future location of a downgradient drinking water supply well where public supply water is not currently available and is not likely to be made available within the foreseeable future; or
(C) The hypothetical point of drinking water exposure located at a distance of 1,000 feet downgradient from the delineated site contamination.

The closest existing water supply well is not directly downgradient, and is approximately 3,000 feet from the Site. This closest water supply well is not known to be a drinking water source as a public water supply is available for the area. As a default, the *point of exposure* for the Site is the property line downgradient/cross gradient of monitoring well MW-21).

EPD also requested a *point of demonstration well* to be identified, consisting of a "monitoring well located between the source of site groundwater contamination and the actual or estimated downgradient point of exposure". Monitoring well MW-23 (Figure 2) is selected as the *point of demonstration well*.

Based on the evaluation presented in Section 4.1, there are no potentially complete exposure pathways at the Site.

# 5. RISK REDUCTION STANDARDS (RRS)

***Soil*** - There have been no known releases of lead or lead containing substances at the Site. Lead concentrations in soil are within the range of background concentrations

***Groundwater*** - The RRS for the point of exposure and the point of demonstration well is the published (Type 1) RRS value for lead in groundwater (0.015 mg/L). The lead concentration reported at the point of demonstration well (MW-23) is below the MCL and indicates the Site is in compliance with the Type 1 RRS. Consistent with, and as a result of, the fate and transport mechanisms known to effectively attenuate the migration of lead in groundwater, the Site is also in compliance with regard to the point of exposure (the property line).

## 6. SUMMARY

In summary, and based on the foregoing discussion, the following findings have been documented.

- In isolated areas, concentrations of metals in soil exceed established background concentrations; however, previous investigations indicate no releases exceeding a reportable quantity and no additional work is required.
- Currently there are no regulated substances in Site groundwater above MCLs.
- Lead was previously present in Site groundwater above the MCL and was adequately delineated. Lead concentrations have decreased over time and are no longer present at concentrations above the laboratory reporting limits.
- There have been no known releases of lead or lead containing substances at the Site. The source of lead in groundwater is believed to be related to a sodium hydroxide release that resulted in mobilization of naturally occurring lead from soil to groundwater.
- An interim corrective action was completed to enhance attenuation of lead mobilized by a change in geochemistry.
- The geochemistry of the Site subsurface supports natural attenuation of lead in groundwater. The process resulted in the re-adsorption to soil of naturally occurring lead that had been dissolved in groundwater. The natural attenuation mechanisms were verified by the fate and transport analysis.
- There are no remaining potential exposure pathways for lead in groundwater
- Lead concentrations in groundwater do not exceed the Type 1 RRS at the identified point of exposure and at the point of demonstration well.

In conclusion, this CSR confirms consistency of the corrective actions with the provisions, purposes, standards, and policies of the VRP, and it is certified that the Site is in compliance with applicable RRS.

LVC will comply with the applicable public participation requirements for this CSR within the regulated timeframe. Haley & Aldrich respectfully requests that EPD issue a decision of concurrence with this CSR and that activities for removing the Site from the HSI proceed accordingly.

# TABLES

# TABLE I
# SUMMARY OF GROUNDWATER ELEVATIONS
## April 8, 2014
## FORMER VULCAN PERFORMANCE CHEMICALS PLANT - DALTON, GA

| Well No. | Top of Casing (ft msl) | Depth to Water (ft below TOC) | Elevation (ft msl) |
|---|---|---|---|
| MW-4 | 712.26 | 1.48 | 710.78 |
| MW-5 | 713.68 | 5.40 | 708.28 |
| MW-6 | 702.78 | 1.94 | 700.84 |
| MW-7 | 712.69 | 4.06 | 708.63 |
| MW-8 | 711.81 | 3.65 | 708.16 |
| MW-13 | 705.92 | 2.23 | 703.69 |
| MW-14 | 711.05 | 2.96 | 708.09 |
| MW-15 | 710.08 | 4.30 | 705.78 |
| MW-16 | 702.42 | 1.69 | 700.73 |
| MW-17 | 711.95 | 3.89 | 708.06 |
| MW-18 | 711.74 | 3.65 | 708.09 |
| MW-19 | 711.62 | 3.41 | 708.21 |
| MW-20 | 710.91 | 2.88 | 708.03 |
| MW-21 | 709.84 | 4.53 | 705.31 |
| MW-22D | 710.00 | 4.74 | 705.26 |
| MW-23 | 708.41 | 5.10 | 703.31 |
| TMW-19 | 715.43 | 14.70 | 700.73 |

# TABLE II
# GROUNDWATER SAMPLING RESULTS
## April 8, 2014
## FORMER VULCAN PERFORMANCE CHEMICALS PLANT - DALTON, GA

| WELL NO. | Lead (mg/L) | Temp (Deg C) | Conductivity (uS/cm) | pH (SU) | DO (mg/L) | ORP (mV) | Eh** (mV) | Turbidity (NTU) |
|---|---|---|---|---|---|---|---|---|
| MW-19 | <0.0100 | 14.42 | 1113 | 9.17 | 0.46 | 213.6 | 413.6 | 3.80 |
| MW-19 DUP | <0.0100 | NA | NA | NA | NA | NA | NA | NA |
| MW-21 | <0.0100 | 15.43 | 462 | 6.52 | 0.76 | 198.6 | 398.6 | 10.10 |
| MW-23 | <0.0100 | 14.68 | 966 | 6.82 | 0.64 | 50.2 | 250.2 | 1.79 |
| RRS* | 0.015* | NA | NA | NA | NA | NA | NA | NA |

NOTES:

MW-19 DUP is a duplicate from MW-19

* Type 1 Risk Reduction Standard

**Eh value calculated by adding 200 mv to the ORP reading.

# TABLE III

# SUMMARY OF LEAD CONCENTRATIONS IN GROUNDWATER (mg/L)

# 1996 - 2007

# FORMER VULCAN PERFORMANCE CHEMICALS PLANT - DALTON, GA

| Well | February-96 | April-03 | May-03 | July-03 | March-06 | May-06 | August-06 | July-07 |
|---|---|---|---|---|---|---|---|---|
| TMW-2 | 0.088 | | | | | | | |
| TMW-3 | BDL | | | | | | | |
| TMW-5 | BDL | | | | | | | |
| TMW-8 | BDL | | | | | | | |
| TMW-9 | BDL | | | | | | | |
| TMW-10 | BDL | | | | | | | |
| TMW-11 | BDL | | | | | | | |
| TMW-12 | | | | | | <0.010 | | |
| TMW-13 | | | | | | <0.010 | | |
| TMW-14 | | | | | | <0.010 | | |
| TMW-15 | | | | | | | | <0.001 |
| TMW-16 | | | | | | | | 0.00162 |
| TMW-17 | | | | | | | | <0.001 |
| TMW-18 | | | | | | | | <0.001 |
| TMW-21 | | | | | | | | <0.001 |
| B-1 | | 0.011 | | | | | | |
| B-2 | | 0.026 | | | | | | |
| B-6 | | <0.010 | | | | | | |
| B-7 | | <0.010 | | | | | | |
| B-10 | | 0.095 | | | | | | |
| B-11 | | <0.010 | | | | | | |
| B-12 | | <0.010 | | | | | | |
| B-13 | | <0.010 | | | | | | |
| B-14 | | <0.010 | | | | | | |
| B-15 | | <0.010 | | | | | | |
| B-16 | | <0.010 | | | | | | |
| B-17 | | <0.010 | | | | | | |
| B-18 | | <0.010 | | | | | | |
| B-19 | | <0.010 | | | | | | |
| MW-1 | | | 0.044 | 0.089 | 0.199 | | 0.200 | 0.243 |
| MW-2 | | | | <0.001 | | | | |
| MW-3D | | | | | | <0.010 | | |
| MW-4 | | | | | | <0.010 | | |
| MW-5 | | | | | | <0.010 | | |
| MW-7 | | | | | | <0.001 | | <0.001 |
| MW-8 | | | | | | <0.001 | | <0.001 |
| MW-9 | | | | | | | | 0.0927 |
| MW-10 | | | | | | | | 0.00108 |
| MW-11 | | | | | | | | <0.001 |

NOTE: Shaded cell indicates an exceedance of the Type 1 RRS for lead (0.015 mg/L)

# TABLE IV

# SUMMARY OF LEAD CONCENTRATIONS IN GROUNDWATER (mg/L)

# 2008 - 2014

# FORMER VULCAN PERFORMANCE CHEMICALS PLANT - DALTON, GA

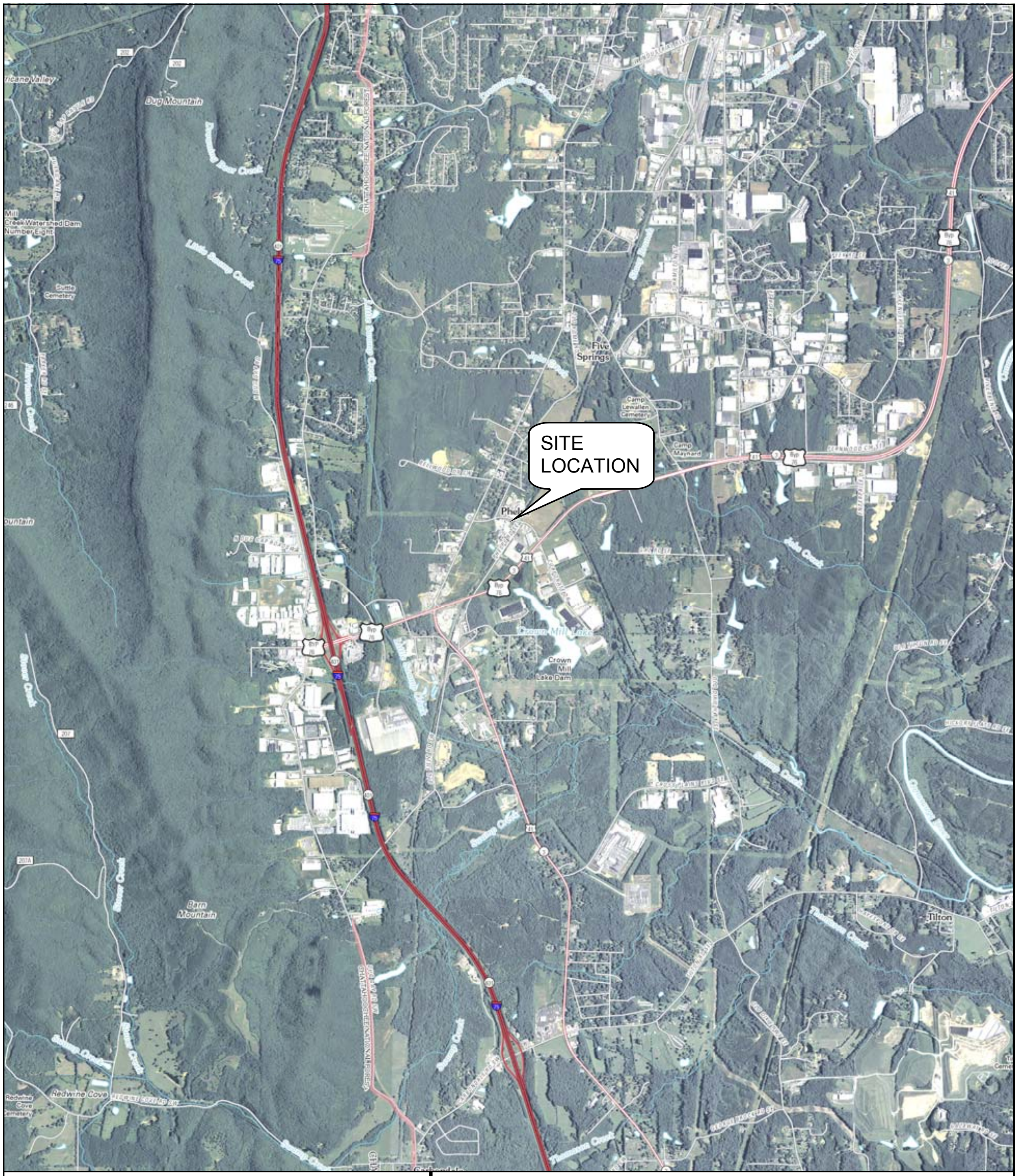
| **Well** | **Oct-08** | **Oct-08*** | **Apr-09** | **Oct-09** | **Apr-10** | **Oct-10** | **Apr-11** | **Sep-11** | **Apr-12** | **Apr-13** | **Apr-14** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| MW-5 | | | | | | | <0.0100 | <0.0100 | <0.0100 | | |
| MW-12 | <0.010 | | | | | | | | | | |
| MW-13 | <0.010 | | <0.0100 | <0.0100 | <0.0100 | | | <0.0100 | <0.0100 | | |
| MW-15 | <0.010 | | | | | | | | | | |
| MW-16 | | | | | | | <0.0100 | <0.0100 | <0.0100 | | |
| MW-17 | <0.010 | | <0.0100 | <0.0100 | <0.0100 | 0.143 | <0.0100 | <0.0100 | <0.0100 | | |
| MW-18 | <0.010 | | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | | |
| MW-19 | 0.103 | 0.0669 | 0.0311 | 0.0523 | 0.0184 | <0.0100 | <0.0100 | <0.0100 | 0.0135 | <0.0100 | <0.0100 |
| MW-20 | 0.0137 | 0.0124 | <0.0100 | <0.0100 | <0.0100 | <0.0100 | 0.0027 | <0.0100 | <0.0100 | | |
| MW-21 | 0.0402 | 0.0346 | 0.0284 | 0.0332 | 0.0315 | 0.0361 | 0.0305 | 0.0300 | 0.0239 | 0.0157[+] | <0.0100 |
| MW-22D | | | | | | | | <0.0100 | <0.0100 | | |
| MW-23 | | | | | | | | <0.0100 | <0.0100 | <0.0100 | <0.0100 |

NOTE: Shaded cell indicates an exceedance of the Type 1 RRS for lead (0.015 mg/L)

* Confirmation samples

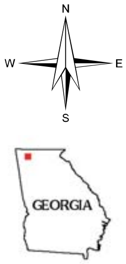
[+] Duplicate sample collected from MW-21 in April 2013 contained lead at 0.0147 mg/L, below the RRS

# FIGURES



NOTES:

1. ALL LOCATIONS ARE APPROXIMATE.
2. BACKGROUND SOURCED FROM THE USGS 7.5 MINUTE SERIES, QUADS: DALTON SOUTH AND VILLANOW, GA 2011.



HALEY& ALDRICH

FORMER VULCAN PERFORMANCE CHEMICALS PLANT
DALTON, GA

## SITE LOCATION

SCALE: 1:24,000
MAY 2014

FIGURE 1

G:\37848\Dalton, GA\Dalton Maps\37848-003-SITE_LOCATION_FIGURE1_01062012_V2.pub

## Legend

| | |
|---|---|
| MW-18<br>(TMW-12) | DESIGNATION<br>REPLACED DESIGNATION (IF APPLICABLE) |
| ⊕ | WATER TABLE MONITORING WELL LOCATION |
| ⊚ | BEDROCK MONITORING WELL LOCATION |
| ⊕ | TMW LOCATION |
| ⊖ | BORING LOCATION |
| ● | PIEZOMETER LOCATION |
| ☒ | ABANDONED WELL |
| ⧓ | DESTROYED WELL |
| 🟨 | EXCAVATED AREA |

NOTES:

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. IMAGERY SOURCE: AERIALS EXPRESS, 15 JANUARY 2009.
3. LOCATIONS FOR B-1 THROUGH B-19, AND TMW-1 THROUGH TMW-14 WERE ESTIMATED BASED ON A MAP TITLED "HISTORIC LEAD CONCENTRATIONS IN GROUNDWATER. FORMER VULCAN PERFORMANCE CHEMICALS PLANT" (2006), CREATED BY CH2MHILL.
4. EXCAVATED AREA ESTIMATED BASED ON A MAP TITLED "2008 EXCAVATION AREA. FORMER VULCAN PERFORMANCE CHEMICALS PLANT" (2008), CREATED BY CH2MHILL.

0 75 150 300
APPROXIMATE SCALE IN FEET

HALEY& ALDRICH

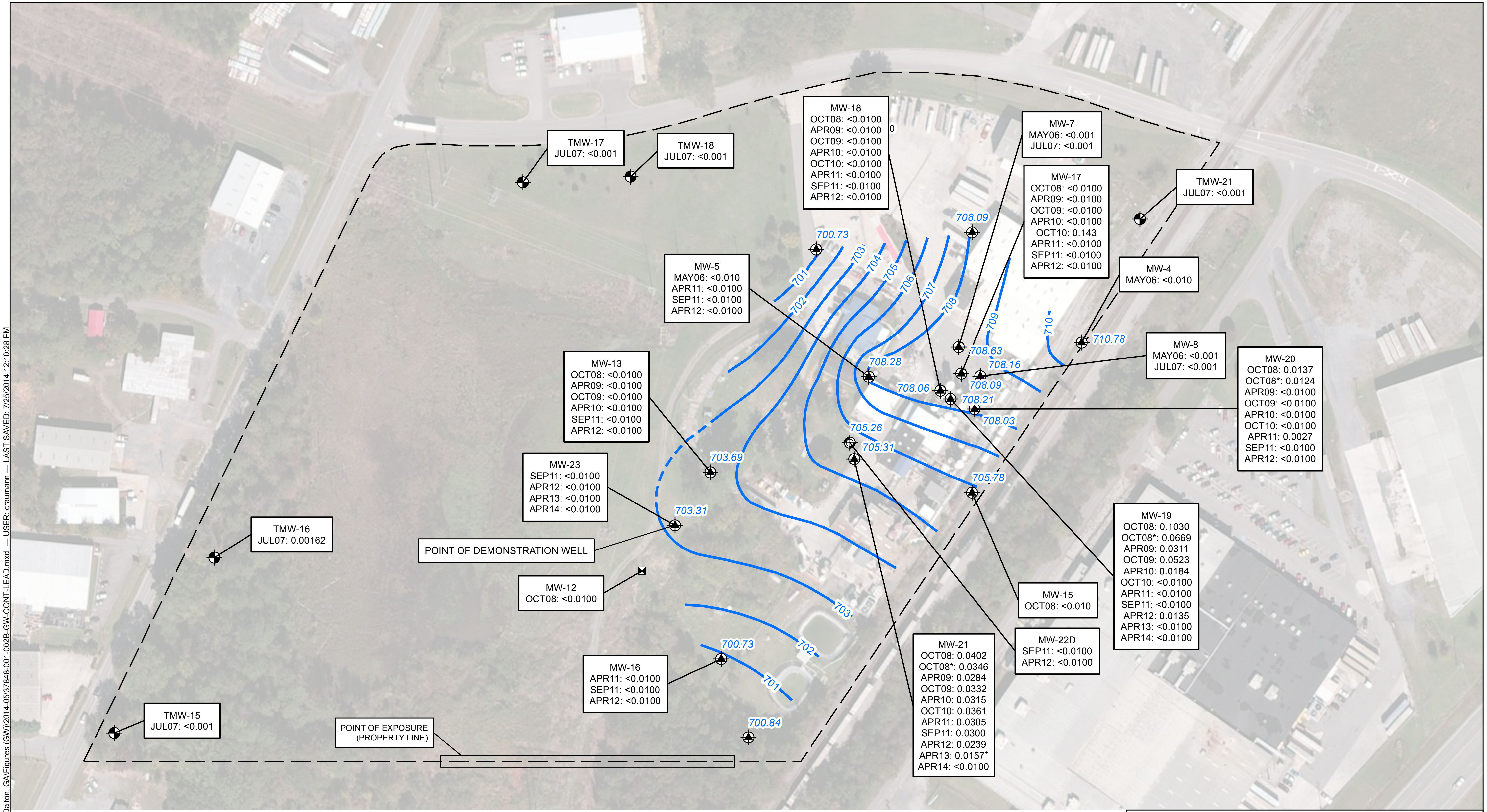
FORMER VULCAN PERFORMANCE CHEMICALS PLANT
DALTON, GEORGIA

# MONITORING WELL LOCATIONS

SCALE: AS SHOWN
MAY 2014

FIGURE 2

G:\37848\Dalton_GA\Figures_(GW)\37848-001-002B-GW-CONT_FIG2_20120706.mxd



**LEGEND**

| | |
|---|---|
| ⌖ | WATER TABLE MONITORING WELL LOCATION |
| ⊕ | BEDROCK MONITORING WELL LOCATION |
| ● | PIEZOMETER LOCATION |
| ⊕ | TMW LOCATION |
| ⧗ | DESTROYED WELL |
| ∿ | WATER TABLE CONTOUR<br>DASHED WHERE INFERRED<br>(ELEVATION IN FEET ABOVE MSL) |
| [_ _] | PROPERTY LINE (APPROX.) |
| *700.00* | GROUNDWATER ELEVATION<br>(FEET ABOVE MSL) |

**NOTES**

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE
2. LABELS INDICATE LEAD CONCENTRATION (mg/L)
3. * CONFIRMATION SAMPLES
4. + DUPLICATE SAMPLE COLLECTED FROM MW-21 IN APRIL 2013 CONTAINED LEAD AT 0.0147 mg/L, BELOW THE RSS
5. IMAGERY SOURCE: ESRI

N
W E
S

0 150 300
SCALE IN FEET

HALEY & ALDRICH

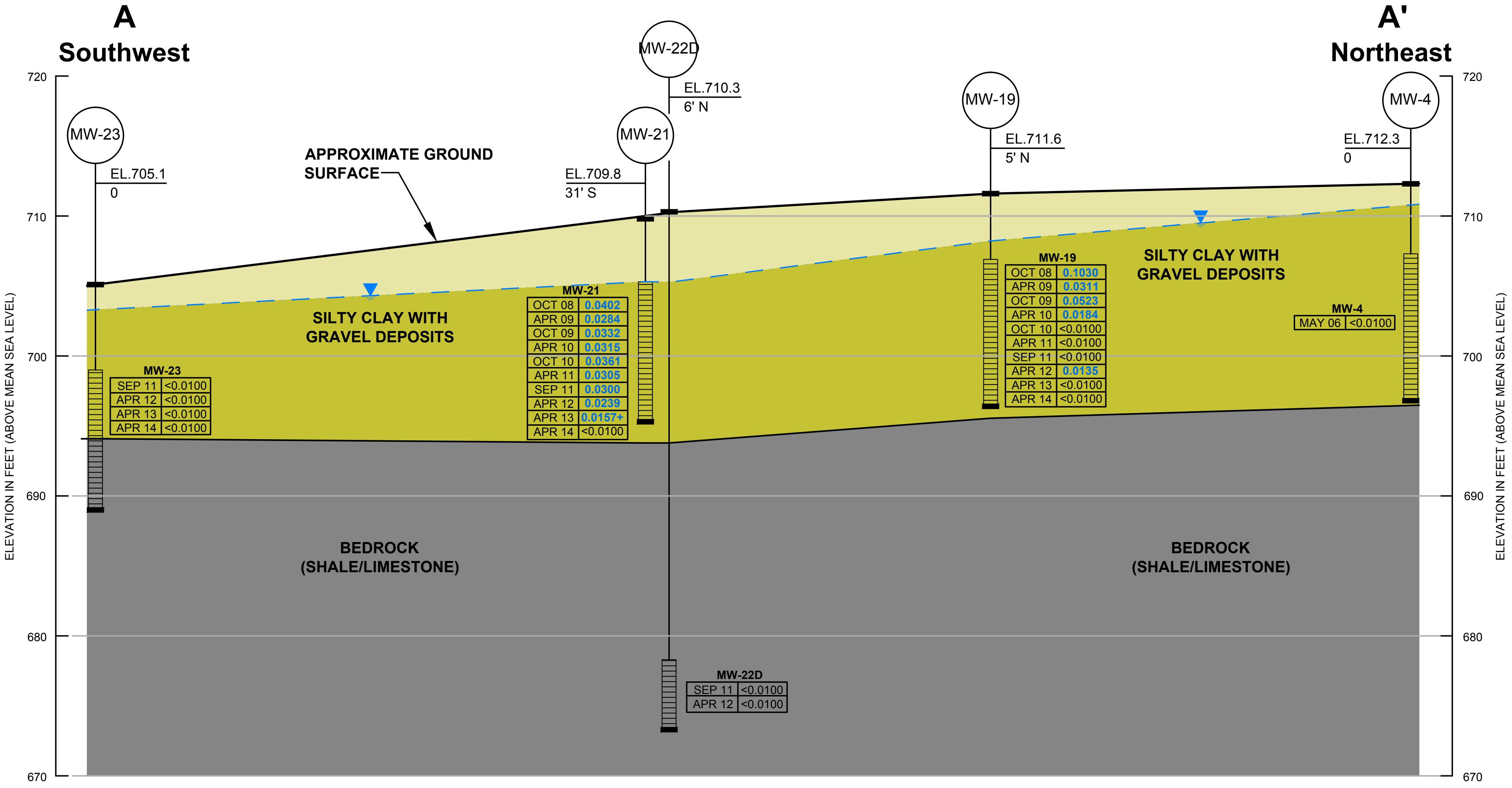
FORMER VULCAN PERFORMANCE CHEMICALS PLANT
DALTON, GEORGIA

## WATER TABLE CONFIGURATION AND LEAD CONCENTRATION

SCALE: AS SHOWN
MAY 2014

FIGURE 3

GIS FILE PATH: \\sdg\Common\37848\Dalton, GA\Figures (GW)\2014-05\37848-001-002B-GW-CONT-LEAD.mxd — USER: craumann — LAST SAVED: 7/25/2014 12:10:28 PM



## CROSS SECTION A-A'

**MW-23**

| | |
|---|---|
| SEP 11 | <0.0100 |
| APR 12 | <0.0100 |
| APR 13 | <0.0100 |
| APR 14 | <0.0100 |

**MW-21**

| | |
|---|---|
| OCT 08 | **0.0402** |
| APR 09 | **0.0284** |
| OCT 09 | **0.0332** |
| APR 10 | **0.0315** |
| OCT 10 | **0.0361** |
| APR 11 | **0.0305** |
| SEP 11 | **0.0300** |
| APR 12 | **0.0239** |
| APR 13 | **0.0157+** |
| APR 14 | <0.0100 |

**MW-22D**

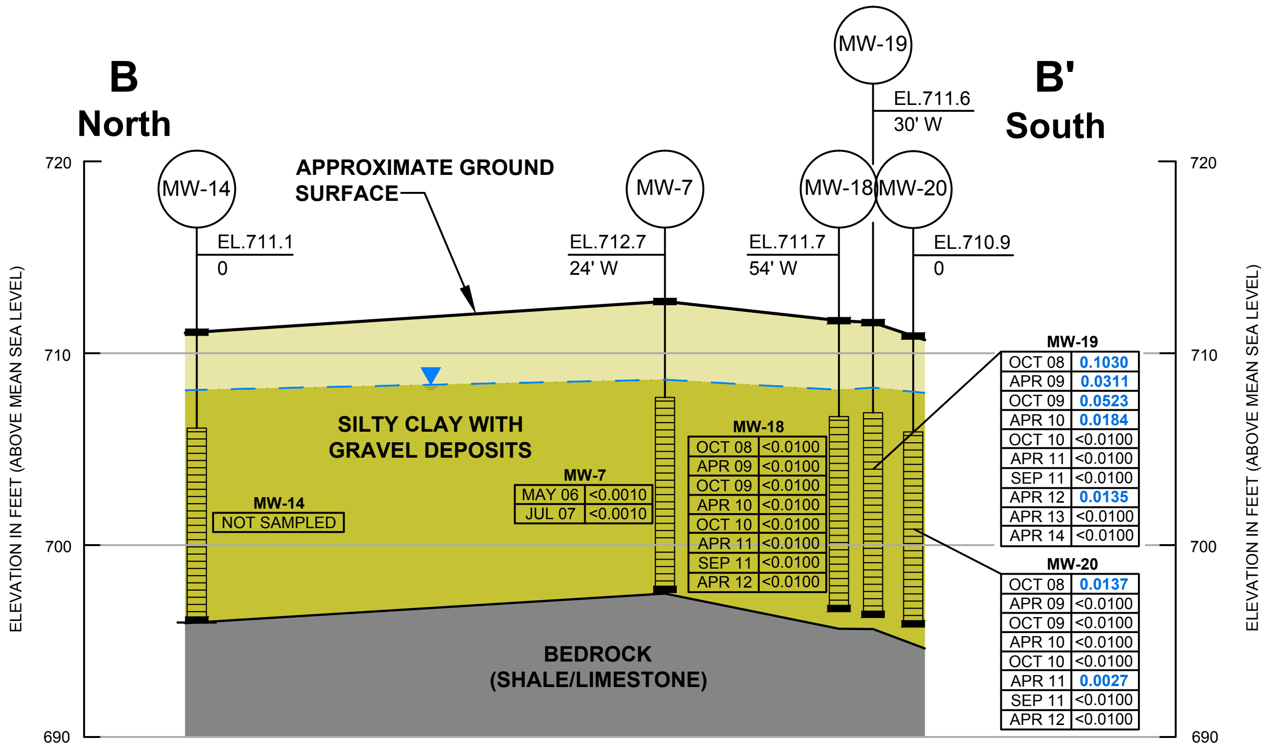
| | |
|---|---|
| SEP 11 | <0.0100 |
| APR 12 | <0.0100 |

**MW-19**

| | |
|---|---|
| OCT 08 | **0.1030** |
| APR 09 | **0.0311** |
| OCT 09 | **0.0523** |
| APR 10 | **0.0184** |
| OCT 10 | <0.0100 |
| APR 11 | <0.0100 |
| SEP 11 | <0.0100 |
| APR 12 | **0.0135** |
| APR 13 | <0.0100 |
| APR 14 | <0.0100 |

**MW-4**

| | |
|---|---|
| MAY 06 | <0.0100 |



## CROSS SECTION B-B'

**MW-14**

| |
|---|
| NOT SAMPLED |

**MW-7**

| | |
|---|---|
| MAY 06 | <0.0010 |
| JUL 07 | <0.0010 |

**MW-18**

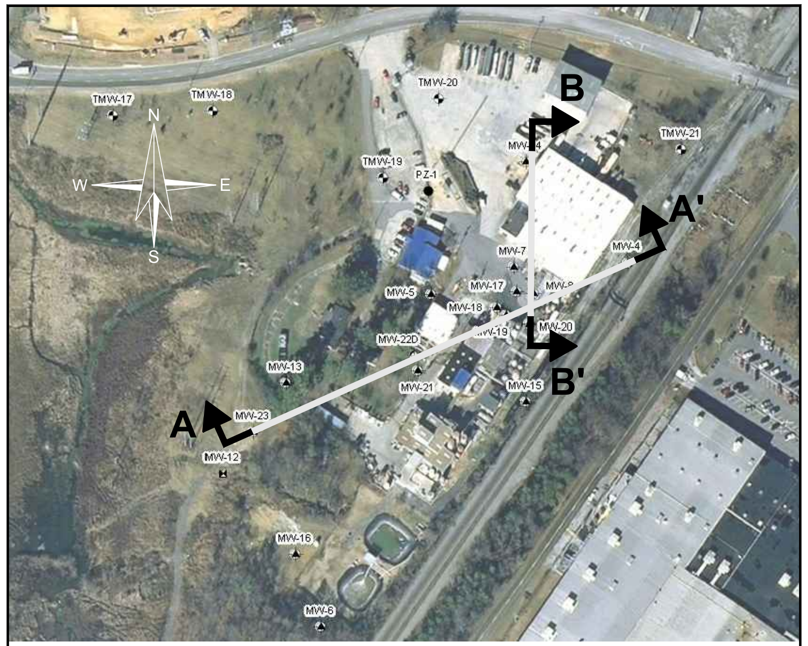
| | |
|---|---|
| OCT 08 | <0.0100 |
| APR 09 | <0.0100 |
| OCT 09 | <0.0100 |
| APR 10 | <0.0100 |
| OCT 10 | <0.0100 |
| APR 11 | <0.0100 |
| SEP 11 | <0.0100 |
| APR 12 | <0.0100 |

**MW-19**

| | |
|---|---|
| OCT 08 | **0.1030** |
| APR 09 | **0.0311** |
| OCT 09 | **0.0523** |
| APR 10 | **0.0184** |
| OCT 10 | <0.0100 |
| APR 11 | <0.0100 |
| SEP 11 | <0.0100 |
| APR 12 | **0.0135** |
| APR 13 | <0.0100 |
| APR 14 | <0.0100 |

**MW-20**

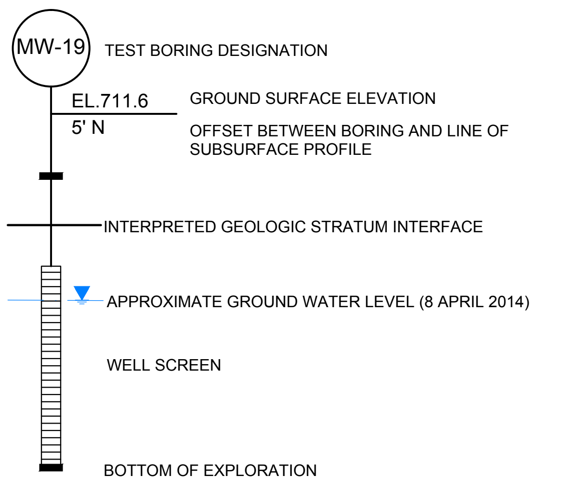
| | |
|---|---|
| OCT 08 | **0.0137** |
| APR 09 | <0.0100 |
| OCT 09 | <0.0100 |
| APR 10 | <0.0100 |
| OCT 10 | <0.0100 |
| APR 11 | **0.0027** |
| SEP 11 | <0.0100 |
| APR 12 | <0.0100 |



## KEYPLAN

NOT TO SCALE

LEGEND:



MW-19 TEST BORING DESIGNATION

EL.711.6 GROUND SURFACE ELEVATION

5' N OFFSET BETWEEN BORING AND LINE OF SUBSURFACE PROFILE

INTERPRETED GEOLOGIC STRATUM INTERFACE

APPROXIMATE GROUND WATER LEVEL (8 APRIL 2014)

WELL SCREEN

BOTTOM OF EXPLORATION

DATA BOX LEGEND:

**MW-21** INDICATES SAMPLE DESIGNATION

INDICATES MONTH AND YEAR SAMPLED

| | |
|---|---|
| OCT 08 | **0.0402** |
| APR 09 | **0.0284** |
| OCT 09 | **0.0332** |
| APR 10 | **0.0315** |
| OCT 10 | **0.0361** |
| APR 11 | **0.0305** |
| SEP 11 | **0.0300** |
| APR 12 | **0.0239** |
| APR 13 | **0.0157+** |
| APR 14 | <0.0100 |

INDICATES LEAD CONCENTRATION IN mg/L AT TIME SAMPLED

**BOLD BLUE** TEXT INDICATES CONCENTRATION ABOVE DETECTION LIMIT

+ INDICATES DUPLICATE SAMPLE COLLECTED FROM MW-21 IN APRIL 2013 CONTAINED LEAD AT 0.0147 mg/L BELOW THE RRS

NOTES:

1. OFFSET DISTANCES INDICATED ARE MEASURED FROM THE PLAN LOCATION OF THE PROFILE LINE, PERPENDICULAR TO THE LINE.
2. SUBSURFACE PROFILES DEPICT THE GENERAL GEOLOGIC CONDITIONS AT THE SITE AND ARE BASED ON INTERPRETATION OF DATA ENCOUNTERED IN THE EXPLORATIONS. LINES REPRESENTING INTERFACES BETWEEN STRATA ON THE PROFILE ARE BASED ON INTERPOLATION BETWEEN ADJACENT BORINGS. THE BORING STICK SHOWS THE INTERPRETED SEQUENCE OF STRATA ENCOUNTERED AT THAT LOCATION. ACTUAL SOIL AND BEDROCK CONDITIONS AND INTERFACES BETWEEN EXPLORATIONS MAY VARY SIGNIFICANTLY FROM THOSE INDICATED ON THE PROFILES.

HORIZ. 0 75 150

VERT. 0 10 20

SCALE IN FEET

HALEY & ALDRICH

FORMER VULCAN PERFORMANCE CHEMICALS PLANT
DALTON, GEORGIA

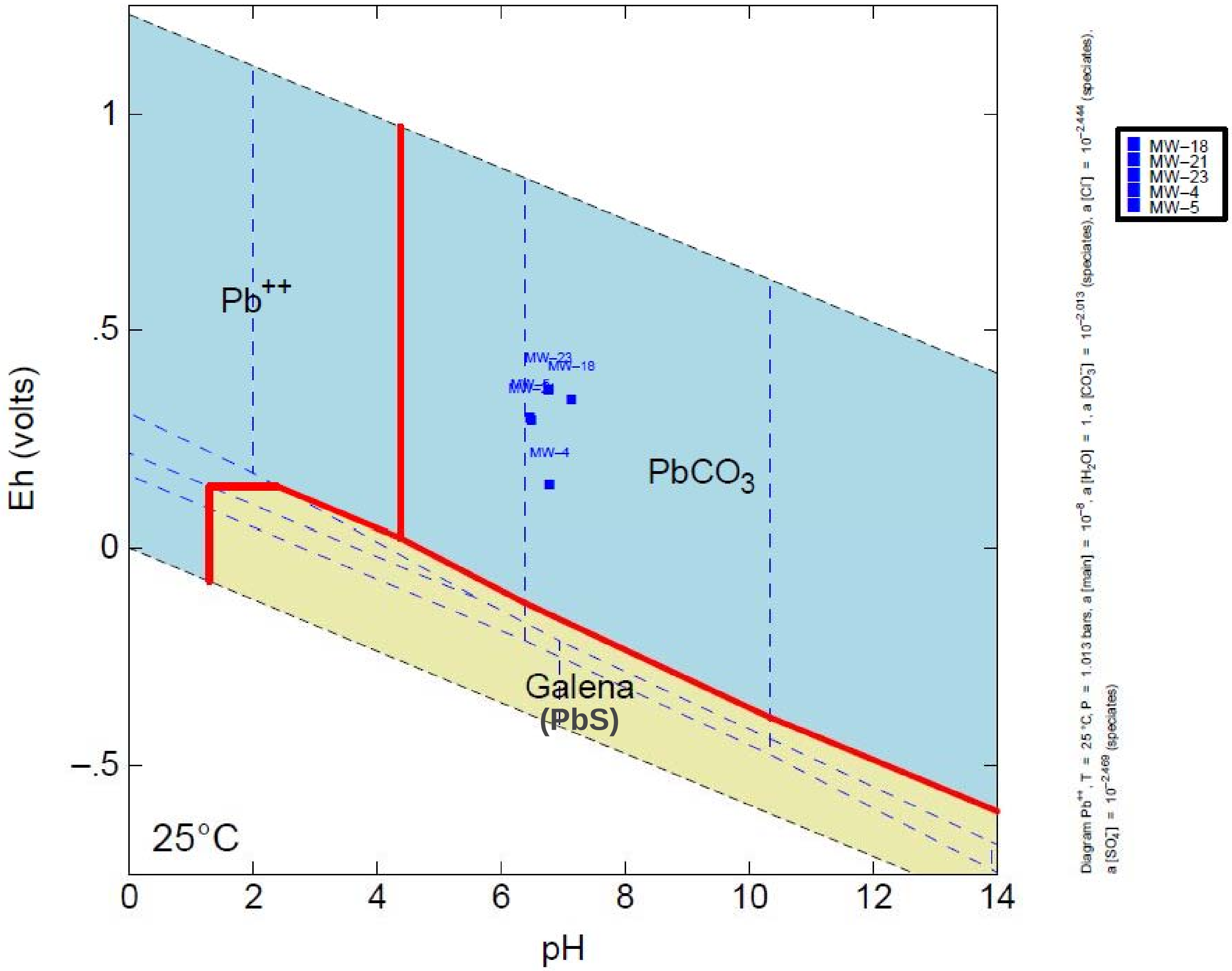
CROSS SECTIONS
A-A' AND B-B'

SCALE: AS SHOWN
JULY 2014

FIGURE 4

J:\GRAPHICS\37848\37848-005-B011.DWG

# Figure 5
# pH vs. Eh Diagram
# Former Vulcan Performance Chemicals Dalton Plant



# APPENDIX A

## Analytical Summary Documents (September 2006)

## Table 1
## Soil Sampling Results
## March 1996 through June 2006
## *Former Vulcan Performance Chemicals Plant, Dalton, Georgia*

| **Analyte (mg/kg):** | **Antimony** | **Arsenic** | **Berylium** | **Chromium** | **Chromium (Hexavalent)** | **Copper** | **Cyanide** | **Lead** | **Nickel** | **Selenium** | **Thallium** | **Zinc** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HSRA Notification Concentration (mg/kg): | 10 | 41 | 3 | 1,200 | -- | 1,500 | 10 | 300 | 420 | 36 | 10 or background if higher | 2,800 |
| **Sample Location (ft bgs)** | | | | | | | | | | | | |
| TMW-1[a] (4'-7') | <5.0 | <3.0 | <1.0 | 6.8 | <1.0 | 5.9 | NA | <2.5 | 7.1 | <4.0 | <5.0 | 18.0 |
| TMW-2[a] (2'-5') | <5.0 | <3.0 | <1.0 | 15.0 | <1.0 | 3.1 | <0.25 | 8.0 | <2.0 | <4.0 | <5.0 | 50.0 |
| TMW-3[a] (3'-6') | <5.0 | 3.8 | <1.0 | 13.0 | <1.0 | 2.6 | <0.25 | 10.0 | <2.0 | <4.0 | <5.0 | 13.0 |
| TMW-5[a] (6.9'-15') | 6.5 | <3.0 | 1.4 | 32.0 | <1.0 | 18.0 | <0.25 | 13.0 | 27.0 | <4.0 | <5.0 | 57.0 |
| TMW-7 (3'-6') | <5.0 | <3.0 | <1.0 | 19.0 | <1.0 | 2.1 | <0.25 | 10.0 | 4.5 | <4.0 | <5.0 | 6.9 |
| TMW8[a] (5'-8') | 5.5 | <3.0 | 1.2 | 23.0 | <1.0 | 17.0 | <0.25 | 19.0 | 10.0 | <4.0 | <5.0 | 30.0 |
| B-1[b] (0'-2') | NA | <4.58 | <2.29 | 20.9 | NA | 9.37 | NA | 11.7 | 7.59 | <4.58 | <4.58 | 17.4 |
| B-2[b] (4'-6') | NA | <5.54 | <2.77 | 30.5 | NA | 16.9 | NA | 11.1 | 19.2 | <5.54 | <5.54 | 39 |
| B-3[b] (2'-4') | NA | <5.95 | <2.97 | 34.7 | NA | 17.8 | NA | 11.7 | 16.6 | <5.95 | 7.32 | 39.5 |
| B-5[b] (4'-6') | NA | <5.45 | <2.72 | 27.8 | NA | 11.7 | NA | 9.22 | 7.85 | <5.45 | 5.77 | 34.3 |
| B-6[b] (2'-4') | NA | 3.47 | <1.72 | 35.9 | NA | 29 | NA | 11.3 | 31.8 | <3.44 | 7.64 | 60.2 |
| B-7[b] (4'-6') | NA | <5.98 | <2.99 | 41.5 | NA | 24.3 | NA | 12.9 | 19.4 | <5.98 | 7.06 | 31 |
| B-9[b] (0'-2') | NA | 10.5 | <3.00 | 33.8 | NA | 30.2 | NA | 26.2 | 13.1 | <5.99 | <5.99 | 59 |
| B-10[b] (4'-6') | NA | 4.43 | <1.92 | 28 | NA | 11.7 | NA | 13.4 | 22.5 | <3.84 | 5.0 | 33.5 |
| B-11[b] (4'-6') | NA | 8.41 | <1.95 | 37.7 | NA | 22.2 | NA | 10.6 | 8.25 | <3.90 | 8.25 | 12.2 |
| B-12[b] (9'-10') | NA | 4.72 | <1.80 | 23.9 | NA | 10.4 | NA | 17.6 | 23.4 | <3.59 | 4.65 | 48.3 |
| B-13[b] (2'-4') | NA | <3.95 | <1.97 | 18.5 | NA | 4.43 | NA | 9.65 | 4.53 | <3.95 | <3.95 | 9.82 |
| B-14[b] (4'-6') | NA | <4.50 | <2.25 | 35.8 | NA | 19.2 | NA | 14.3 | 31.2 | <4.50 | 7.77 | 50.9 |
| B-15[b] (2'-4') | NA | 6.82 | <2.78 | 32.9 | NA | 11 | NA | 6.9 | 5.82 | <5.57 | 6.5 | 10.6 |
| B-16[b] (9'-11') | NA | <5.33 | <2.67 | 23.1 | NA | 17.1 | NA | 6.38 | 19.5 | <5.33 | <5.33 | 38 |
| B-17[b] (4'-6') | NA | <4.16 | <2.08 | 127 | NA | 40 | NA | 66.5 | 22.2 | <4.16 | 5.96 | 556 |
| B-18[b] (6'-8') | NA | <3.92 | 3.5 | 46.7 | NA | 34.8 | NA | 8.73 | 35 | 4.69 | 8.36 | 51.6 |
| B-19[b] (10'-12') | NA | <5.43 | <2.71 | 36.3 | NA | 27.8 | NA | 13.8 | 19.3 | <5.43 | 6.23 | 50.2 |
| TMW-12[c] (4'-6') | NA | NA | NA | NA | NA | NA | NA | 4.95 | NA | NA | NA | NA |
| TMW-12[c] (9'-11') | NA | NA | NA | NA | NA | NA | NA | 4.06 | NA | NA | NA | NA |
| TMW-12[c] (14'-15') | NA | NA | NA | NA | NA | NA | NA | 6.57 | NA | NA | NA | NA |
| TMW-13[c] (4'-6') | NA | NA | NA | NA | NA | NA | NA | 7.78 | NA | NA | NA | NA |
| TMW-13[c] (9'-11') | NA | NA | NA | NA | NA | NA | NA | 6.37 | NA | NA | NA | NA |
| TMW-14[c] (4'-6') | NA | NA | NA | NA | NA | NA | NA | 3.74 | NA | NA | NA | NA |
| TMW-14[c] (9'-11') | NA | NA | NA | NA | NA | NA | NA | 5.72 | NA | NA | NA | NA |
| MW-3D[d] (4'-6') | NA | NA | NA | NA | NA | NA | NA | 28.9 | NA | NA | NA | NA |
| MW-3D[d] (9'-11') | NA | NA | NA | NA | NA | NA | NA | 8.37 | NA | NA | NA | NA |
| MW-3D[d] (14'-15.5') | NA | NA | NA | NA | NA | NA | NA | 5.73 | NA | NA | NA | NA |
| B-20[e] (1'-2') | NA | NA | 1.29J | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| B-21[e] (1'-2') | NA | NA | 1.97J | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| B-22[e] (1'-2') | NA | NA | <2.40 | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| B-23[e] (1'-2') | NA | NA | 1.30J | NA | NA | NA | NA | NA | NA | NA | NA | NA |

**Notes:**

a. TMWs were installed, sampled, and abandoned by CH2M HILL in 1996
b. Borings were advanced and sampled by Clayton Group Services in 2003
c. TMWs were installed, sampled, and abandoned by CH2M HILL in 2006
d. Monitoring wells were installed and sampled by CH2M HILL in 2006
e. Borings were advanced and sampled by CH2M HILL in 2006
f. Yellow highlight indicates an exceedence of HSRA criterion in soil

**Legend:**

| | |
|---|---|
| mg/kg | milligram per kilogram |
| NA | Not Analyzed |
| TMW | Temporary Monitoring Well |
| B | Boring |
| J | Value was below the analytical method detection limit |

## Table 2
## Groundwater Sampling Results
## March 1996 through May 2006
## *Former Vulcan Materials Plant, Dalton, Georgia*

| Analyte | Sample Date | Antimony Total | Antimony Dissolved | Arsenic Total | Arsenic Dissolved | Beryllium Total | Beryllium Dissolved | Cadmium Total | Cadmium Dissolved | Chromium Total | Chromium Dissolved | Copper Total | Copper Dissolved | Lead Total | Lead Dissolved | Nickel Total | Nickel Dissolved | Selenium Total | Selenium Dissolved | Silver Total | Silver Dissolved | Thallium Total | Thallium Dissolved | Zinc Total | Zinc Dissolved | Mercury Total | Mercury Dissolved | pH | Turbidity |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Units** | | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | µg/L | SU | NTUs |
| **GA HSRA Appendix III Criteria** | | 6 | NC | 50 | NC | 4 | NC | 5 | NC | 100 | NC | 1,300[e] | NC | 15[e] | NC | 100 | NC | 50 | NC | 100 | NC | 2 | 2 | 2,000 | NC | 2 | NC | NC | NC |
| **EPA Drinking Water Standards MCL** | | NC | 6 | NC | 10 | NC | 4 | NC | 5 | NC | 100 | NC | TT[f] | NC | TT[f] | NC | NC | NC | 50 | NC | NC | NC | 2 | NC | NC | NC | NC | NC | NC |
| **EPA Region IX PRG** | | NC | 15 | NC | 0.045 | NC | 2,600 | NC | 18 | NC | 110 | NC | 1,400 | NC | NC | NC | 730 | NC | 180 | NC | 180 | NC | 2.4 | NC | 11,000 | NC | 11 | NC | NC |
| **TMW-2[a]** | **03/96** | NA | NA | BDL | NA | NA | NA | NA | NA | 19 | NA | 45 | NA | 88 | NA | BDL | NA | NA | NA | NA | NA | NA | NA | 1,700 | NA | 1.2 | NA | 13 | silty, cloudy[g] |
| **TMW-3[a]** | **03/96** | NA | NA | BDL | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | BDL | NA | BDL | NA | NA | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | 6.9 | clear[g] |
| **TMW-4[a]** | **03/96** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.3 | cloudy[g] |
| **TMW-5[a]** | **03/96** | NA | NA | BDL | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | BDL | NA | 110 | NA | NA | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | 6.4 | silty, cloudy[g] |
| **TMW-6[a]** | **03/96** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 7.4 | silty, cloudy[g] |
| **TMW8[a]** | **03/96** | NA | NA | BDL | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | BDL | NA | 23 | NA | NA | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | 7.7 | silty, cloudy[g] |
| **TMW-9[a]** | **03/96** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | BDL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 10 | silty, cloudy[g] |
| **TMW-10[a]** | **03/96** | NA | NA | BDL | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | BDL | NA | 98 | NA | NA | NA | NA | NA | NA | NA | BDL | NA | BDL | NA | 6.5 | silty, cloudy[g] |
| **TMW-11[a]** | **03/96** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | BDL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.9 | silty, cloudy[g] |
| **B-1[b]** | **04/03** | NA | <5.00 | <5.0 | <5.00 | <1.0 | <1.00 | NA | <0.700 | 15.5 | 0.58 J | 10.4 | 1.1 J | 10.9 | 0.42 J | 17.5 | 7.90 | NA | 0.84 J | NA | <5.00 | NA | <1.00 | 45.8 | 6.2 J | NA | <0.2 | 6.7 | >999 |
| **B-2[b]** | **04/03** | NA | <5.00 | <5.0 | 1.6 J | <1.0 | 0.052 J | NA | 0.095 J | 16.9 | 1.2 J | 9.64 | 1.4 J | 26.4 | 26.80 | 88.7 | 75.40 | NA | 0.65 J | NA | <5.00 | NA | <1.00 | 42 | 20.30 | NA | <0.2 | 6.77 | >999 |
| **MW-1[c]** | **05/03** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 44 | 40 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.40 | >999 |
| | **07/03** | 0.086 J | 0.13 J | 1.1 J | 1.1 | <1.0 | <1.0 | 2.06 | 2.19 | <5.0 | <5.0 | 14.6 | 13.2 | 88.9 | 94.7 | 88.9 | 94.2 | <5.0 | <5.00 | 0.009 J | 0.006 J | <1.0 | <1.00 | 30.9 | 32 | NA | NA | 6.42 | NA |
| | **03/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 199 | 190 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.49 | 1.28 |
| | **08/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 200 | 200 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA |
| **B-6[b]** | **04/03** | NA | NA | <5.0 | NA | <1.0 | NA | NA | NA | <5.0 | NA | <5.0 | NA | <1.0 | NA | 10 | NA | NA | NA | NA | NA | NA | NA | <10.0 | NA | NA | NA | 7.4 | 36 |
| **B-7[b]** | **04/03** | NA | 0.18 J | <5.0 | 1.0 J | <1.0 | 0.052 J | NA | <0.700 | 11.1 | 3.2 J | 5.47 | 6.92 | 7.01 | 4.63 | 25.9 | 7.13 | NA | <5.00 | NA | <5.00 | NA | 0.061 J | <10.0 | 22.2 | NA | <0.5 | 6.9 | 619 |
| **B-10[b]** | **04/03** | NA | 0.068 J | <5.0 | <5.00 | 8.87 | 0.028 J | NA | <0.700 | 77.3 | 3.3 J | 28.7 | 1.8 J | 95.2 | 0.80 J | 64.4 | 4.9 J | NA | 0.79 J | NA | <5.00 | NA | <1.00 | 145 | 10.2 | NA | <0.5 | 7.4 | >999 |
| **MW-2[d]** | **07/03** | 0.15 J | 0.15 J | 0.68 J | 0.63 J | <1.0 | <1.0 | <0.7 | <0.7 | <5.0 | <5.0 | 1.4 J | 1.1 J | 0.86 J | 0.71 J | 3.7 J | 3.1 J | 1.8 J | 1.8 J | 0.008 J | 0.0040 J | <1.0 | <1.0 | 9.7 J | 5.9 J | NA | NA | 6.8 | NA |
| **B-11[b]** | **04/03** | NA | 0.065 J | <5.0 | <5.00 | <1.0 | 1.5 | NA | <0.700 | <5.0 | 15.0 | <5.0 | 9.38 | 3.25 | 10.7 | <5.0 | 26.5 | NA | 0.32 J | NA | <5.00 | NA | 0.083 J | <10.0 | 31.1 | NA | <0.2 | 6 | 150 |
| **B-12[b]** | **04/03** | NA | NA | <5.0 | NA | <1.0 | NA | NA | NA | <5.0 | NA | <5.0 | NA | 1.48 | NA | 6.02 | NA | NA | NA | NA | NA | NA | NA | <10.0 | NA | NA | NA | 6.7 | 10 |
| **B-13[b]** | **04/03** | NA | 0.12 J | <5.0 | 0.26 J | <1.0 | <1.00 | NA | <0.700 | <5.0 | 21.4 | <5.0 | 1.8 J | 2.31 | 0.24 J | <5.0 | 6.07 | NA | <5.00 | NA | <5.00 | NA | <1.00 | <10.0 | 22.7 | NA | <0.5 | 7.2 | 192 |
| **B-14[b]** | **04/03** | NA | NA | <5.0 | NA | <1.0 | NA | NA | NA | <5.0 | NA | <5.0 | NA | <1.0 | NA | <5.0 | NA | NA | NA | NA | NA | NA | NA | <10.0 | NA | NA | NA | 7.7 | 18 |
| **B-15[b]** | **04/03** | NA | <5.00 | <5.0 | <5.00 | <1.0 | <1.00 | NA | <0.700 | <5.0 | 0.43 J | <5.0 | 0.85 J | 2.83 | 0.39 J | 6.59 | 3.9 J | NA | 0.48 J | NA | <5.00 | NA | <1.00 | <10.0 | 5.1 J | NA | <0.2 | 6.5 | 13 |
| **B-16[b]** | **04/03** | NA | NA | <5.0 | NA | <1.0 | NA | NA | NA | <5.0 | NA | <5.0 | NA | <1.0 | NA | <5.0 | NA | NA | NA | NA | NA | NA | NA | <10.0 | NA | NA | NA | 7.1 | 8 |
| **B-17[b]** | **04/03** | NA | NA | 6.39 | NA | <1.0 | NA | NA | NA | <5.0 | NA | <5.0 | NA | 2.61 | NA | 8.63 | NA | NA | NA | NA | NA | NA | NA | <10.0 | NA | NA | NA | 7.1 | 5 |
| **B-18[b]** | **04/03** | NA | <5.00 | <5.0 | <5.00 | <1.0 | 0.46 J | NA | <0.700 | <5.0 | 2.5 J | <5.0 | 2.8 J | 4.32 | 2.47 | 23.7 | 18.7 | NA | <5.00 | NA | <5.00 | NA | <1.00 | <10.0 | 8.9 J | NA | <0.5 | 5.9 | 38 |
| **B-19[b]** | **04/03** | NA | 0.13 J | <5.0 | 0.43 J | <1.0 | 0.34 J | NA | <0.700 | <5.0 | 4.7 J | <5.0 | 5.08 | 5.85 | 6.30 | 284 | 88.0 | NA | 0.34 J | NA | <5.00 | NA | <1.00 | <10.0 | 24.5 | NA | <0.5 | 6.8 | 123 |
| **MW-3D[j]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 5.9 | 5.2 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.7 | 4.2 |
| **MW-4[j]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 9.2 | 3.9 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 7.0 | 3.8 |
| **MW-5[j]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | <0.01 | <0.01 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.8 | 1.7 |
| **MW-6[j]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | <0.2 | 3.7 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.01 | 3.7 |
| **TMW-12[i]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | <0.01 | <0.01 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.72 | NA |
| **TMW-13[i]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | BDL | B DL | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.84 | 850 |
| **TMW-14[i]** | **05/06** | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 4.6 | 3.6 | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | 6.98 | 1,100 |

**Notes:**

a. TMWs 2-11 were installed, sampled, and abandoned by CH2M HILL in 1996

b. Soil borings were installed, sampled, and abandoned by Clayton Group Services in April 2003

c. MW-1 was installed by CH2M HILL in May 2003 to confirm lead concentrations in B-2

d. MW-2 was installed by CH2M HILL in July 2003 to confirm lead concentrations in B-10

e. Action level

f. Treatment Technique - a required process intended to reduce the level of a contaminant in drinking water (as defined by US EPA)

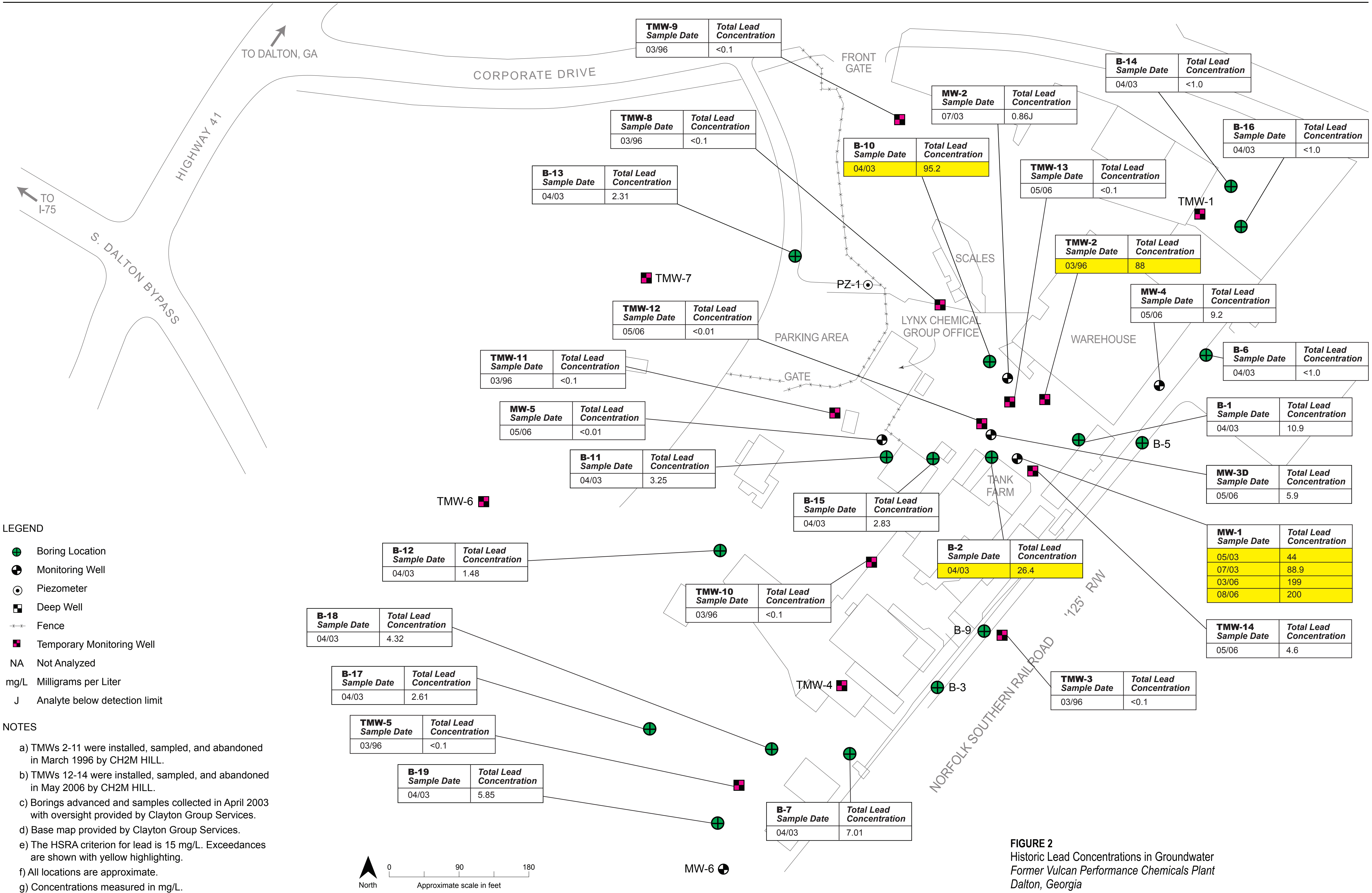
g. Visual observation

h. Yellow highlighting indicates exceedances of HSRA Appendix III, Table 1 criteria.

i. TMWs 12-14 were installed, sampled, and abandoned by CH2M HILL in 2006

**Abbreviations:**

| | |
|---|---|
| BDL | Below Detection Limit |
| J | Analyte below detection limits |
| NA | Not analyzed |
| NC | No criterion established |
| SU | Standard units |
| µg/L | microgram per liter |
| TMW | Temporary Monitoring Well |
| B | Boring |
| MW | Monitoring Well |
| NTUs | Nephelometric Turbidity Units |



| TMW-9 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | <0.1 |

| TMW-8 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | <0.1 |

| B-13 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 2.31 |

| MW-2 Sample Date | Total Lead Concentration |
|---|---|
| 07/03 | 0.86J |

| B-10 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 95.2 |

| B-14 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | <1.0 |

| B-16 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | <1.0 |

| TMW-13 Sample Date | Total Lead Concentration |
|---|---|
| 05/06 | <0.1 |

| TMW-2 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | 88 |

| MW-4 Sample Date | Total Lead Concentration |
|---|---|
| 05/06 | 9.2 |

| B-6 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | <1.0 |

| TMW-12 Sample Date | Total Lead Concentration |
|---|---|
| 05/06 | <0.01 |

| TMW-11 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | <0.1 |

| MW-5 Sample Date | Total Lead Concentration |
|---|---|
| 05/06 | <0.01 |

| B-11 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 3.25 |

| B-1 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 10.9 |

| MW-3D Sample Date | Total Lead Concentration |
|---|---|
| 05/06 | 5.9 |

| B-15 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 2.83 |

| MW-1 Sample Date | Total Lead Concentration |
|---|---|
| 05/03 | 44 |
| 07/03 | 88.9 |
| 03/06 | 199 |
| 08/06 | 200 |

| B-2 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 26.4 |

| B-12 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 1.48 |

| TMW-10 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | <0.1 |

| TMW-14 Sample Date | Total Lead Concentration |
|---|---|
| 05/06 | 4.6 |

| B-18 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 4.32 |

| B-17 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 2.61 |

| TMW-3 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | <0.1 |

| TMW-5 Sample Date | Total Lead Concentration |
|---|---|
| 03/96 | <0.1 |

| B-19 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 5.85 |

| B-7 Sample Date | Total Lead Concentration |
|---|---|
| 04/03 | 7.01 |

LEGEND

| | |
|---|---|
| ⊕ | Boring Location |
| ◕ | Monitoring Well |
| ⊙ | Piezometer |
| ▚ | Deep Well |
| -×- | Fence |
| ▚ | Temporary Monitoring Well |
| NA | Not Analyzed |
| mg/L | Milligrams per Liter |
| J | Analyte below detection limit |

NOTES

a) TMWs 2-11 were installed, sampled, and abandoned in March 1996 by CH2M HILL.
b) TMWs 12-14 were installed, sampled, and abandoned in May 2006 by CH2M HILL.
c) Borings advanced and samples collected in April 2003 with oversight provided by Clayton Group Services.
d) Base map provided by Clayton Group Services.
e) The HSRA criterion for lead is 15 mg/L. Exceedances are shown with yellow highlighting.
f) All locations are approximate.
g) Concentrations measured in mg/L.

FIGURE 2
Historic Lead Concentrations in Groundwater
*Former Vulcan Performance Chemicals Plant*
*Dalton, Georgia*

# APPENDIX B

## Groundwater Sampling Field Notes

## (April 2014)

# AEM Groundwater Sampling Field Log

AEM Project: Haley & Aldrich - Former Vulcan Site AEM Job No.: 1398-1401 Well No.: MW - 19

Sampling Personnel: Tony Gordon, [✓ Chad Crumbley] Date: 4-8-2014

Comments: Time In: 1352 Time Out: 1603

**Well Information**

| |
|---|
| 0.04 gal/ft in 1-inch-ID well |
| 0.16 gal/ft in 2-inch-ID well |
| 0.65 gal/ft in 4-inch-ID well |

Well Diameter: 2.0 inches Reference Point Marked: [✓ Yes] No

Depth to Water: 3.41 feet below T.O.C. Well Depth: 15.25 feet below T.O.C.

**Purging Information**

Purge Method (check): [✓ Low Flow-Low Stress] Micro-purge

Water Column: 11.84 ft

1 Well Volume= 1.89 gal

3 Well Volume= 5.67 gal

Total Purged: 5.75 gal

Well Purge Dry (?): yes/[✓ no]

Purge Start Time: 1402

Purge End Time: 1549

Total Time: 107 min

Purge Rate: 0.05 gpm

**Purging Equipment and Calibration Information**

Bailer: ☐ Teflon ☐ Poly. Pump: ☐ Grundfos ☑ Peri. ID# P-6

Pump Tubing Type: ☐ Teflon ☑ Teflon-Lined Poly. ☐ Polyethylene

Meter(s) Used: ☐ Hanna 991300 ☑ YSI 556 ☐ Lamotte 2020 ID#'s 12

Calibration Date/Time: 4-8-2014 (1341)

Comments: Clean purge water

**Groundwater Field Parameters**

| Time | Gallons Purged | Temp. Deg. Cel | Cond. µS/cm | pH SU | Dissolved Oxygen mg/L | ORP mV | Turbidity NTUs | Water Level ft. from TOC |
|---|---|---|---|---|---|---|---|---|
| 1425 | 1.0 | 13.48° | 1078 | 8.84 | 1.31 | 219.4 | 9.43 | 4.28 |
| 1440 | 2.0 | 13.56°C | 1113 | 9.14 | 0.79 | 220.5 | 6.85 | 4.29 |
| 1502 | 3.0 | 13.40°C | 1115 | 9.12 | 3.13 | 221.0 | 5.04 | 4.32 |
| 1519 | 4.0 | 13.73° | 1118 | 9.16 | 0.64 | 216.9 | 4.29 | 4.32 |
| 1533 | 5.0 | 13.99° | 1112 | 9.21 | 0.52 | 216.3 | 4.18 | 4.32 |
| 1549 | 5.75 | 14.42° | 1113 | 9.17 | 0.46 | 213.6 | 3.80 | 4.32 |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| Stabilization Info: | | +/- 0.5 deg. | +/- 5% | +/- 0.1 SU | +/- 10% | +/- 10% | <10 NTUs | ----- |

**Sample Collection Parameters**

Sample Collection Method (check all): Bailer Straw Method [✓ Pump Tubing] Vacuum Jug Other

Final Tubing/Pump Depth: 4.50 feet below T.O.C Final Groundwater Depth(if applic.) 4.32 feet below T.O.C

Final Sample Turbidity: 3.80 NTUs Ferrous Iron Concentration (if sampled): NA mg/L

Comments: Clear Smpl, no odor

**Laboratory Analytical Information**

| Sample ID | Analysis | Container | Qty. | Preservative | Time Sampled |
|---|---|---|---|---|---|
| MW - 19 | Total Lead (6010B) | 250 mL HDPE | 1 | $HNO_3$ | 1551 |
| MW - 19 Dup | " " | " " | 1 | $HNO_3$ | 1551 |

Sample Laboratory (circle): ACL/Xenco/[✓ AES]/Other Delivery Method: [✓ Hand Delivery]/Fed-Ex/UPS/Other

**Field Personnel Signature:**

# AEM Groundwater Sampling Field Log

AEM Project: Haley & Aldrich - Former Vulcan Site AEM Job No.: 1398-1401 Well No.: MW-21

Sampling Personnel: Tony Gordon, [✓ Chad Crumbley] Date: 4-8-2014

Comments: P. Cloudy / Mild - Slight breeze Time In: 1615 Time Out: 1905

## Well Information

Well Diameter: 2.0 inches Reference Point Marked: [✓ Yes] No

Depth to Water: 4.33 feet below T.O.C. Well Depth: 14.05' feet below T.O.C.

0.04 gal/ft in 1-inch-ID well
[✓ 0.16 gal/ft in 2-inch-ID well]
0.65 gal/ft in 4-inch-ID well

## Purging Information

Water Column: 9.72 ft

1 Well Volume= 1.56 gal

3 Well Volume= 4.67 gal

Total Purged: 4.75 gal

Well Purge Dry (?): yes [✓ no]

Purge Method (check): [✓ Low Flow-Low Stress] Micro-purge

Purge Start Time: 1622

Purge End Time: 1845

Total Time: 143 min

Purge Rate: .03 gpm

### Purging Equipment and Calibration Information

Bailer: ☐ Teflon ☐ Poly. Pump: ☐ Grundfos ☒ Peri. ID# P-6

Pump Tubing Type: ☐ Teflon ☒ Teflon-Lined Poly. ☐ Polyethylene

Meter(s) Used: ☐ Hanna 991300 ☒ YSI 556 ☐ Lamotte 2020 ID#'s 12

Calibration Date/Time: 4-8-2014 (1341)

Comments:

## Groundwater Field Parameters

| Time | Gallons Purged | Temp. Deg. Cel | Cond. µS/cm | pH SU | Dissolved Oxygen mg/L | ORP mV | Turbidity NTUs | Water Level ft. from TOC |
|---|---|---|---|---|---|---|---|---|
| 1653 | 1.0 | 17.24 | 335 | 7.29 | 3.04 | 196.9 | 34.4 | 4.52 |
| 1723 | 2.0 | 15.54 | 349 | 6.46 | 2.82 | 198.6 | 19.70 | 4.52 |
| 1746 | 3.0 | 15.43 | 386 | 6.44 | 1.63 | 188.7 | 15.30 | 4.52 |
| 1809 | 3.5 | 15.46 | 459 | 6.46 | 1.17 | 192.2 | 13.90 | 4.52 |
| 1819 | 4.0 | 15.40 | 460 | 6.48 | 1.08 | 195.8 | 11.36 | 4.52 |
| 1837 | 4.75 | 15.43 | 462 | 6.52 | .76 | 198.6 | 10.10 | 4.52 |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
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| | | | | | | | | |
| | | | | | | | | |
| Stabilization Info: | | +/- 0.5 deg. | +/- 5% | +/- 0.1 SU | +/- 10% | +/- 10% | <10 NTUs | ----- |

## Sample Collection Parameters

Sample Collection Method (check all): Bailer Straw Method [✓ Pump Tubing] Vacuum Jug Other

Final Tubing/Pump Depth: ~4.70 feet below T.O.C

Final Groundwater Depth(if applic.) 4.52 feet below T.O.C

Final Sample Turbidity: ~~4.52~~ 10 NTUs 7.17 NTU

Ferrous Iron Concentration (if sampled): — NA mg/L

Comments:

## Laboratory Analytical Information

| Sample ID | Analysis | Container | Qty. | Preservative | Time Sampled |
|---|---|---|---|---|---|
| MW-21 | Total Lead (6010B) | 250 mL HDPE | 1 | $HNO_3$ | 1845 |
| | | | | | |

Sample Laboratory (circle): ACL/Xenco/[✓ AES]/Other

Delivery Method: [✓ Hand Delivery]/Fed-Ex/UPS/Other

**Field Personnel Signature:**

# AEM Groundwater Sampling Field Log

AEM Project: Haley & Aldrich - Former Vulcan Site AEM Job No.: 1398-1401
Well No.: MW-23
Sampling Personnel: [✓ Tony Gordon], Chad Crumbley
Date: 4/8/2014
Comments:
Time In: 1400 Time Out: 1620

## Well Information

Well Diameter: 2.0 inches
Reference Point Marked: [✓ Yes] No
Depth to Water: 5.10 feet below T.O.C.
Well Depth: 19.00 feet below T.O.C.

| |
|---|
| 0.04 gal/ft in 1-inch-ID well |
| 0.16 gal/ft in 2-inch-ID well |
| 0.65 gal/ft in 4-inch-ID well |

## Purging Information

Purge Method (check): [✓ Low Flow-Low Stress] Micro-purge

Water Column: 13.90 ft
1 Well Volume= 2.2 gal
3 Well Volume= 6.6 gal
Total Purged: 7.0 gal
Well Purge Dry (?): yes/[✓ no]

Purge Start Time: 1423
Purge End Time: 1612
Total Time: 109 min
Purge Rate: 0.06 gpm

### Purging Equipment and Calibration Information

Bailer: ☐ Teflon ☐ Poly. Pump: ☐ Grundfos ☒ Peri. ID# P-7 [illegible]
Pump Tubing Type: ☐ Teflon ☒ Teflon-Lined Poly. ☐ Polyethylene
Meter(s) Used: ☐ Hanna 991300 ☒ YSI 556 ☐ Lamotte 2020 ID#'s Rental
Calibration Date/Time: 1350 4/8/2014
Comments: clear purge water, no odor

## Groundwater Field Parameters

| Time | Gallons Purged | Temp. Deg. Cel | Cond. µS/cm | pH SU | Dissolved Oxygen mg/L | ORP mV | Turbidity NTUs | Water Level ft. from TOC |
|---|---|---|---|---|---|---|---|---|
| 1458 | 2.0 | 13.68° | 978 | 6.81 | 2.28 | 77.2 | 3.97 | 9.81 |
| 1512 | 3.0 | 14.40° | 978 | 6.83 | 1.54 | 66.6 | 3.86 | 10.27 |
| 1529 | 4.0 | 14.32° | 977 | 6.83 | 1.05 | 59.4 | 3.30 | 10.98 |
| 1543 | 5.0 | 14.39° | 979 | 6.84 | 0.32 | 51.8 | 2.43 | 11.50 |
| 1549 | 5.5 | 14.63° | 972 | 6.85 | 0.78 | 48.3 | 2.39 | 11.83 |
| 1556 | 6.0 | 14.45° | 969 | 6.82 | 0.69 | 48.1 | 2.13 | 12.03 |
| 1604 | 6.5 | 14.59° | 968 | 6.83 | 0.63 | 49.3 | 2.10 | 12.22 |
| 1612 | 7.0 | 14.68° | 966 | 6.82 | 0.64 | 50.2 | 1.79 | 12.30 |
| Stabilization Info: | | +/- 0.5 deg. | +/- 5% | +/- 0.1 SU | +/- 10% | +/- 10% | <10 NTUs | ----- |

## Sample Collection Parameters

Sample Collection Method (check all): Bailer Straw Method [✓ Pump Tubing] Vacuum Jug Other
Final Tubing/Pump Depth: 12.5 feet below T.O.C
Final Groundwater Depth(if applic.) 12.22 feet below T.O.C
Final Sample Turbidity: 1.79 NTUs (2.22 after sample)
Ferrous Iron Concentration (if sampled): NA mg/L
Comments:

## Laboratory Analytical Information

| Sample ID | Analysis | Container | Qty. | Preservative | Time Sampled |
|---|---|---|---|---|---|
| MW-23 | Total Lead (6010B) | 250 mL HDPE | 1 | $HNO_3$ | 1615 |

Sample Laboratory (circle): ACL/Xenco/[✓ AES]/Other
Delivery Method: [✓ Hand Delivery]/Fed-Ex/UPS/Other

**Field Personnel Signature:** Tony J Gordon

# April 2014 Semi-Annual
# Groundwater Level Measurements
# Former Vulcan Plant - Dalton, Ga

| Estimated Time | Recorded Date | Well Number | Aquifer Zone | Apr-14 DTW[1] | Apr-14 DTB[2] | Lead (Method 6010B) |
|---|---|---|---|---|---|---|
| 1205 | 4/8/2014 | MW-4 | Residuum | 1.48 | 15.10 | |
| 1128 | 4/8/2014 | MW-5 | Residuum | 5.40 | 18.42 | |
| 1257 | 4/8/2014 | MW-6 | Residuum | 1.94 | 15.26 | |
| 1232 | 4/8/2014 | MW-7 | Residuum | 4.06 | 15.73 | |
| 1235 | 4/8/2014 | MW-8 | Residuum | 3.65 | 14.70 | |
| 1135 | 4/8/2014 | MW-13 | Residuum | 2.23 | 11.10 | |
| 1158 | 4/8/2014 | MW-14 | Residuum | 2.96 | 15.06 | |
| 1210 | 4/8/2014 | MW-15 | Residuum | 4.30 | 14.57 | |
| 1252 | 4/8/2014 | MW-16 | Residuum | 1.69 | 15.09 | |
| 1221 | 4/8/2014 | MW-17 | Residuum | 3.89 | 14.95 | |
| 1228 | 4/8/2014 | MW-18 | Residuum | 3.65 | 15.15 | |
| 1218 | 4/8/2014 | **MW-19** | Residuum | 3.41 | 15.25 | X |
| 1245 | 4/8/2014 | MW-20 | Residuum | 2.88 | 14.44 | |
| 1123 | 4/8/2014 | **MW-21** | Residuum | 4.53 | 14.05 | X |
| 1120 | 4/8/2014 | MW-22D | Residuum | 4.74 | 36.81 | |
| 1112 | 4/8/2014 | **MW-23** | Residuum | 5.10 | 19.00 | X |
| 1150 | 4/8/2014 | TMW-19 | Residuum | 4.70 | 15.25 | |
| 1155 | 4/8/2014 | TMW-20 | Residuum | 13.65 | 15.00 | |
| 1142 | 4/8/2014 | PZ-1 (1") | Residuum | 15.25 | 21.50 | |

[1] - Depth to Water (DTW) measured in feet from Top of Casing (TOC)

[2] - Depth to Bottom (DTB) measured in feet from Top of Casing

🟨 - Well Sampled

# Vulcan
# Dalton, GA

| Meter | Date | Time | pH | | | Conductivity (µS/cm) | | | ORP | | D.O. (mg/L) / % | | Turbidity (NTU) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| YSI #12 | 4/8/14 | 1341 | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | 7.27 | 7.00 | 1413 | Temperature 22.20 | | Temperature 22.20 | | Barometric Pressure | | ~~8.68~~ [illegible] | ~~10.2~~ [illegible] |
| | | | 4 | 3.99 | 3.99 | | 1,313 | 1,413 | 226.3 | 240.1 | 96.9% | 101% | | |
| | | | 10 | — | — | | | | | | | | | |
| Lamotte # 5 | 4/8/14 | 1341 | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | — | — | 1413 | Temperature — | | Temperature — | | Barometric Pressure — | | 8.68 | 10.2 |
| | | | 4 | — | — | | — | — | — | — | — | — | | |
| | | | 10 | — | — | | | | | | | | | |
| YSI Rental | 4/8/14 | 1150 | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | 6.98 | 7.01 | 1413 | Temperature 18.56° | | Temperature 18.56°C | | Barometric Pressure 760.07 mmHg | | — | — |
| | | | 4 | 3.69 | 4.00 | | 1,408 | 1,413 | 238.6 | 240.0 | 106.9% | 100.0% | | |
| | | | 10 | — | — | | | | | | | | | |
| ~~[illegible]~~ Lamotte #7 | 4/8/14 | 1150 | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | — | — | 1413 | Temperature — | | Temperature — | | Barometric Pressure — | | 9.27 | 9.98 |
| | | | 4 | — | — | | — | — | — | — | — | — | | |
| | | | 10 | — | — | | | | | | | | | |
| | | | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | | | 1413 | Temperature | | Temperature | | Barometric Pressure | | | |
| | | | 4 | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | |
| | | | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | | | 1413 | Temperature | | Temperature | | Barometric Pressure | | | |
| | | | 4 | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | |
| | | | | Before | After | | Before | After | Before | After | Before | After | Before | After |
| | | | 7 | | | 1413 | Temperature | | Temperature | | Barometric Pressure | | | |
| | | | 4 | | | | | | | | | | | |
| | | | 10 | | | | | | | | | | | |

| Standard | Lot Number | Expiration |
|---|---|---|
| pH 7 | 23066880 / 2208038 | Jun-15 / 7/14 |
| pH 4 | 2301425 / 2210176 | Dec-14 / 9/14 |
| Conductivity | 10520 / 10526 | 16-Aug-14 |
| ORP | ~~NA~~/ 4917 | ~~NA~~ 8/17 |
| Turbidity | NA | NA |

| ORP Calibration Chart | |
|---|---|
| Temp °C | Value, mV |
| 10 | 250.5 |
| 15 | 244.0 |
| 20 | 237.5 |
| 25 | 231.0 |
| 30 | 224.5 |
| 35 | 218.0 |

Notes:

| Designation | Meters | Serial # |
|---|---|---|
| 1 | Hanna HI 991300 | |
| 2 | LaMotte 2020e | ME 11876 |
| 3 | Hanna HI 991300 | |

| Designation | Meters | Serial # |
|---|---|---|
| 4 | YSI 556 MPS | 06L1239AN |
| 5 | LaMotte 2020 | 5377-4004 |
| 6 | Hydac | 9700142667 |

| Designation | Meters | Serial # |
|---|---|---|
| 7 | LaMotte 2020we | 185-3710 |
| 8 | Hanna HI 991300 | |
| 9 | Hanna HI 991300 | 8257290 |

Field Personnel Signature

# APPENDIX C

## Laboratory Analytical Reports

## (April 2014)

AES

ANALYTICAL ENVIRONMENTAL SERVICES, INC.

April 16, 2014

Daniel McDonnell
Haley & Aldrich
501 River Street, Suite 100
Greenville SC 29601

TEL: (864) 214-8754
FAX:

RE: Former Vulcan Materials (Dalton, GA)

Dear Daniel McDonnell: Order No: 1404902

Analytical Environmental Services, Inc. received 4 samples on 4/9/2014 8:10:00 AM for the analyses presented in following report.

No problems were encountered during the analyses. Additionally, all results for the associated Quality Control samples were within EPA and/or AES established limits. Any discrepancies associated with the analyses contained herein will be noted and submitted in the form of a project Case Narrative.

AES' certifications are as follows:

-NELAC/Florida Certification number E87582 for analysis of Environmental Water, soil/hazardous waste, and Drinking Water Microbiology, effective 07/01/13-06/30/14.

-AIHA-LAP, LLC Laboratory ID: 100671 for Industrial Hygiene samples (Organics, Inorganics), Environmental Lead (Paint, Soil, Dust Wipes, Air), and Environmental Microbiology (Fungal) effective until 09/01/15.

These results relate only to the items tested. This report may only be reproduced in full.

If you have any questions regarding these test results, please feel free to call.

CKanhai

Chantelle Kanhai

Project Manager

3080 Presidential Drive • Atlanta, Georgia 30340 • Tel: 770.457.8177 • Fax: 770.457.8188 • Toll Free: 800.972.4889
www.aesatlanta.com

ANALYTICAL ENVIRONMENTAL SERVICES, INC
3785 Presidential Parkway, Atlanta GA 30340-3704
AES TEL.: (770) 457-8177 / TOLL-FREE (800) 972-4889 / FAX: (770) 457-8188

# CHAIN OF CUSTODY

Work Order: 1404902
Date: 4/ /14 Page 1 of 1

COMPANY: Haley & Aldrich. Inc
Attn: Daniel McDonnell

ADDRESS: 501 River street, Suite 100
Greenville, South Carolina
29601

PHONE: (864) 214-8754

~~FAX:~~ dmcdonnell@HaleyAldrich.com

SAMPLED BY: T. Gordon / C. Crumbley (AEM)

SIGNATURE: Tony J Gordon

**Visit our website www.aesatlanta.com to check on the status of your results, place bottle orders, etc.**

| # | SAMPLE ID | SAMPLED DATE | SAMPLED TIME | Grab | Composite | Matrix (See codes) | ANALYSIS REQUESTED: Total Pb (6010B)<br>PRESERVATION (See codes): N | REMARKS | No # of Containers |
|---|---|---|---|---|---|---|---|---|---|
| 1 | MW-23 | 4/8/14 | 1615 | X | | GW | X | | 1 |
| 2 | MW-21 | 4/8/14 | 1845 | X | | GW | X | | 1 |
| 3 | MW-19 Dup | 4/8/14 | 1551 | X | | GW | X | | 1 |
| 4 | MW-19 | 4/8/14 | 1551 | X | | GW | X | | 1 |
| 5 | | | | | | | | | |
| 6 | (Temp Blank) | | | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |
| 10 | | | | | | | | | |
| 11 | | | | | | | | | |
| 12 | | | | | | | | | |
| 13 | | | | | | | | | |
| 14 | | | | | | | | | |

| RELINQUISHED BY | DATE/TIME | RECEIVED BY | DATE/TIME |
|---|---|---|---|
| 1: Tony J Gordon | 4/9/14 (0800) | 1: | 4/9/14 8:10 |
| 2: | | 2: | |
| 3: | | 3: | |

SPECIAL INSTRUCTIONS/COMMENTS:

SHIPMENT METHOD
OUT / / VIA:
IN / / VIA:
[✓ CLIENT] FedEx UPS MAIL COURIER
GREYHOUND OTHER ____

PROJECT INFORMATION
PROJECT NAME: Former Vulcan Materials (Dalton, Georgia)
PROJECT #: 1398-1401 (AEM)
SITE ADDRESS: 134 Phelps Road
Dalton, GA 30720
SEND REPORT TO: DAN McDonnell
INVOICE TO: Dan McDonnell
(IF DIFFERENT FROM ABOVE)
Haley & Aldrich, Inc
(See Above)
QUOTE #: PO#:

RECEIPT
Total # of Containers: 4

Turnaround Time Request
☑ Standard 5 Business Days
○ 2 Business Day Rush
○ Next Business Day Rush
○ Same Day Rush (auth req.)
○ Other ____

STATE PROGRAM (if any): HSRA
E-mail? [✓ Y] N; Fax? Y / N
DATA PACKAGE: I [✓ II] III IV

**SAMPLES RECEIVED AFTER 3PM OR ON SATURDAY ARE CONSIDERED RECEIVED THE NEXT BUSINESS DAY. IF TURNAROUND TIME IS NOT INDICATED, AES WILL PROCEED WITH STANDARD TAT OF SAMPLES. SAMPLES ARE DISPOSED 30 DAYS AFTER REPORT COMPLETION UNLESS OTHER ARRANGEMENTS ARE MADE.**

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) DW = Drinking Water (Blanks) O = Other (specify) WW = Waste Water
PRESERVATIVE CODES: H+I = Hydrochloric acid + ice I = Ice only N = Nitric acid S+I = Sulfuric acid + ice S/M+I = Sodium Bisulfate/Methanol + ice O = Other (specify) NA = None

White Copy - Original; Yellow Copy - Client

| | | | |
|---|---|---|---|
| **Client:** | Haley & Aldrich | **Client Sample ID:** | MW-23 |
| **Project Name:** | Former Vulcan Materials (Dalton, GA) | **Collection Date:** | 4/8/2014 4:15:00 PM |
| **Lab ID:** | 1404902-001 | **Matrix:** | Groundwater |

| Analyses | Result | Qual | MDL | Reporting Limit | Units | BatchID | DF | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **METALS, TOTAL SW6010C** | | | | **(SW3010A)** | | | | | |
| Lead | 0.0013 | J | 0.0009 | 0.0100 | mg/L | 189531 | 1 | 04/14/2014 20:04 | JL |

**Qualifiers:**

| | | | |
|---|---|---|---|
| * | Value exceeds maximum contaminant level | E | Estimated value above quantitation range |
| BRL | Not detected at MDL | S | Spike Recovery outside limits due to matrix |
| H | Holding times for preparation or analysis exceeded | J | Estimated value detected below Reporting Limit |
| N | Analyte not NELAC certified | > | Greater than Result value |
| B | Analyte detected in the associated method blank | < | Less than Result value |
| NC | Not confirmed | Narr | See case narrative |

| | | | |
|---|---|---|---|
| **Client:** | Haley & Aldrich | **Client Sample ID:** | MW-21 |
| **Project Name:** | Former Vulcan Materials (Dalton, GA) | **Collection Date:** | 4/8/2014 6:45:00 PM |
| **Lab ID:** | 1404902-002 | **Matrix:** | Groundwater |

| Analyses | Result | Qual | MDL | Reporting Limit | Units | BatchID | DF | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **METALS, TOTAL SW6010C** | | | | **(SW3010A)** | | | | | |
| Lead | 0.0048 | J | 0.0009 | 0.0100 | mg/L | 189531 | 1 | 04/14/2014 20:08 | JL |

| **Qualifiers:** | | | | |
|---|---|---|---|---|
| | * | Value exceeds maximum contaminant level | E | Estimated value above quantitation range |
| | BRL | Not detected at MDL | S | Spike Recovery outside limits due to matrix |
| | H | Holding times for preparation or analysis exceeded | J | Estimated value detected below Reporting Limit |
| | N | Analyte not NELAC certified | > | Greater than Result value |
| | B | Analyte detected in the associated method blank | < | Less than Result value |
| | NC | Not confirmed | Narr | See case narrative |

| | | | |
|---|---|---|---|
| **Client:** | Haley & Aldrich | **Client Sample ID:** | MW-19 DUP |
| **Project Name:** | Former Vulcan Materials (Dalton, GA) | **Collection Date:** | 4/8/2014 3:51:00 PM |
| **Lab ID:** | 1404902-003 | **Matrix:** | Groundwater |

| Analyses | Result | Qual | MDL | Reporting Limit | Units | BatchID | DF | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **METALS, TOTAL SW6010C** | | | | **(SW3010A)** | | | | | |
| Lead | BRL | | 0.0009 | 0.0100 | mg/L | 189531 | 1 | 04/14/2014 20:12 | JL |

**Qualifiers:**

| | | | |
|---|---|---|---|
| * | Value exceeds maximum contaminant level | E | Estimated value above quantitation range |
| BRL | Not detected at MDL | S | Spike Recovery outside limits due to matrix |
| H | Holding times for preparation or analysis exceeded | J | Estimated value detected below Reporting Limit |
| N | Analyte not NELAC certified | > | Greater than Result value |
| B | Analyte detected in the associated method blank | < | Less than Result value |
| NC | Not confirmed | Narr | See case narrative |

| | | | |
|---|---|---|---|
| **Client:** | Haley & Aldrich | **Client Sample ID:** | MW-19 |
| **Project Name:** | Former Vulcan Materials (Dalton, GA) | **Collection Date:** | 4/8/2014 3:51:00 PM |
| **Lab ID:** | 1404902-004 | **Matrix:** | Groundwater |

| Analyses | Result | Qual | MDL | Reporting Limit | Units | BatchID | DF | Date Analyzed | Analyst |
|---|---|---|---|---|---|---|---|---|---|
| **METALS, TOTAL SW6010C** | | | | **(SW3010A)** | | | | | |
| Lead | 0.0010 | J | 0.0009 | 0.0100 | mg/L | 189531 | 1 | 04/14/2014 20:15 | JL |

**Qualifiers:**

| | | | |
|---|---|---|---|
| * | Value exceeds maximum contaminant level | E | Estimated value above quantitation range |
| BRL | Not detected at MDL | S | Spike Recovery outside limits due to matrix |
| H | Holding times for preparation or analysis exceeded | J | Estimated value detected below Reporting Limit |
| N | Analyte not NELAC certified | > | Greater than Result value |
| B | Analyte detected in the associated method blank | < | Less than Result value |
| NC | Not confirmed | Narr | See case narrative |

**Analytical Environmental Services, Inc.**

## Sample/Cooler Receipt Checklist

Client HALEY & ALDRICH, INC — Work Order Number 1404902

Checklist completed by 4/9/14
Signature — Date

Carrier name: FedEx __ UPS __ Courier __ Client ✓ US Mail __ Other ____

Shipping container/cooler in good condition? Yes ✓ No __ Not Present __

Custody seals intact on shipping container/cooler? Yes __ No __ Not Present ✓

Custody seals intact on sample bottles? Yes __ No __ Not Present ✓

Container/Temp Blank temperature in compliance? (4°C±2)* Yes ✓ No __

Cooler #1 4.0 Cooler #2 ____ Cooler #3 ____ Cooler #4 ____ Cooler#5 ____ Cooler #6 ____

Chain of custody present? Yes ✓ No __

Chain of custody signed when relinquished and received? Yes ✓ No __

Chain of custody agrees with sample labels? Yes ✓ No __

Samples in proper container/bottle? Yes ✓ No __

Sample containers intact? Yes ✓ No __

Sufficient sample volume for indicated test? Yes ✓ No __

All samples received within holding time? Yes ✓ No __

Was TAT marked on the COC? Yes ✓ No __

Proceed with Standard TAT as per project history? Yes __ No __ Not Applicable ✓

Water - VOA vials have zero headspace? No VOA vials submitted ✓ Yes __ No __

Water - pH acceptable upon receipt? Yes ✓ No __ Not Applicable __

Adjusted? ________ Checked by ________

Sample Condition: Good ✓ Other(Explain) ________

(For diffusive samples or AIHA lead) Is a known blank included? Yes __ No ✓

**See Case Narrative for resolution of the Non-Conformance.**

* Samples do not have to comply with the given range for certain parameters.

\L\Quality Assurance\Checklists Procedures Sign-Off Templates\Checklists\Sample Receipt Checklists\Sample_Cooler_Receipt_Checklist

**Client:** Haley & Aldrich
**Project Name:** Former Vulcan Materials (Dalton, GA)
**Workorder:** 1404902

# ANALYTICAL QC SUMMARY REPORT

**BatchID:** **189531**

Sample ID: **MB-189531** Client ID: Units: **mg/L** Prep Date: **04/11/2014** Run No: **265540**
SampleType: **MBLK** TestCode: **METALS, TOTAL SW6010C** BatchID: **189531** Analysis Date: **04/14/2014** Seq No: **5594779**

| Analyte | Result | RPT Limit | SPK value | SPK Ref Val | %REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | BRL | 0.0100 | | | | | | | | | |

Sample ID: **LCS-189531** Client ID: Units: **mg/L** Prep Date: **04/11/2014** Run No: **265540**
SampleType: **LCS** TestCode: **METALS, TOTAL SW6010C** BatchID: **189531** Analysis Date: **04/14/2014** Seq No: **5594778**

| Analyte | Result | RPT Limit | SPK value | SPK Ref Val | %REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 0.9866 | 0.0100 | 1.000 | | 98.7 | 80 | 120 | | | | |

Sample ID: **1404509-009BMS** Client ID: Units: **mg/L** Prep Date: **04/11/2014** Run No: **265540**
SampleType: **MS** TestCode: **METALS, TOTAL SW6010C** BatchID: **189531** Analysis Date: **04/14/2014** Seq No: **5594782**

| Analyte | Result | RPT Limit | SPK value | SPK Ref Val | %REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 1.001 | 0.0100 | 1.000 | | 100 | 75 | 125 | | | | |

Sample ID: **1404509-009BMSD** Client ID: Units: **mg/L** Prep Date: **04/11/2014** Run No: **265540**
SampleType: **MSD** TestCode: **METALS, TOTAL SW6010C** BatchID: **189531** Analysis Date: **04/14/2014** Seq No: **5594787**

| Analyte | Result | RPT Limit | SPK value | SPK Ref Val | %REC | Low Limit | High Limit | RPD Ref Val | %RPD | RPD Limit | Qual |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Lead | 0.9865 | 0.0100 | 1.000 | | 98.7 | 75 | 125 | 1.001 | 1.45 | 20 | |

**Qualifiers:**

| | | | | | |
|---|---|---|---|---|---|
| > | Greater than Result value | < | Less than Result value | B | Analyte detected in the associated method blank |
| BRL | Below reporting limit | E | Estimated (value above quantitation range) | H | Holding times for preparation or analysis exceeded |
| J | Estimated value detected below Reporting Limit | N | Analyte not NELAC certified | R | RPD outside limits due to matrix |
| Rpt Lim | Reporting Limit | S | Spike Recovery outside limits due to matrix | | |